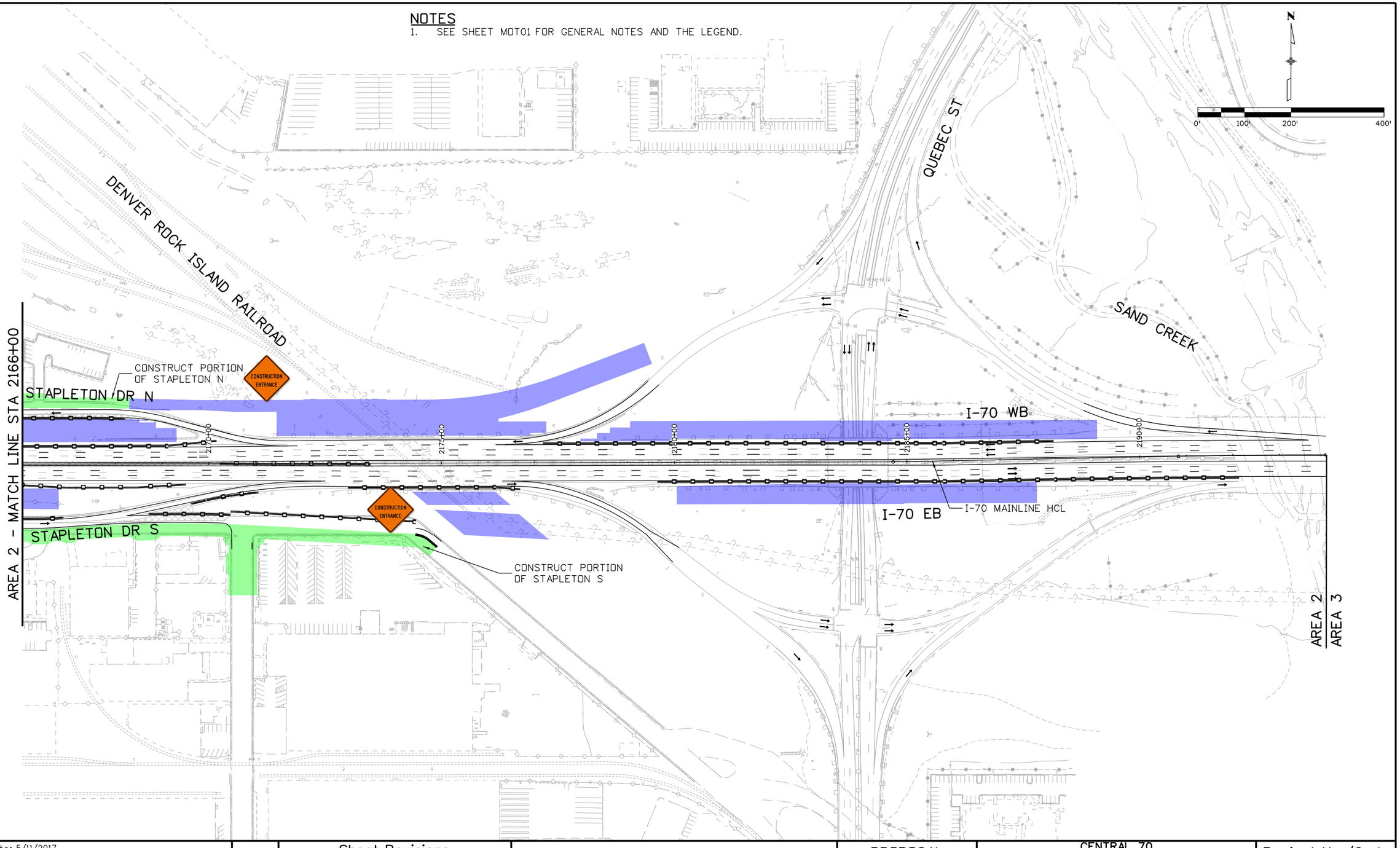
NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.



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Print Date: 5/11/2017			
File Name: See sheet edge for information			
Front Range Mobility Group	Horiz. Scale: As Noted		
	Vert. Scale: As Noted		
	Unit Information		
	Unit Leader		

Sheet Revisions

Date:	Comments	Init.

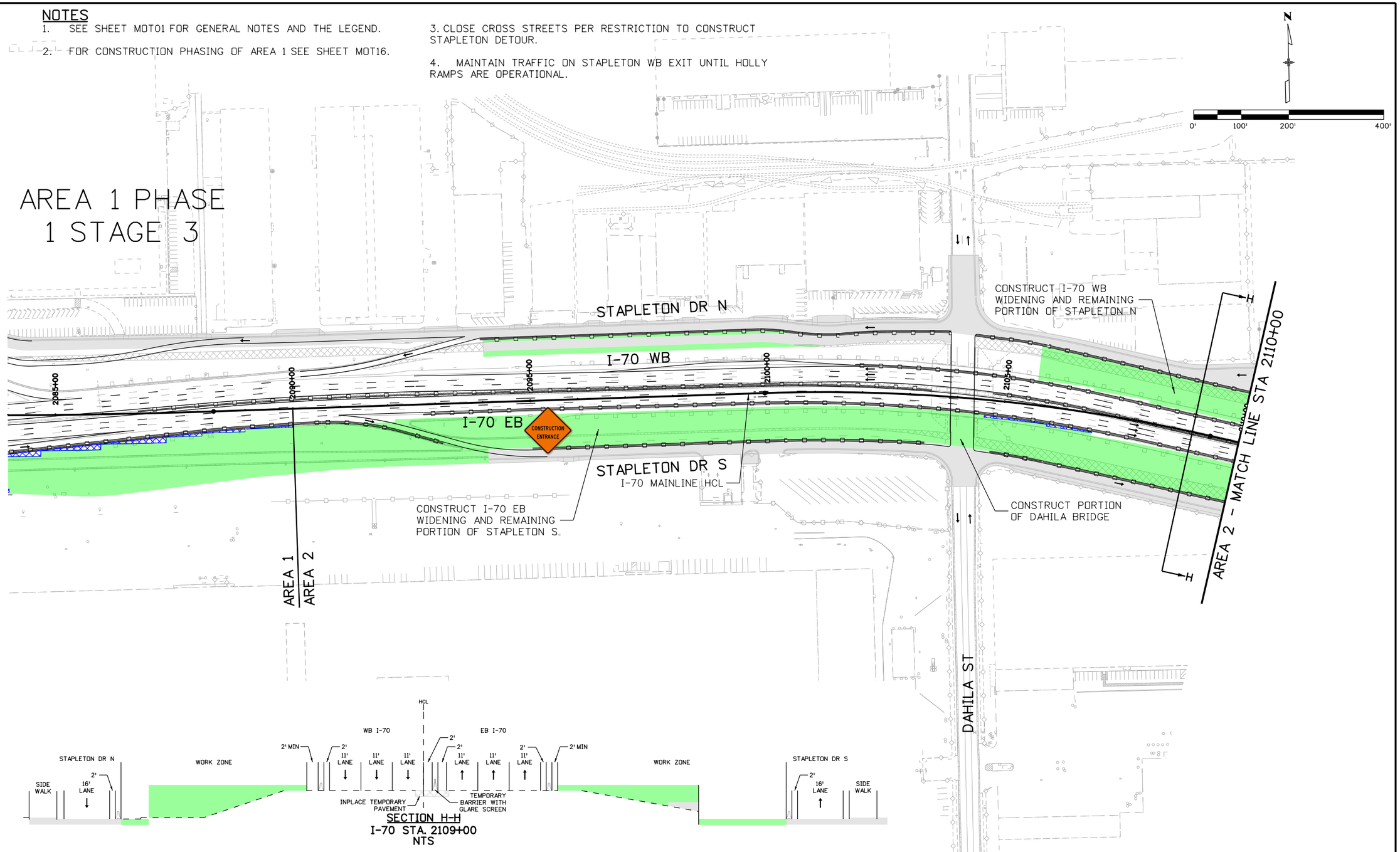
Colorado Department of Transportation
2000 South Holly Street
Denver, CO 80222
Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 2 PHASE 1 STAGE 2			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 51 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. FOR CONSTRUCTION PHASING OF AREA 1 SEE SHEET MOT16.
3. CLOSE CROSS STREETS PER RESTRICTION TO CONSTRUCT STAPLETON DETOUR.
4. MAINTAIN TRAFFIC ON STAPLETON WB EXIT UNTIL HOLLY RAMPS ARE OPERATIONAL.

AREA 1 PHASE 1 STAGE 3



SECTION H-H
I-70 STA. 2109+00
NTS

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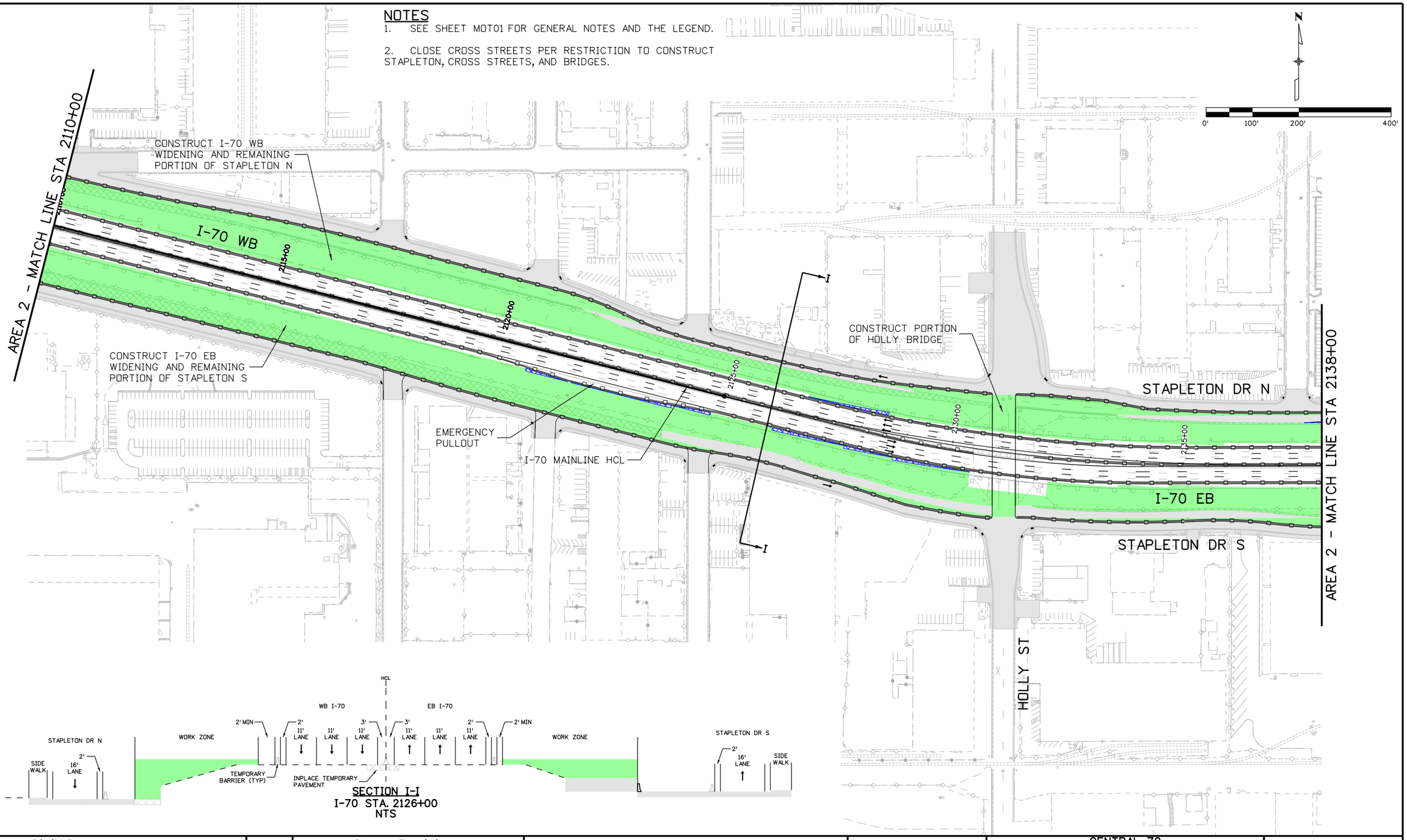
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 2 PHASE 1 STAGE 3			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 52 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CLOSE CROSS STREETS PER RESTRICTION TO CONSTRUCT STAPLETON, CROSS STREETS, AND BRIDGES.



SECTION I-I
I-70 STA. 2126+00
NTS

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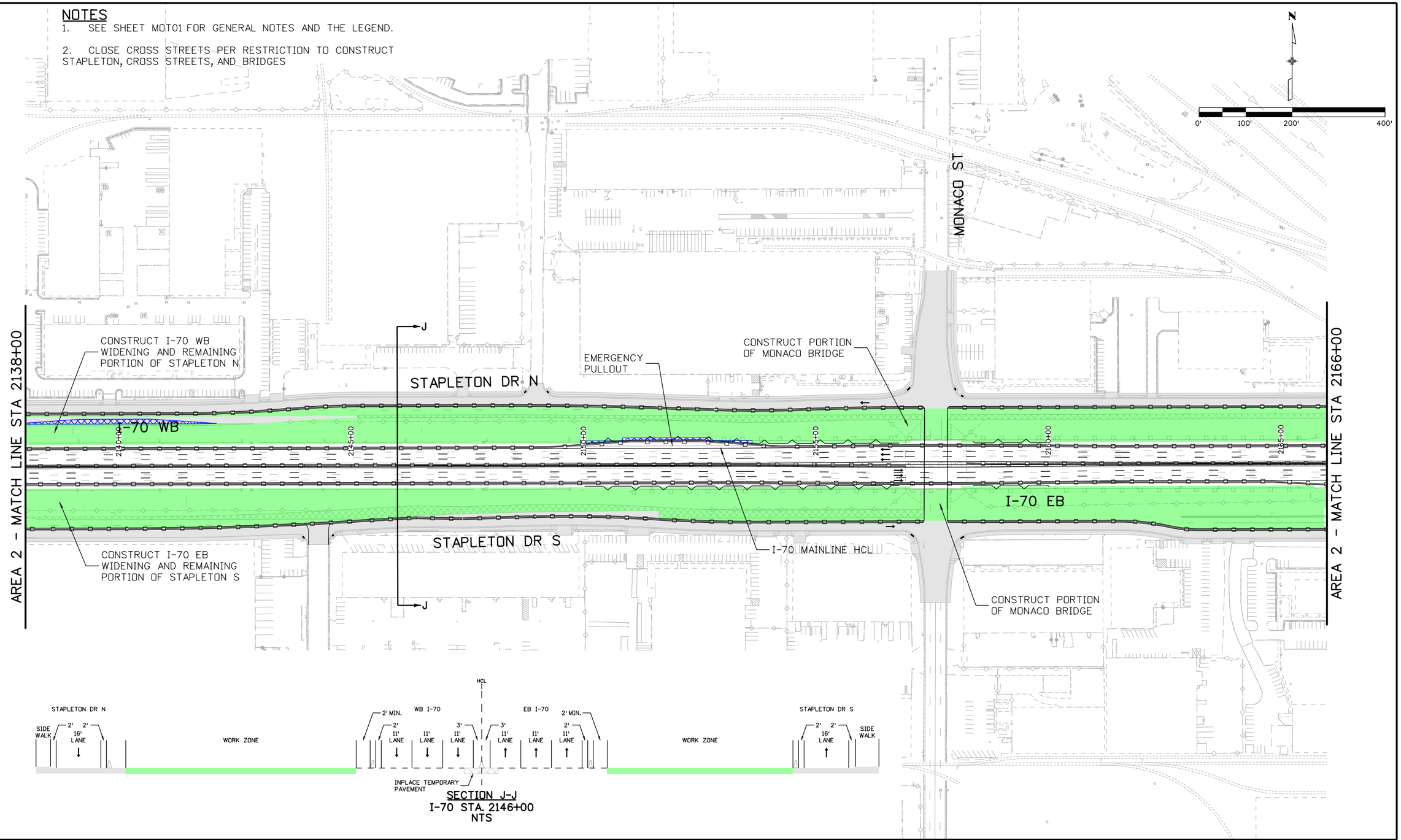
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 2 PHASE 1 STAGE 3			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 53 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CLOSE CROSS STREETS PER RESTRICTION TO CONSTRUCT STAPLETON, CROSS STREETS, AND BRIDGES



SECTION J-J
I-70 STA. 2146+00
NTS

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Print Date: 5/11/2017
File Name: See sheet edge for information
Horiz. Scale: As Noted
Vert. Scale: As Noted
Unit Information
Unit Leader

Front Range Mobility Group

Sheet Revisions		
Date:	Comments	Init.

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Region 1 KJS

PROPOSAL
No Revisions:
Revised:
Void:

CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 2
PHASE 1 STAGE 3

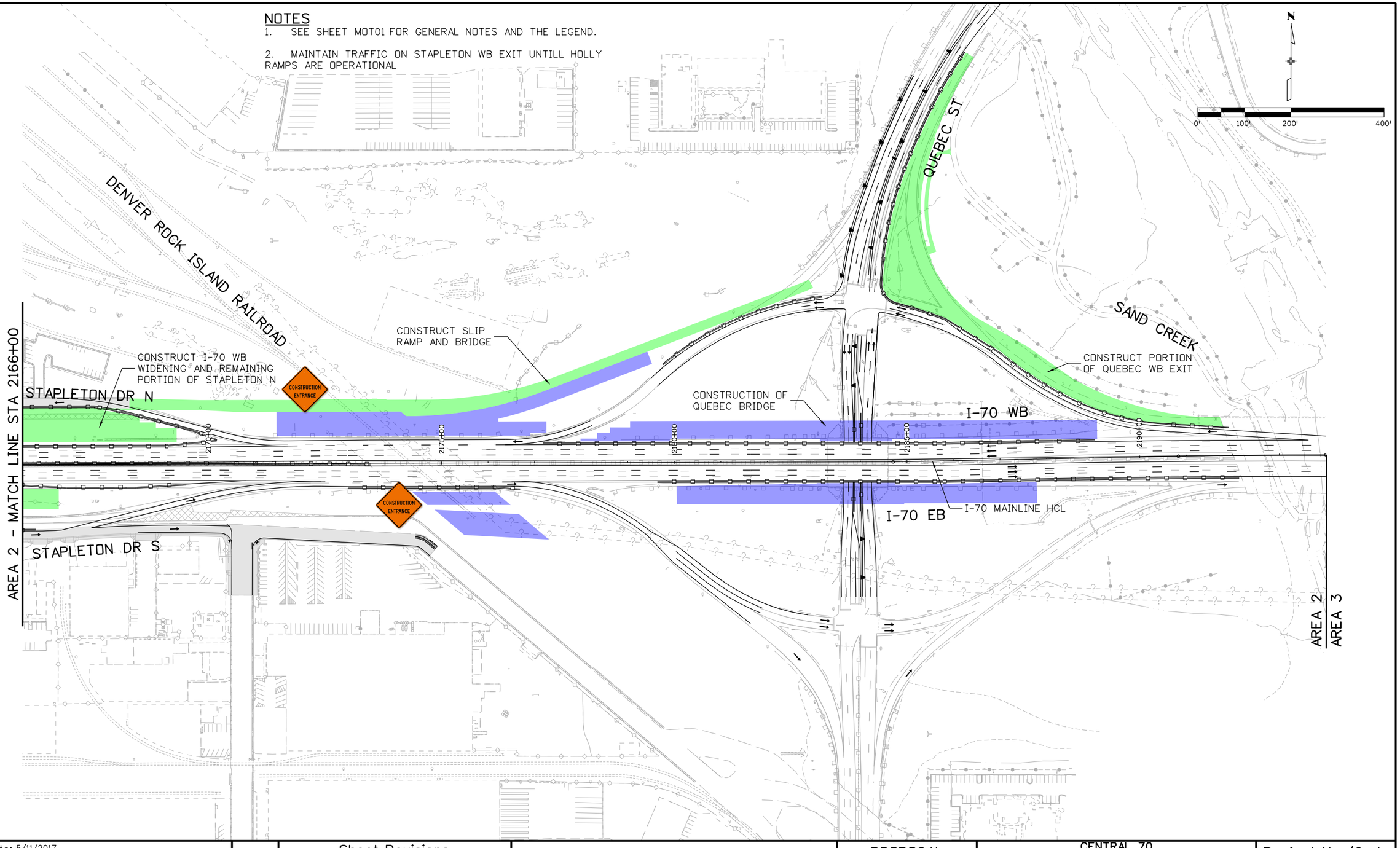
Designer: R. MITRY
Detailer: C. SNYDER
Sheet Subset: MOT
Structure Numbers:
Subset Sheets: 54 of 83

Project No./Code
FBR 0704-234
19631
Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. MAINTAIN TRAFFIC ON STAPLETON WB EXIT UNTILL HOLLY RAMPS ARE OPERATIONAL



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Print Date: 5/11/2017
File Name: See sheet edge for information

Front Range Mobility Group

Horiz. Scale:	As Noted
Vert. Scale:	As Noted
Unit Information	
Unit Leader	

Sheet Revisions		
Date:	Comments	Init.

Colorado Department of Transportation
2000 South Holly Street
Denver, CO 80222
Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PROPOSAL

No Revisions:

Revised:

Void:

CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 2
PHASE 1 STAGE 3

Designer:	R. MITRY	Structure Numbers	
Detailer:	C. SNYDER		
Sheet Subset:	MOT	Subset Sheets:	55 of 83

Project No./Code

FBR 0704-234

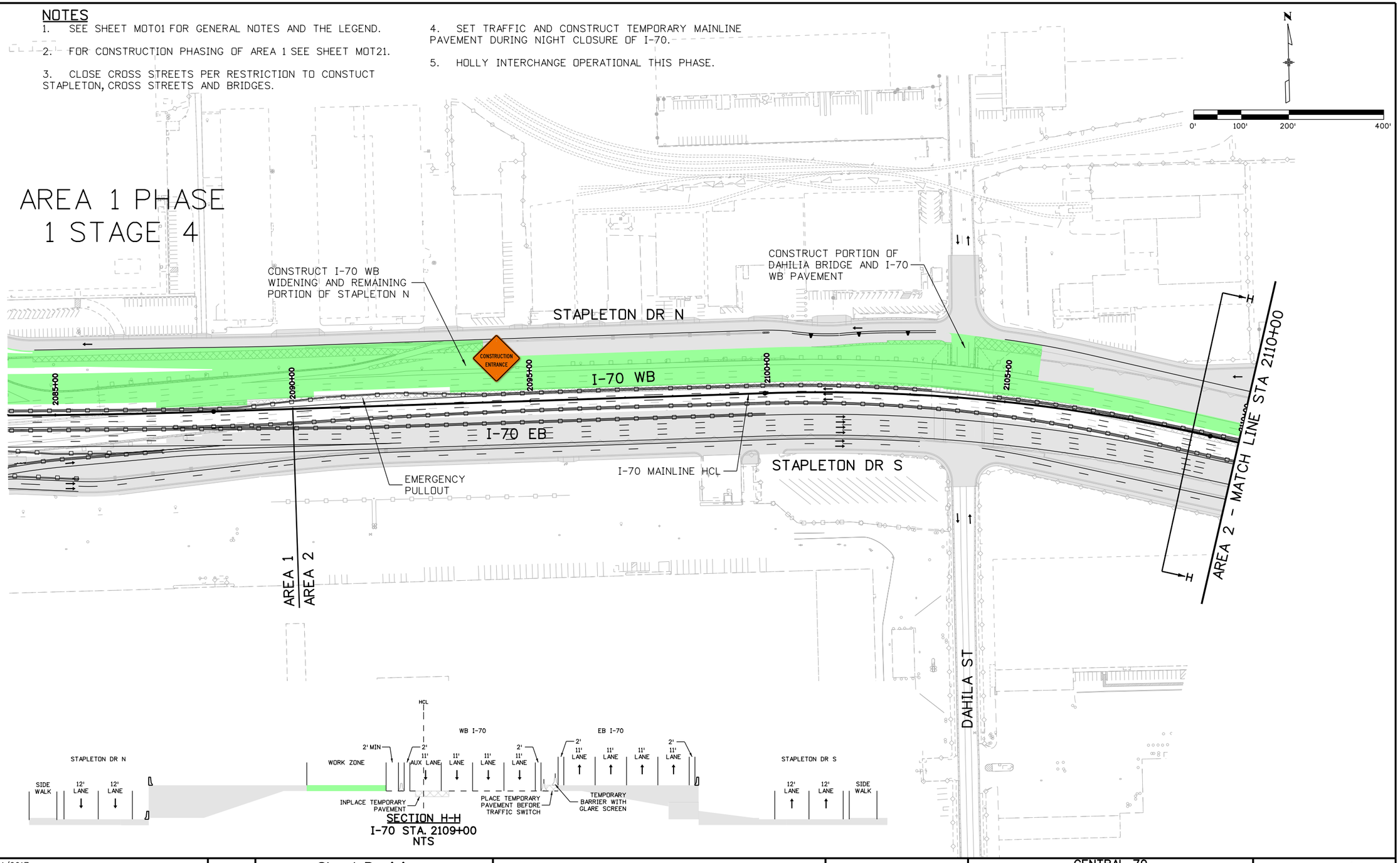
19631

Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. FOR CONSTRUCTION PHASING OF AREA 1 SEE SHEET MOT21.
3. CLOSE CROSS STREETS PER RESTRICTION TO CONSTUCT STAPLETON, CROSS STREETS AND BRIDGES.
4. SET TRAFFIC AND CONSTRUCT TEMPORARY MAINLINE PAVEMENT DURING NIGHT CLOSURE OF I-70.
5. HOLLY INTERCHANGE OPERATIONAL THIS PHASE.

AREA 1 PHASE 1 STAGE 4



SECTION H-H
I-70 STA. 2109+00
NTS

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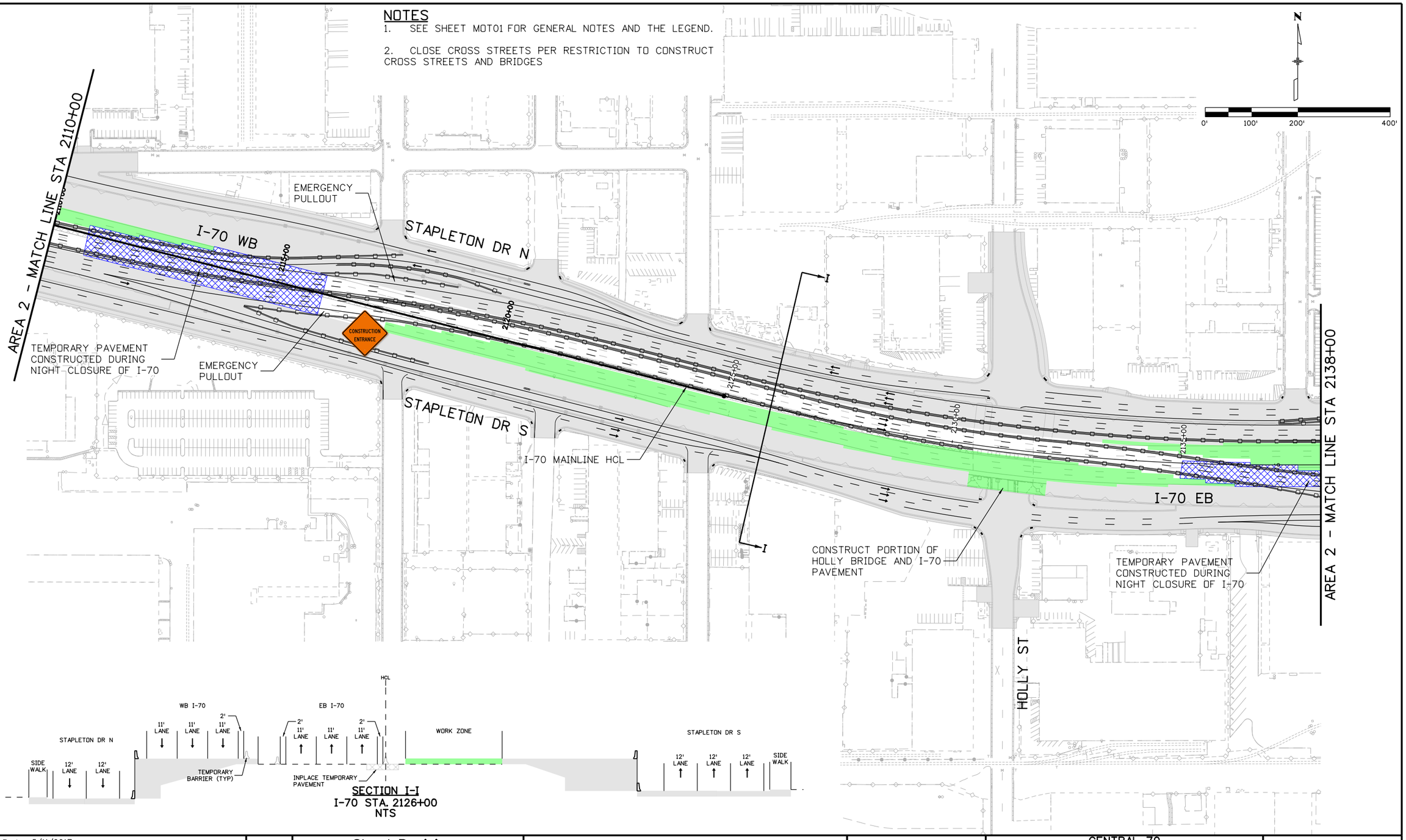
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 2 PHASE 2 STAGE 1			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 56 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CLOSE CROSS STREETS PER RESTRICTION TO CONSTRUCT CROSS STREETS AND BRIDGES



SECTION I-I
I-70 STA. 2126+00
NTS

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Print Date: 5/11/2017
File Name: See sheet edge for information

Front Range Mobility Group

Horiz. Scale:	As Noted
Vert. Scale:	As Noted
Unit Information	
Unit Leader	

Sheet Revisions		
Date:	Comments	Init.

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Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PROPOSAL
No Revisions:
Revised:
Void:

CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 2
PHASE 2 STAGE 1

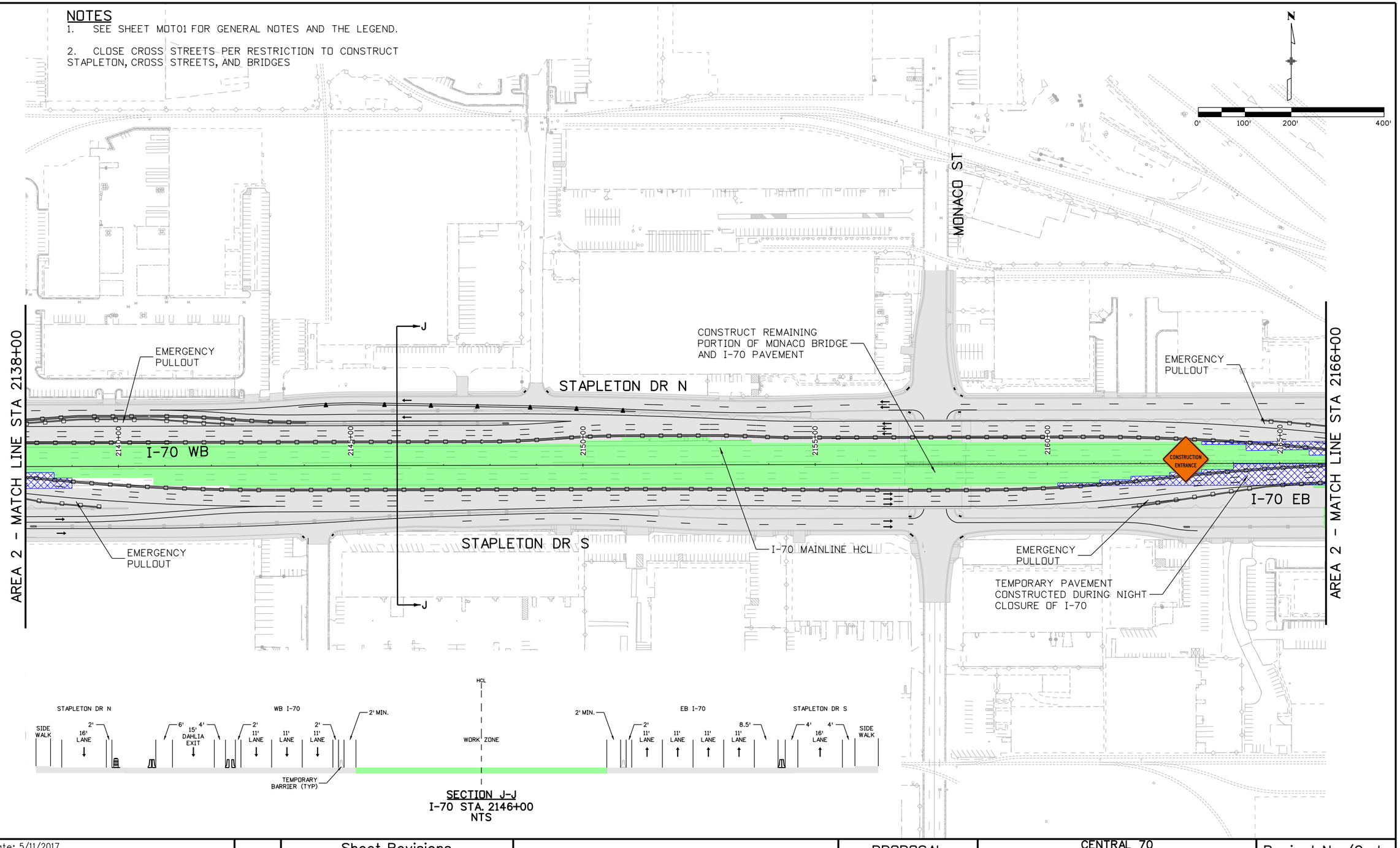
Designer:	R. MITRY	Structure Numbers	
Detailer:	C. SNYDER		
Sheet Subset:	MOT	Subset Sheets:	57 of 83

Project No./Code
FBR 0704-234
19631
Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CLOSE CROSS STREETS PER RESTRICTION TO CONSTRUCT STAPLETON, CROSS STREETS, AND BRIDGES



SECTION J-J
I-70 STA. 2146+00
NTS

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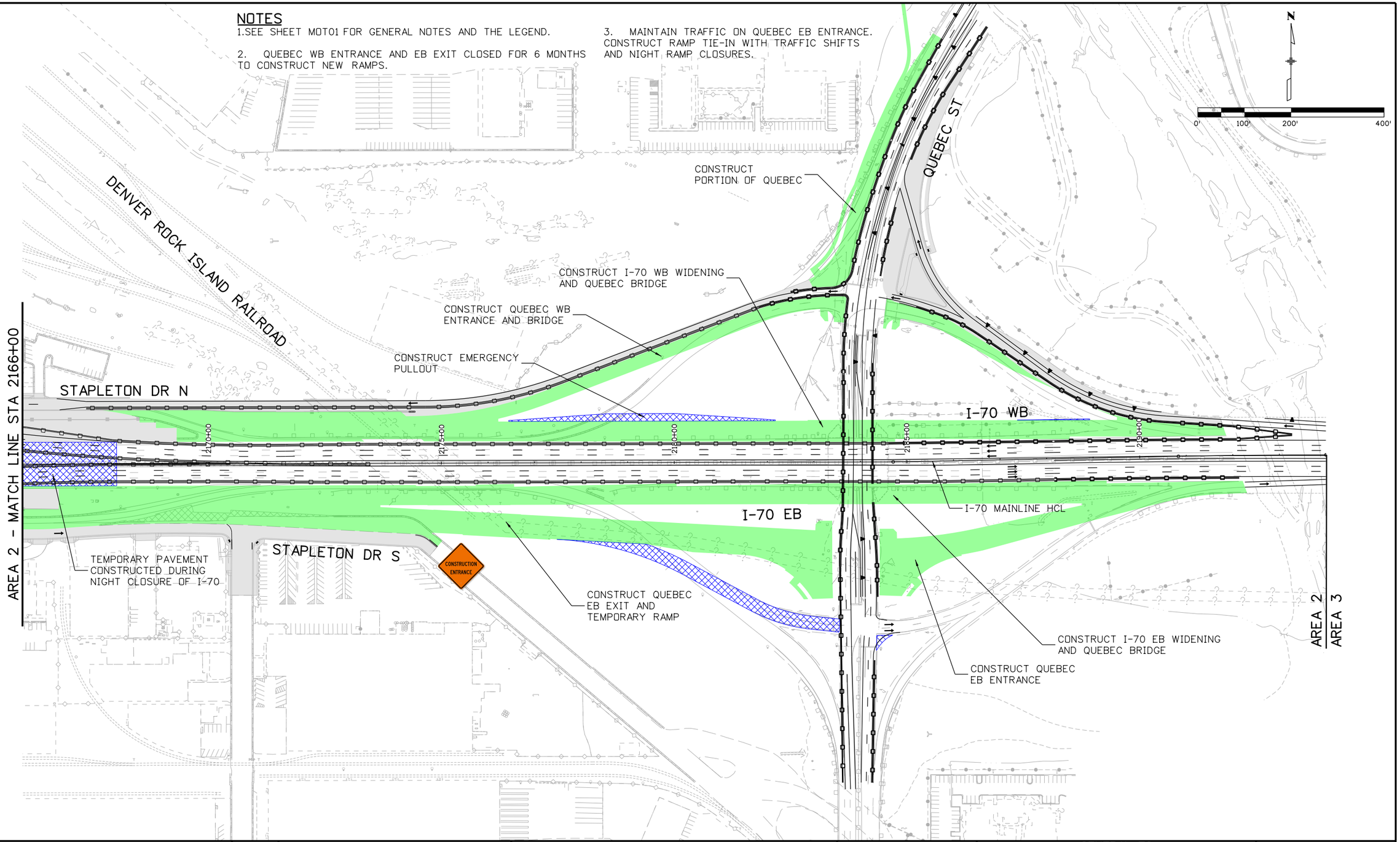
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 2 PHASE 2 STAGE 1			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 58 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. QUEBEC WB ENTRANCE AND EB EXIT CLOSED FOR 6 MONTHS TO CONSTRUCT NEW RAMPS.
3. MAINTAIN TRAFFIC ON QUEBEC EB ENTRANCE. CONSTRUCT RAMP TIE-IN WITH TRAFFIC SHIFTS AND NIGHT RAMP CLOSURES.



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Print Date: 5/11/2017
File Name: See sheet edge for information

Front Range Mobility Group

Horiz. Scale:	As Noted
Vert. Scale:	As Noted
Unit Information	
Unit Leader	

Sheet Revisions		
Date:	Comments	Init.

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Region 1 KJS

PROPOSAL

No Revisions:	
Revised:	
Void:	

CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 2
PHASE 2 STAGE 1

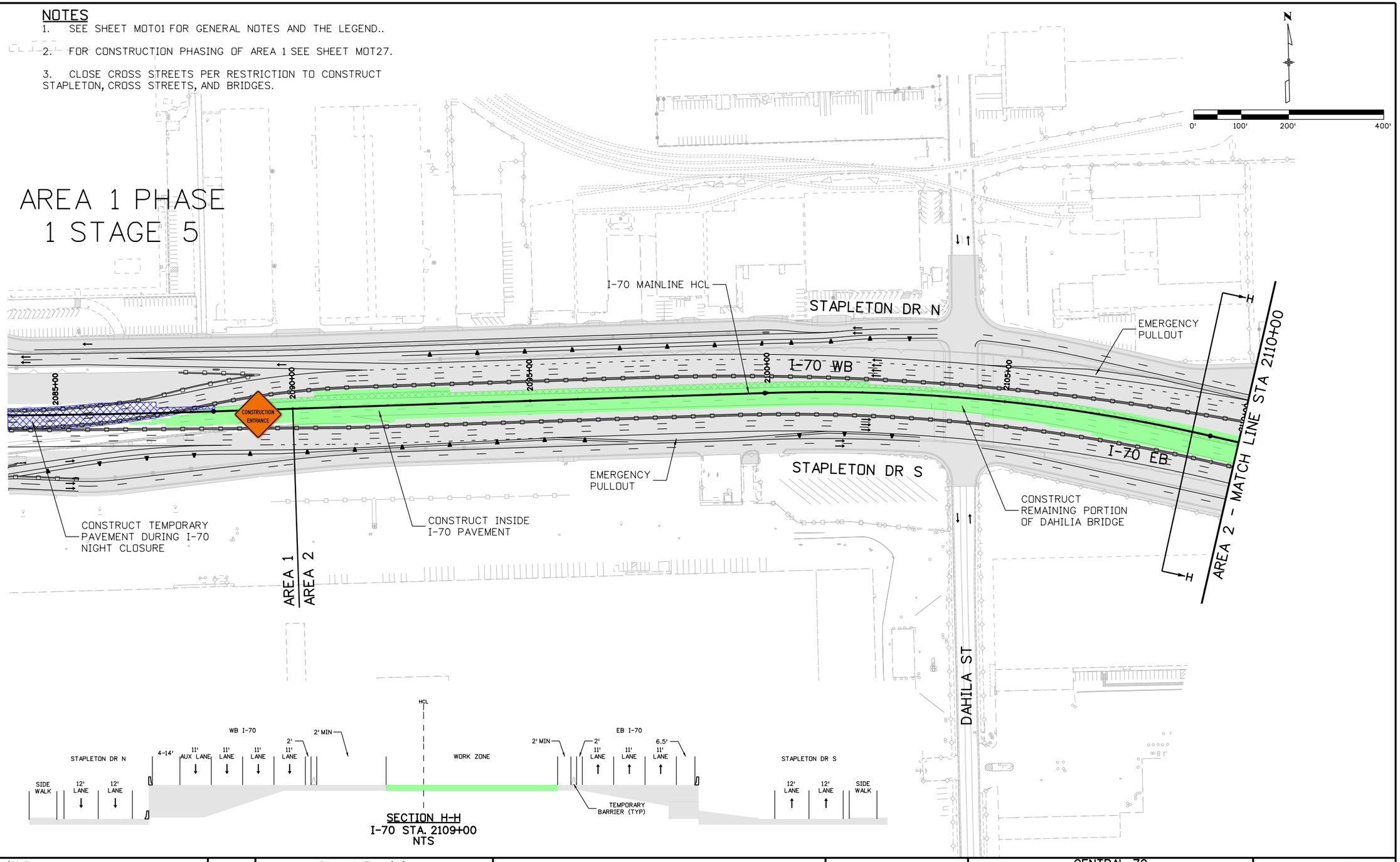
Designer:	R. MITRY	Structure Numbers	
Detailer:	C. SNYDER		
Sheet Subset:	MOT	Subset Sheets:	59 of 83

Project No./Code
FBR 0704-234
19631
Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND..
2. FOR CONSTRUCTION PHASING OF AREA 1 SEE SHEET MOT27.
3. CLOSE CROSS STREETS PER RESTRICTION TO CONSTRUCT STAPLETON, CROSS STREETS, AND BRIDGES.

AREA 1 PHASE 1 STAGE 5



SECTION H-H
I-70 STA. 2109+00
NTS

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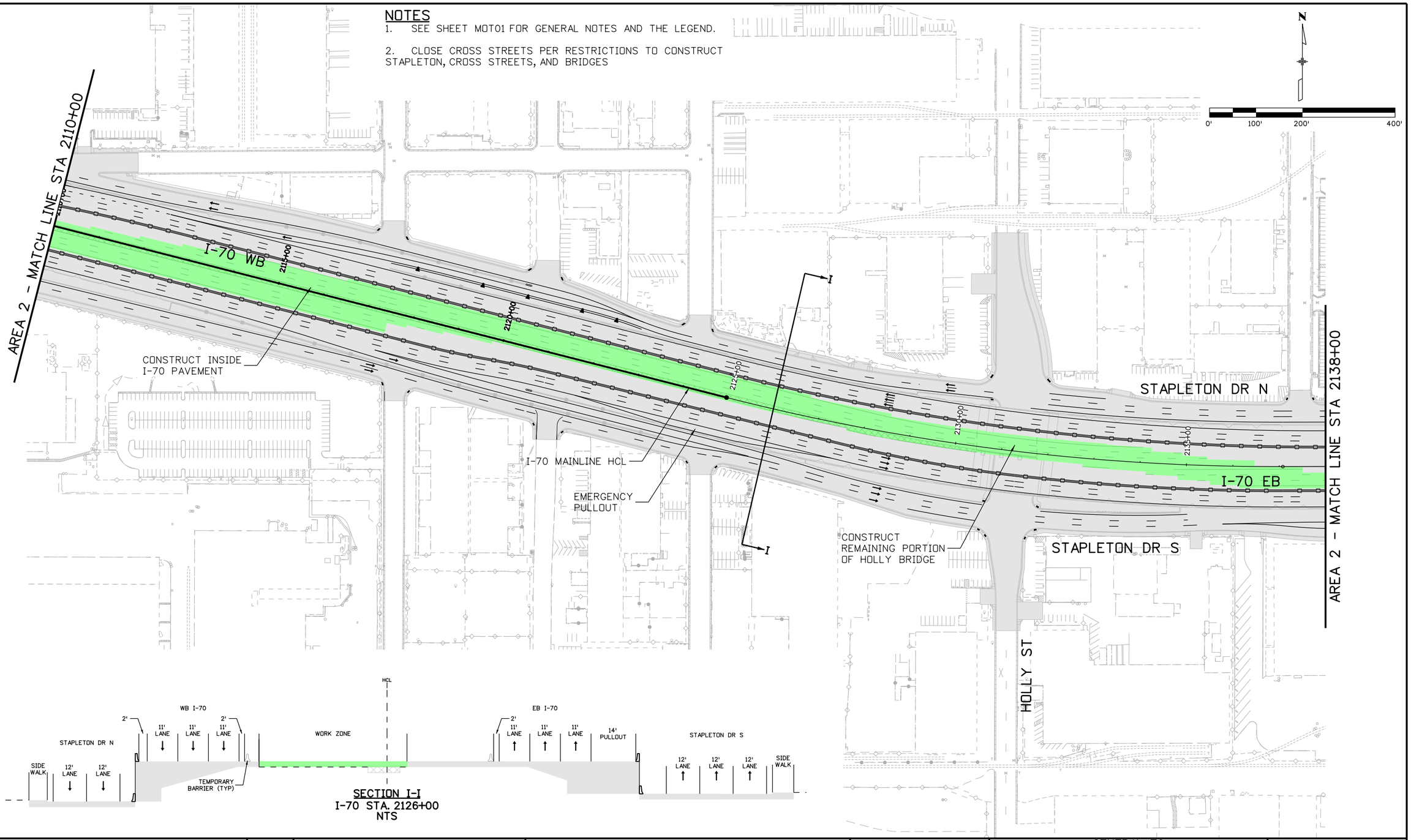
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 2 PHASE 3 STAGE 1			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 60 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CLOSE CROSS STREETS PER RESTRICTIONS TO CONSTRUCT STAPLETON, CROSS STREETS, AND BRIDGES



SECTION I-I
I-70 STA. 2126+00
NTS

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Print Date: 5/11/2017
File Name: See sheet edge for information
Horiz. Scale: As Noted
Vert. Scale: As Noted
Unit Information
Unit Leader

Front Range Mobility Group

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Date:	Comments	Init.

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Region 1 KJS

PROPOSAL
No Revisions:
Revised:
Void:

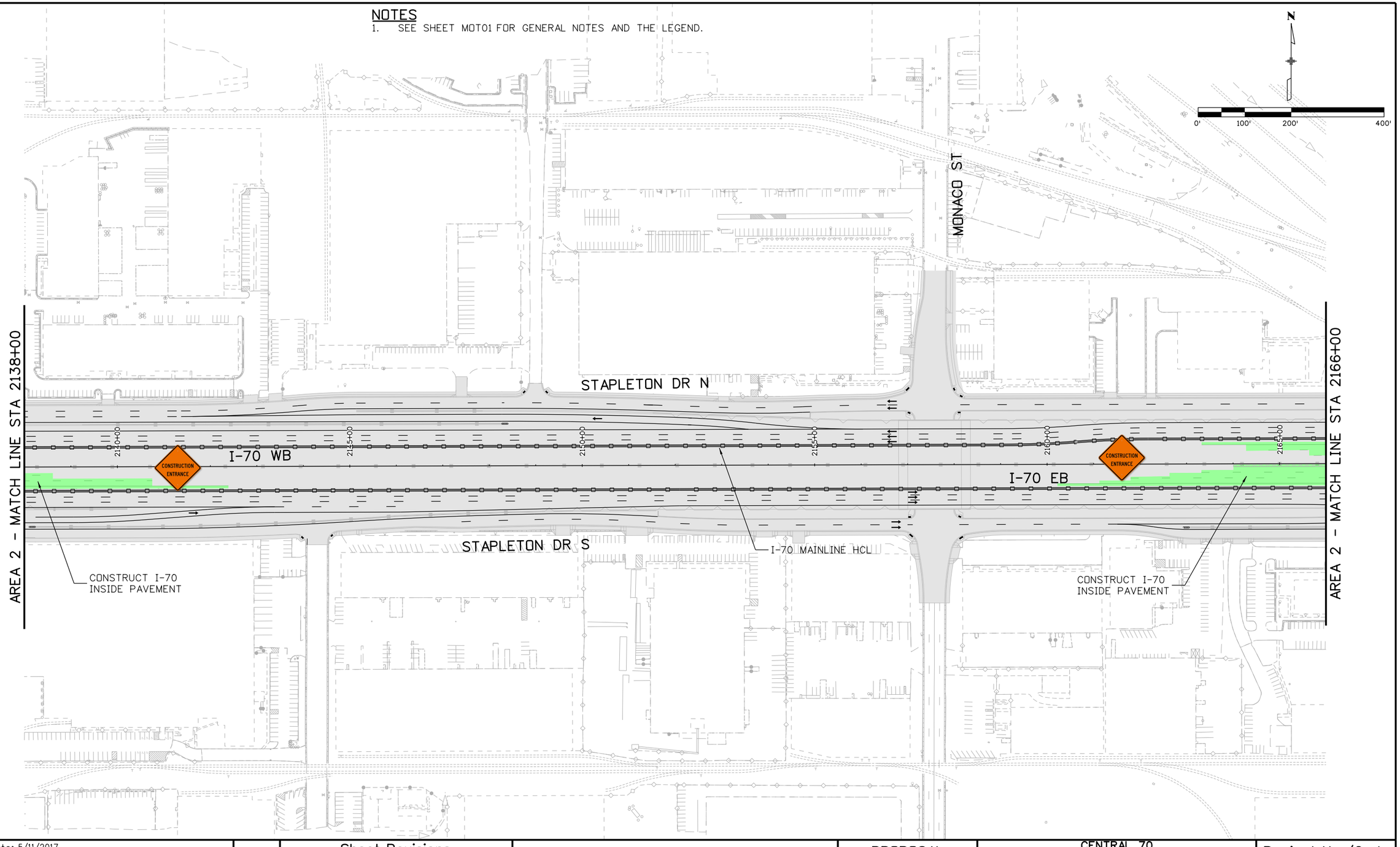
CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 2
PHASE 3 STAGE 1

Designer: R. MITRY
Detailer: C. SNYDER
Sheet Subset: MOT
Structure Numbers:
Subset Sheets: 61 of 83

Project No./Code
FBR 0704-234
19631
Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.



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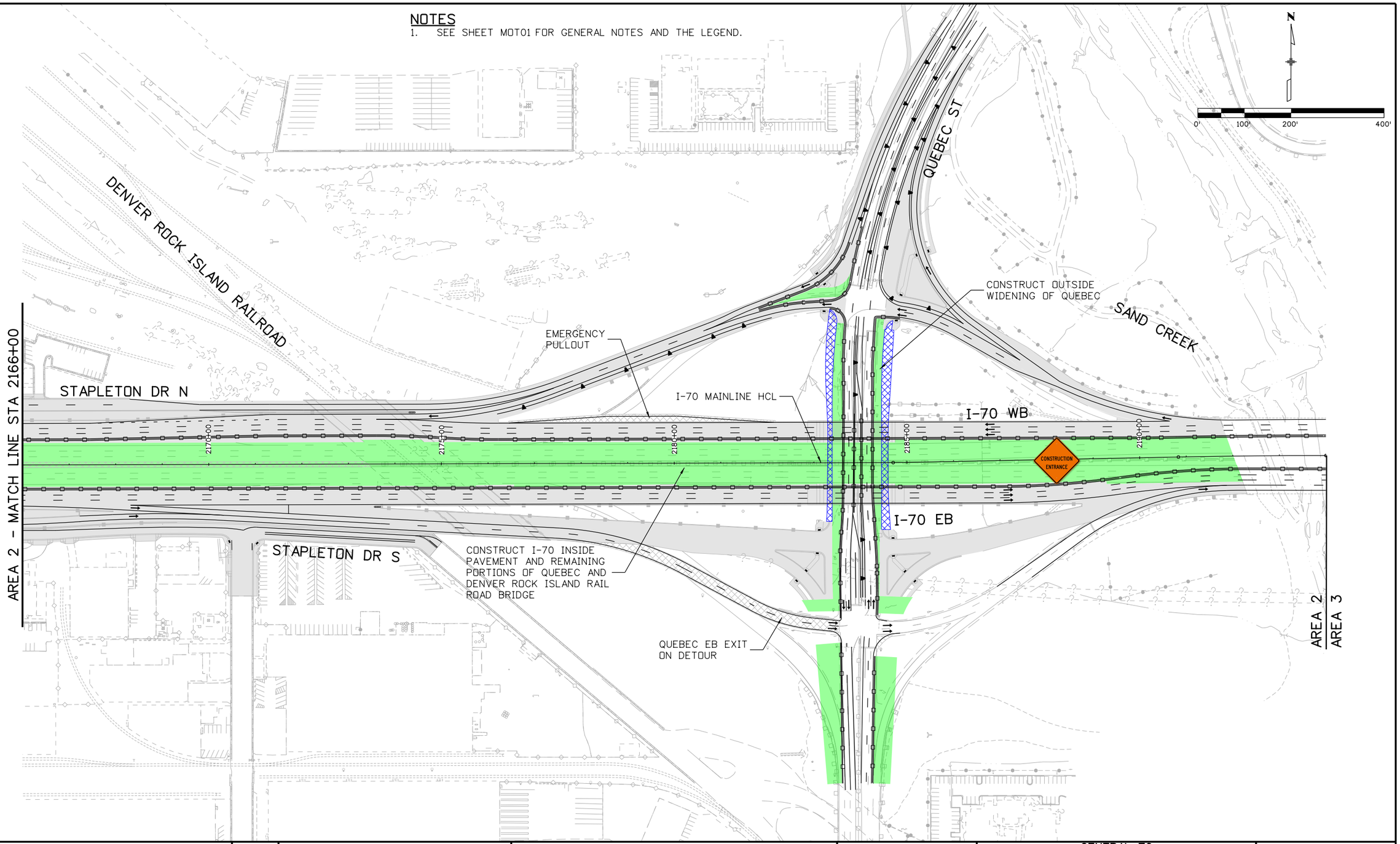
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 2 PHASE 3 STAGE 1			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 62 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.



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Print Date: 5/11/2017
File Name: See sheet edge for information

Front Range Mobility Group

Horiz. Scale:	As Noted
Vert. Scale:	As Noted
Unit Information	
Unit Leader	

Sheet Revisions		
Date:	Comments	Init.

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Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PROPOSAL

No Revisions:	
Revised:	
Void:	

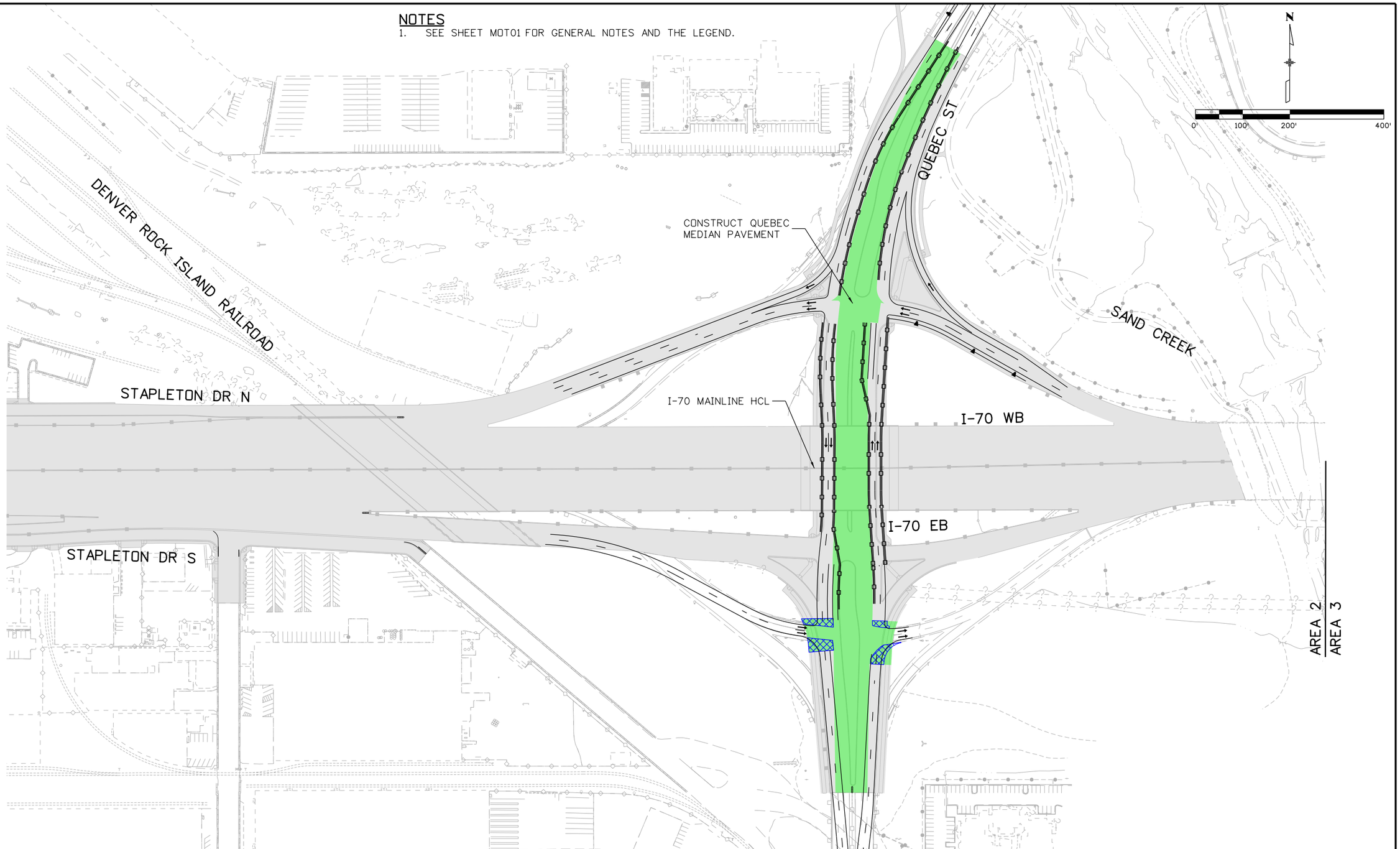
CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 2
PHASE 3 STAGE 1

Designer:	R. MITRY	Structure Numbers	
Detailer:	C. SNYDER		
Sheet Subset:	MOT	Subset Sheets:	63 of 83

Project No./Code
FBR 0704-234
19631
Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.



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Print Date: 5/11/2017

File Name: See sheet edge for information

Front Range Mobility Group

Horiz. Scale:	As Noted
Vert. Scale:	As Noted
Unit Information	
Unit Leader	

Sheet Revisions		
Date:	Comments	Init.

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Denver, CO 80222
Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PROPOSAL

No Revisions:

Revised:

Void:

CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 2
PHASE 3 STAGE 2

Designer:	R. MITRY	Structure Numbers	
Detailer:	C. SNYDER		
Sheet Subset:	MOT	Subset Sheets: 64	of 83

Project No./Code

FBR 0704-234

19631

Sheet Number

Attachment 1
MOT Plans - Area 3-5

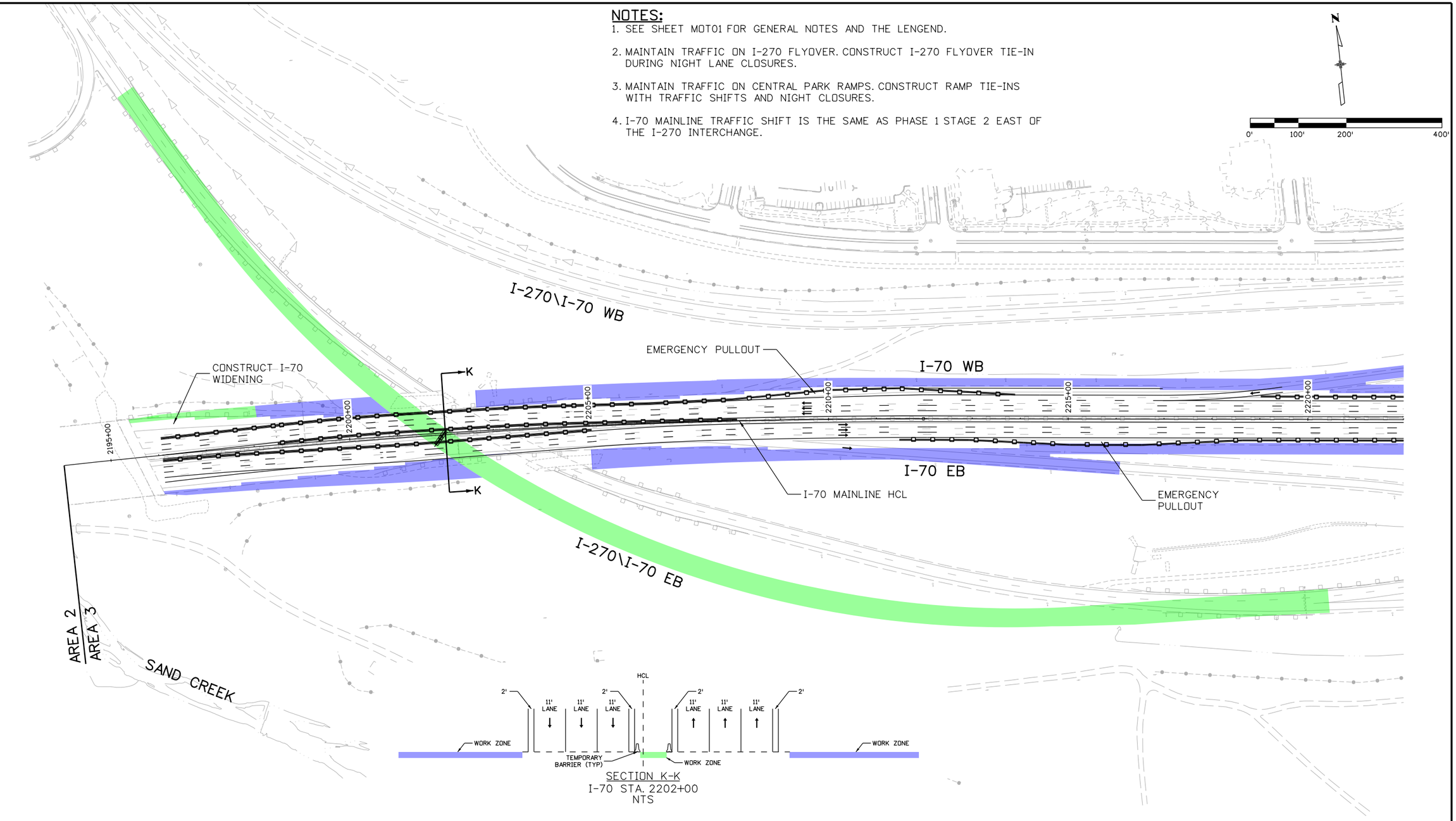
Front Range
Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

NOTES:

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LENGEND.
2. MAINTAIN TRAFFIC ON I-270 FLYOVER. CONSTRUCT I-270 FLYOVER TIE-IN DURING NIGHT LANE CLOSURES.
3. MAINTAIN TRAFFIC ON CENTRAL PARK RAMPS. CONSTRUCT RAMP TIE-INS WITH TRAFFIC SHIFTS AND NIGHT CLOSURES.
4. I-70 MAINLINE TRAFFIC SHIFT IS THE SAME AS PHASE 1 STAGE 2 EAST OF THE I-270 INTERCHANGE.



SECTION K-K
I-70 STA. 2202+00
NTS

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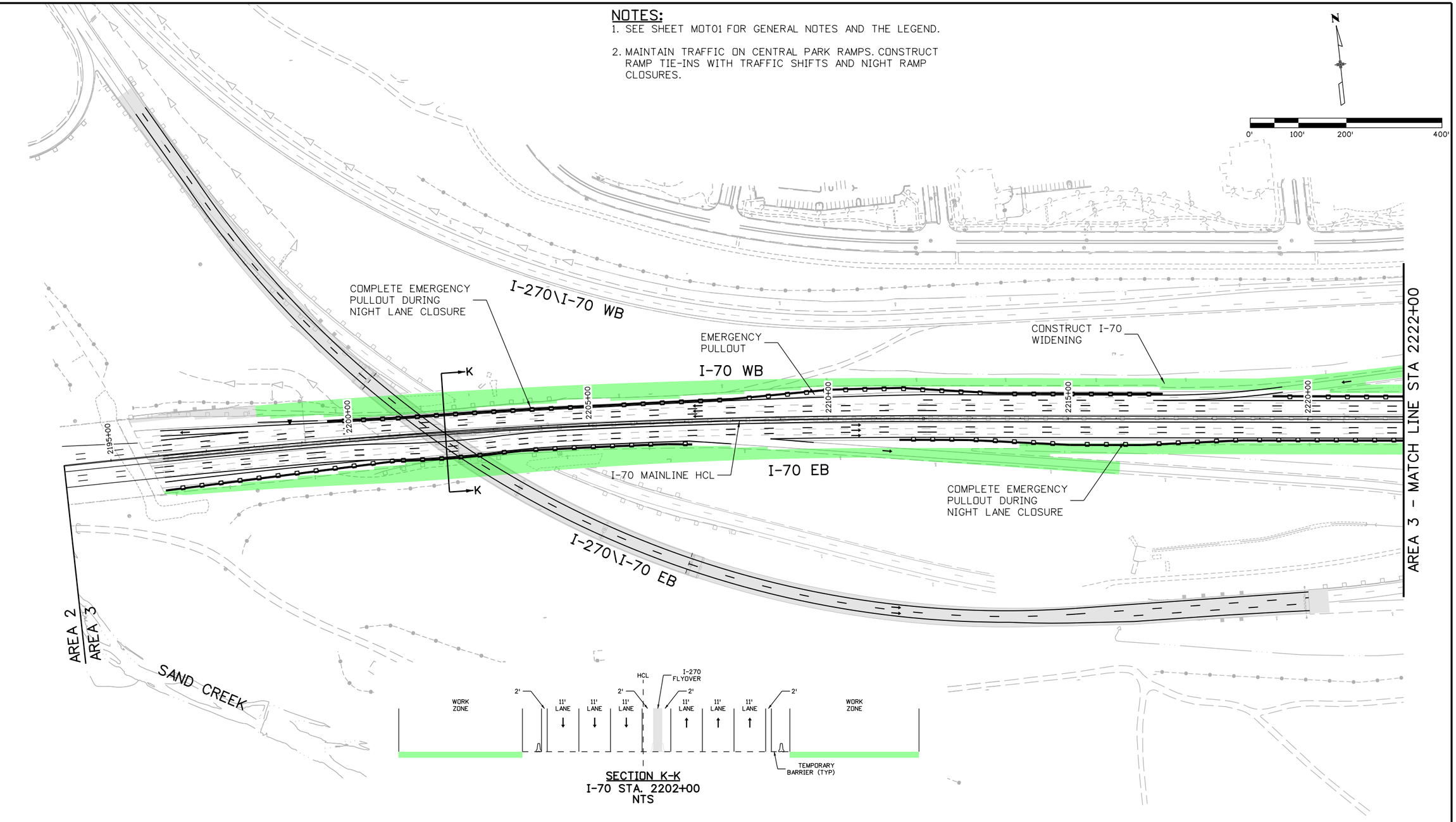
Print Date: 5/11/2017		Sheet Revisions			Colorado Department of Transportation	PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 3 PHASE 1 STAGE 1	Project No./Code
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:		FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Designer: R. MITRY / Structure Numbers	19631
	Vert. Scale: As Noted					Void:	Detailer: C. SNYDER	
	Unit Information				Region 1 KJS		Sheet Subset: MOT / Subset Sheets: 65 of 83	Sheet Number
	Unit Leader							

NOTES:

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. MAINTAIN TRAFFIC ON CENTRAL PARK RAMPS. CONSTRUCT RAMP TIE-INS WITH TRAFFIC SHIFTS AND NIGHT RAMP CLOSURES.



SECTION K-K
I-70 STA. 2202+00
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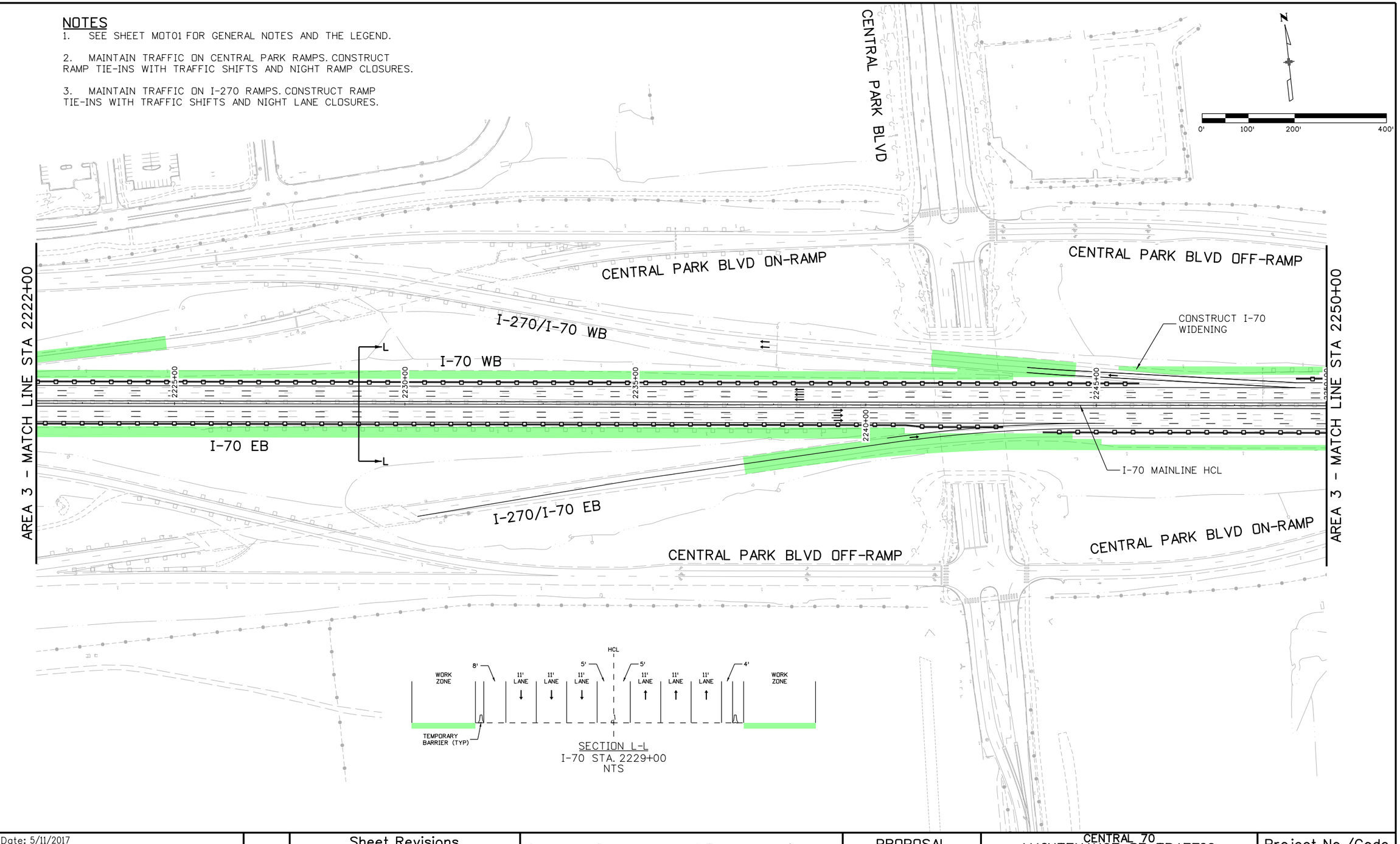
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:		FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Designer: R. MITRY / Structure Numbers	19631
	Vert. Scale: As Noted					Void:	Detailer: C. SNYDER	
	Unit Information				Region 1 KJS		Sheet Subset: MOT / Subset Sheets: 66 of 83	Sheet Number
	Unit Leader							

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. MAINTAIN TRAFFIC ON CENTRAL PARK RAMPS. CONSTRUCT RAMP TIE-INS WITH TRAFFIC SHIFTS AND NIGHT RAMP CLOSURES.
3. MAINTAIN TRAFFIC ON I-270 RAMPS. CONSTRUCT RAMP TIE-INS WITH TRAFFIC SHIFTS AND NIGHT LANE CLOSURES.



SECTION L-L
I-70 STA. 2229+00
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Print Date: 5/11/2017		Sheet Revisions			
File Name: See sheet edge for information		Date:	Comments	Init.	
Front Range Mobility Group	Horiz. Scale: As Noted				
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

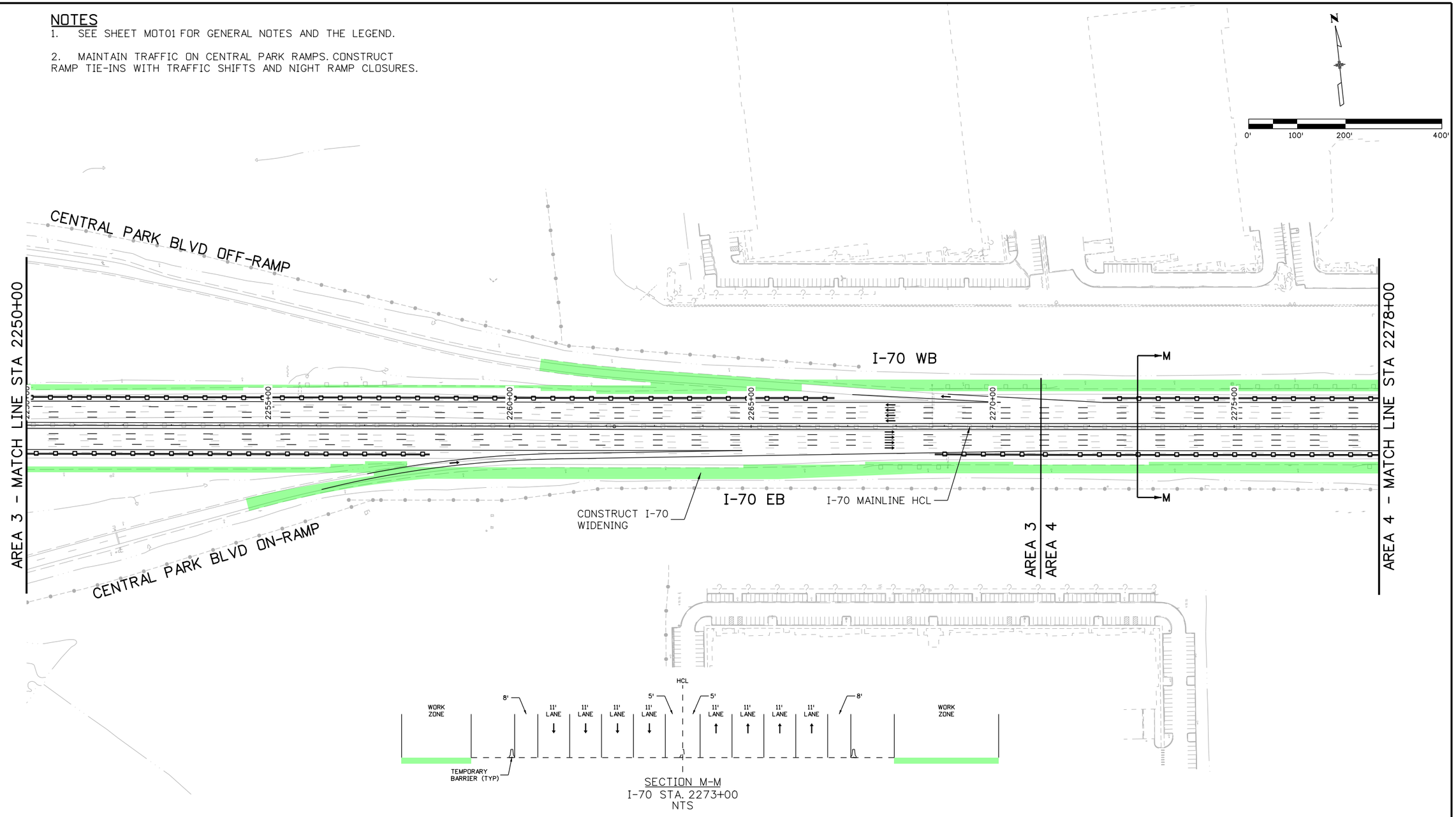
Colorado Department of Transportation
2000 South Holly Street
Denver, CO 80222
Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 3 PHASE 1 STAGE 2			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 67 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. MAINTAIN TRAFFIC ON CENTRAL PARK RAMPS. CONSTRUCT RAMP TIE-INS WITH TRAFFIC SHIFTS AND NIGHT RAMP CLOSURES.



SECTION M-M
I-70 STA. 2273+00
NTS

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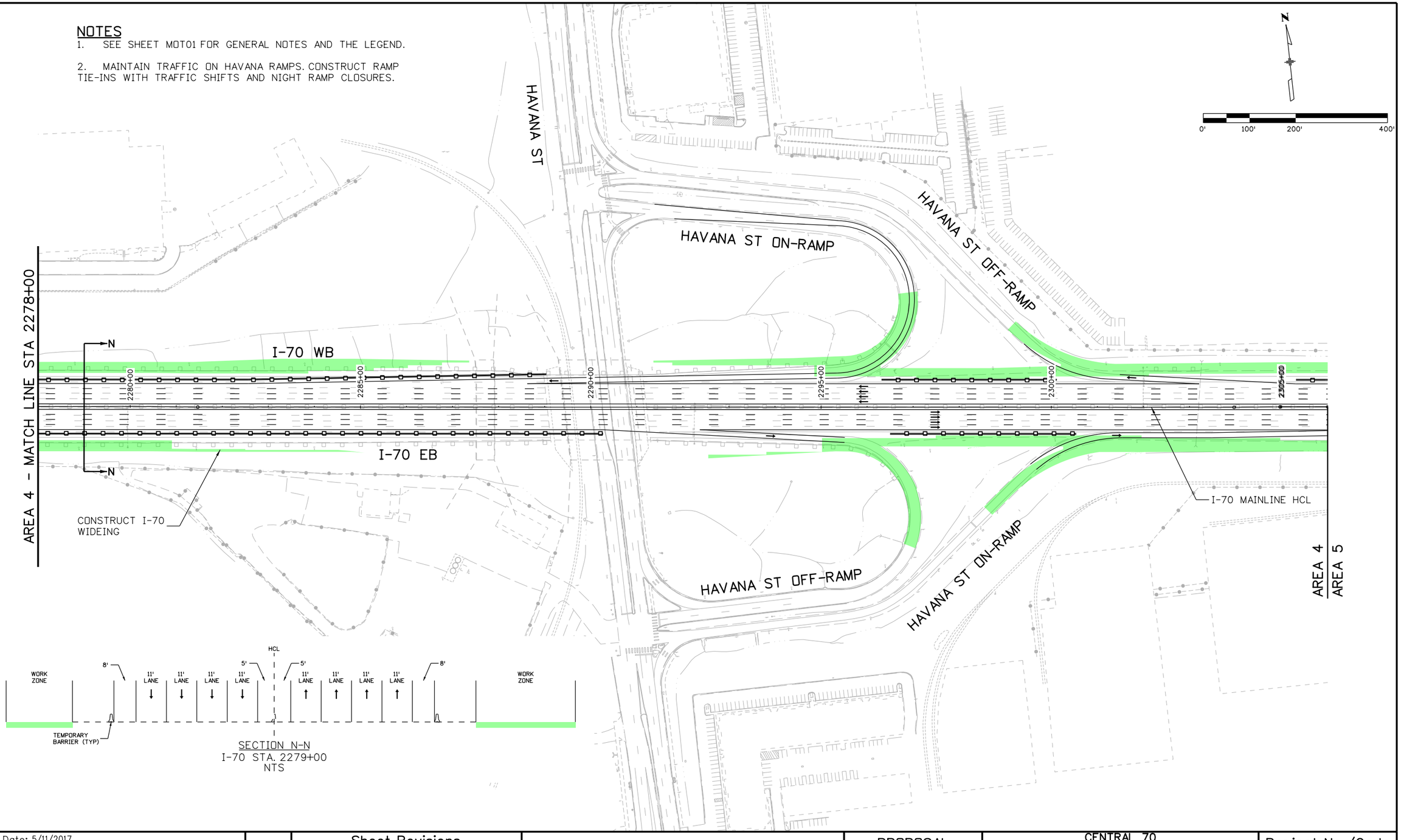
Print Date: 5/11/2017		Sheet Revisions			Colorado Department of Transportation	PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREAS 3 & 4 PHASE 1 STAGE 2	Project No./Code
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:	Designer: R. MITRY	FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Detailer: C. SNYDER / Structure Numbers	19631
	Vert. Scale: As Noted							
	Unit Information				Region 1 KJS	Void:	Sheet Subset: MOT / Subset Sheets: 68 of 83	Sheet Number
	Unit Leader							

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. MAINTAIN TRAFFIC ON HAVANA RAMPS. CONSTRUCT RAMP TIE-INS WITH TRAFFIC SHIFTS AND NIGHT RAMP CLOSURES.



SECTION N-N
I-70 STA. 2279+00
NTS

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Print Date: 5/11/2017			
File Name: See sheet edge for information			
Front Range Mobility Group	Horiz. Scale: As Noted		
	Vert. Scale: As Noted		
	Unit Information		
	Unit Leader		

Sheet Revisions		
Date:	Comments	Init.

Colorado Department of Transportation
2000 South Holly Street
Denver, CO 80222
Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PROPOSAL
No Revisions:
Revised:
Void:

CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 4
PHASE 1 STAGE 2

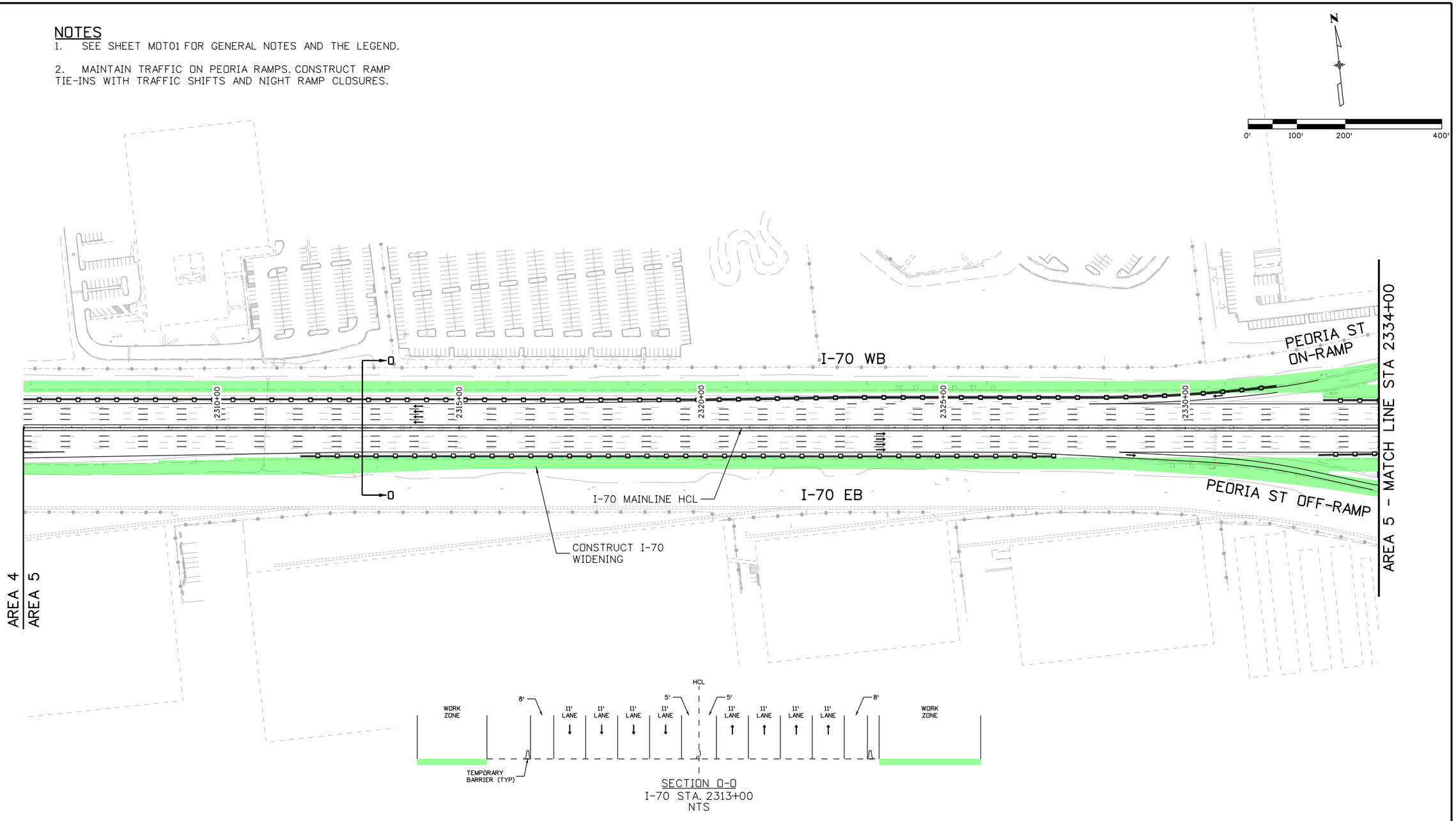
Designer:	R. MITRY	Structure Numbers	
Detailer:	C. SNYDER		
Sheet Subset:	MOT	Subset Sheets: 69 of 83	

Project No./Code
FBR 0704-234
19631
Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. MAINTAIN TRAFFIC ON PEORIA RAMPS. CONSTRUCT RAMP TIE-INS WITH TRAFFIC SHIFTS AND NIGHT RAMP CLOSURES.



SECTION O-O
I-70 STA. 2313+00
NTS

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Print Date: 5/11/2017		Sheet Revisions			Colorado Department of Transportation	PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 5 PHASE 1 STAGE 2	Project No./Code
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:	Designer: R. MITRY	FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Detailer: C. SNYDER	19631
	Vert. Scale: As Noted					Void:	Sheet Subset: MOT	Sheet Number
	Unit Information				Region 1 KJS		Structure Numbers	
	Unit Leader						Subset Sheets: 70 of 83	

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. MAINTAIN TRAFFIC ON PEORIA RAMPS. CONSTRUCT RAMP TIE-INS WITH TRAFFIC SHIFTS AND NIGHT RAMP CLOSURES.

N

0' 100' 200' 400'

PEORIA ST

PEORIA ST ON-RAMP

PEORIA ST OFF-RAMP

CONSTRUCT PORTION OF PEORIA BRIDGE

CONSTURCT I-70 WIDENING

I-70 WB

I-70 EB

AREA 5 - MATCH LINE STA 2334+00

AREA 5 - MATCH LINE STA 2362+00

2335+00 2340+00 2345+00 2350+00 2355+00 2360+00

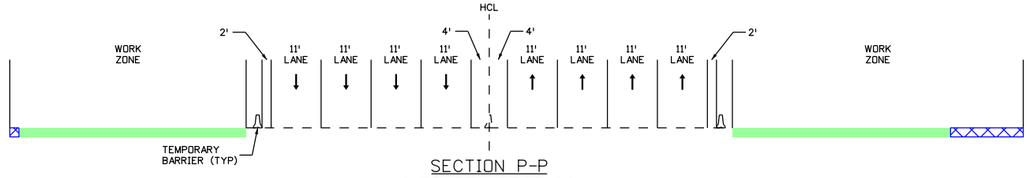
CONSTRUCT TEMPORARY PAVEMENT TO ACCOMMODATE PHASE 2 TRAFFIC SHIFT

I-70 MAINLINE HCL

P

PEORIA ST OFF-RAMP

PEORIA ST ON-RAMP



SECTION P-P
I-70 STA. 2349+00
NTS

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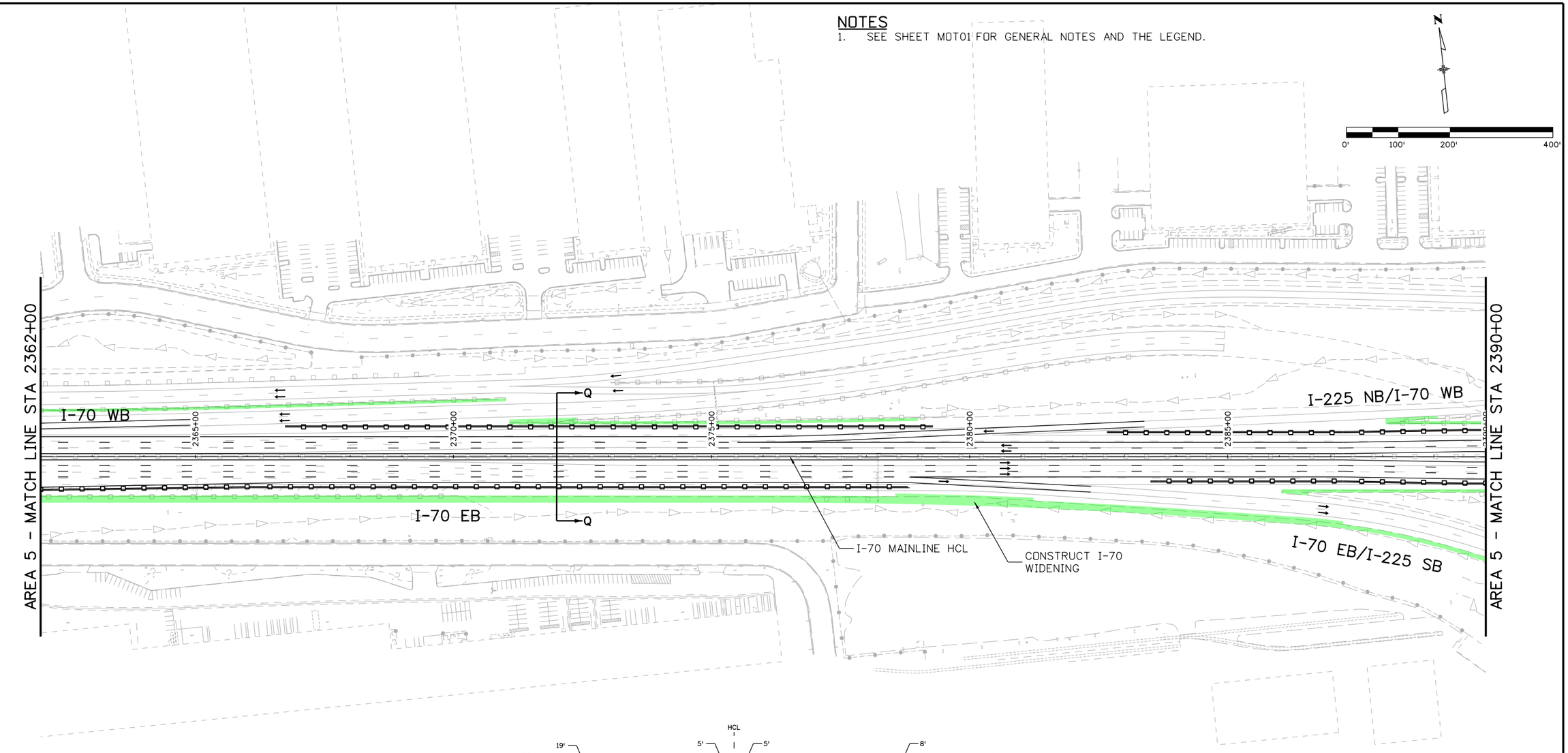
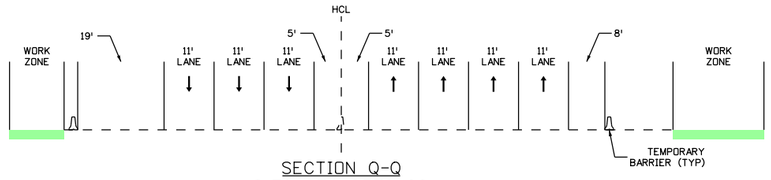
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 5 PHASE 1 STAGE 2			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 71 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.





SECTION Q-Q
I-70 STA. 2372+00
NTS

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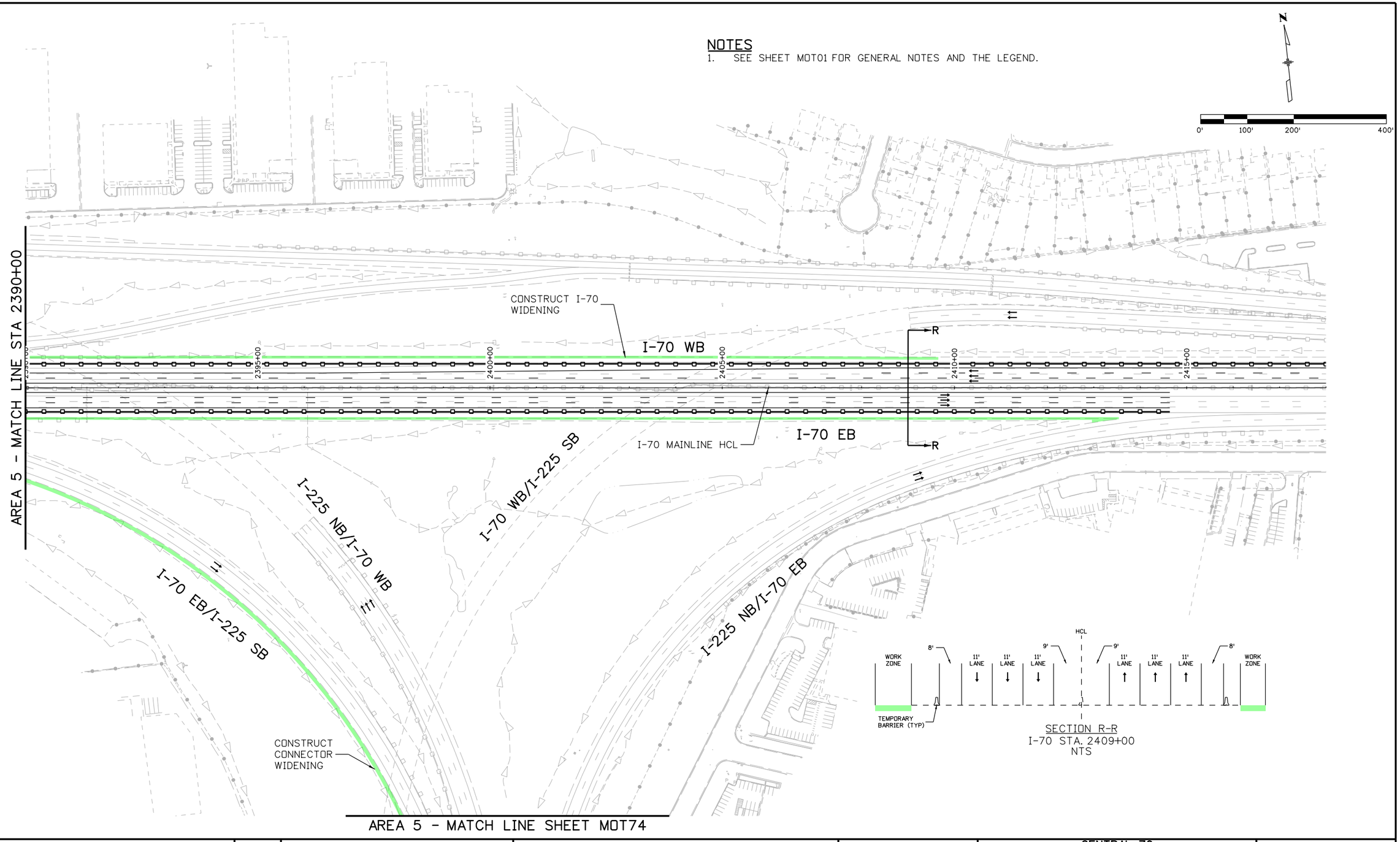
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Detailer: C. SNYDER			19631
	Vert. Scale: As Noted						Sheet Subset: MOT	Subset Sheets: 72 of 83		Sheet Number
	Unit Information				Region 1 KJS	Void:				
	Unit Leader									

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.



SECTION R-R
I-70 STA. 2409+00
NTS

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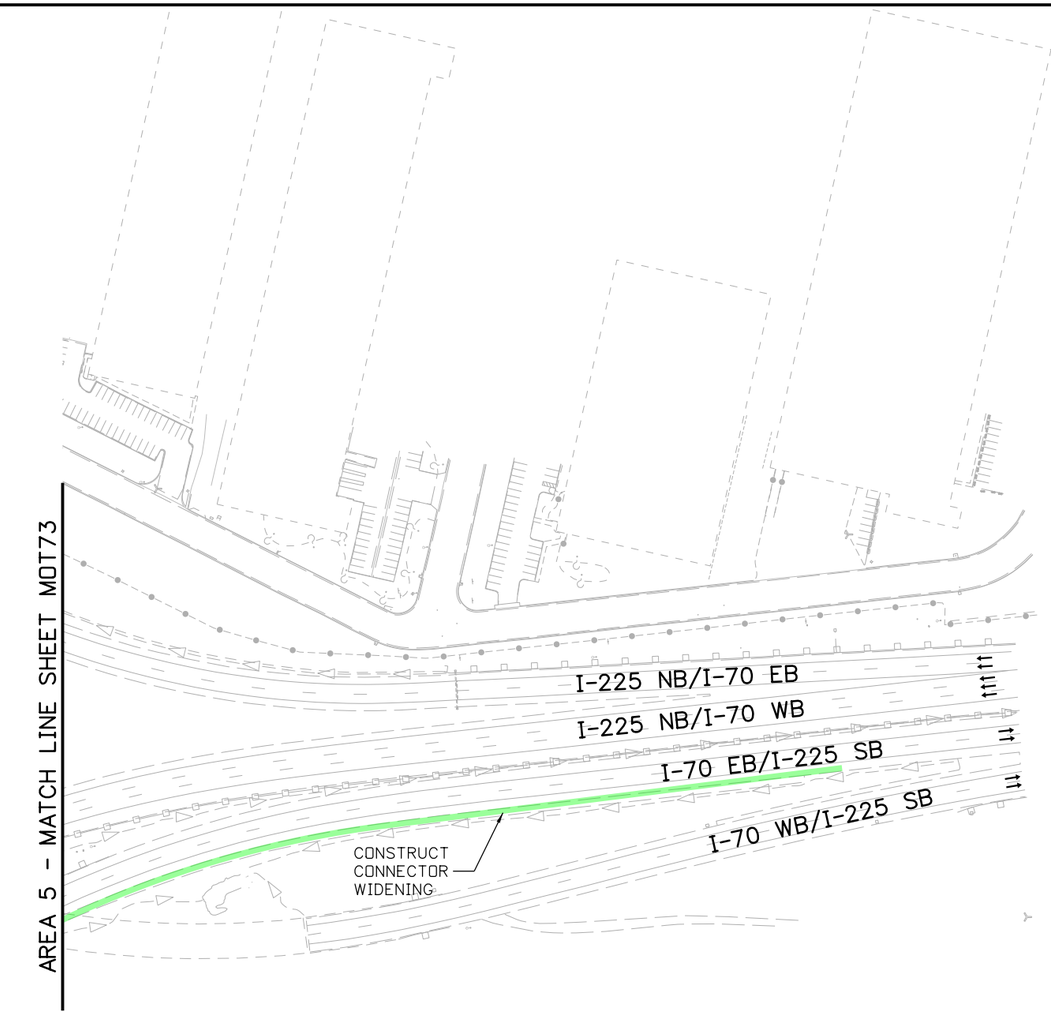
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 5 PHASE 1 STAGE 2			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 73 of 83		Sheet Number



N

0' 100' 200' 400'

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

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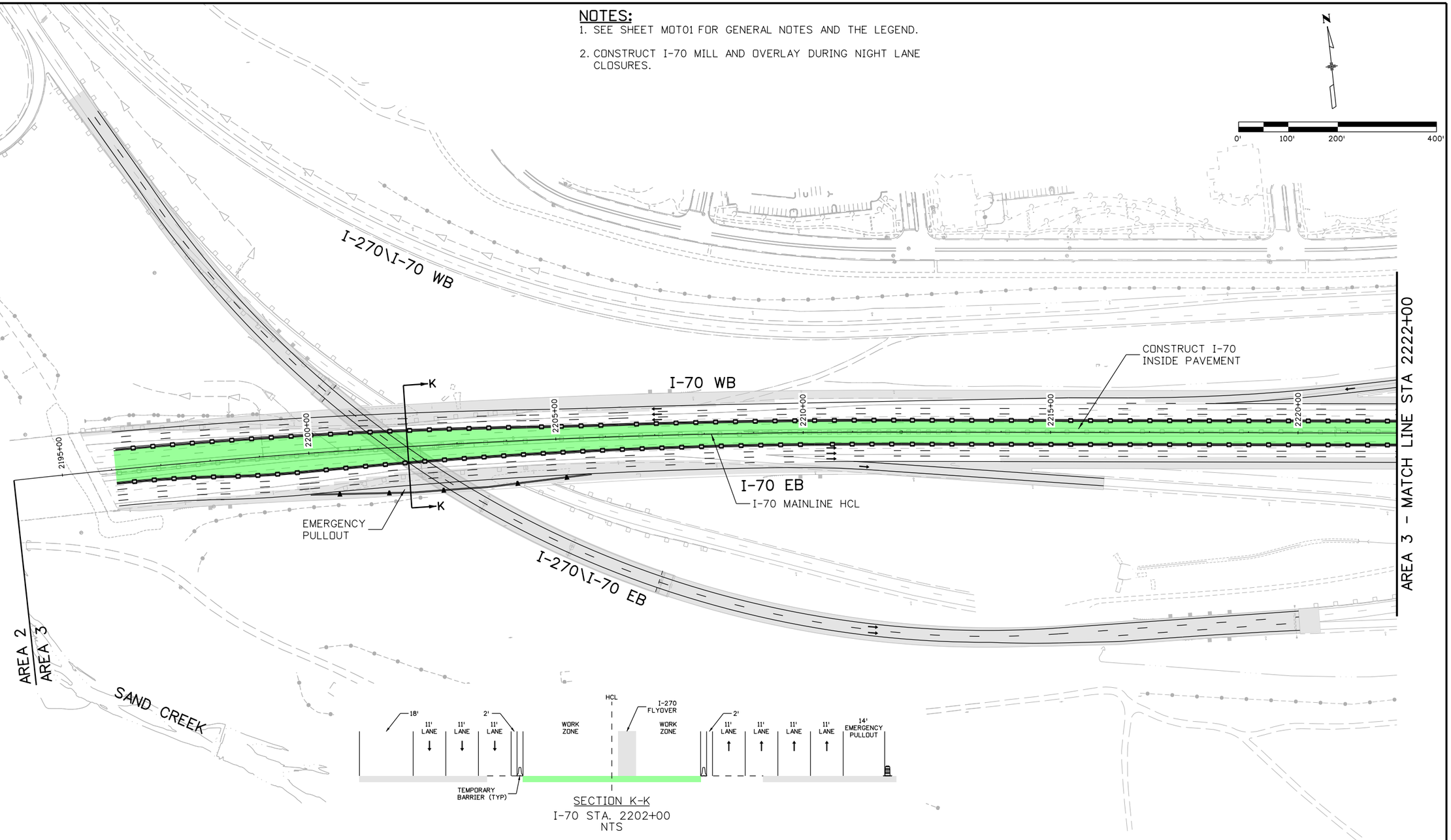
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:		FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Designer: R. MITRY / Structure Numbers	19631
	Vert. Scale: As Noted						Detailer: C. SNYDER	
	Unit Information				Region 1 KJS	Void:	Sheet Subset: MOT / Subset Sheets: 74 of 83	Sheet Number
	Unit Leader							

NOTES:

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.



SECTION K-K
I-70 STA. 2202+00
NTS

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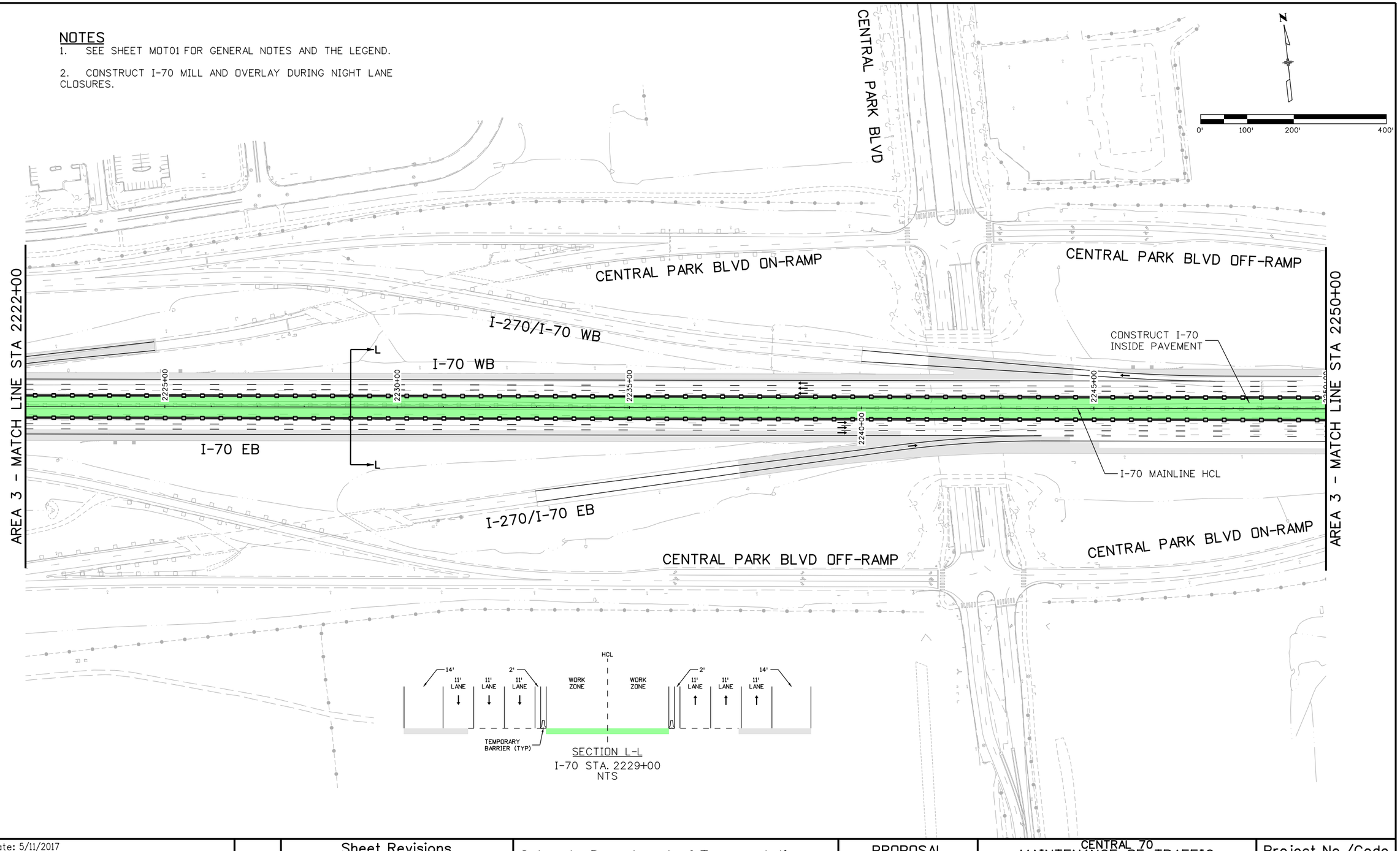
File Name: See sheet edge for information			Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:				FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted						Revised:	Designer: R. MITRY	Structure Numbers		19631
	Vert. Scale: As Noted							Detailer: C. SNYDER			
	Unit Information						Void:	Sheet Subset: MOT	Subset Sheets: 75 of 83		Sheet Number
	Unit Leader					Region 1 KJS					

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.



SECTION L-L
I-70 STA. 2229+00
NTS

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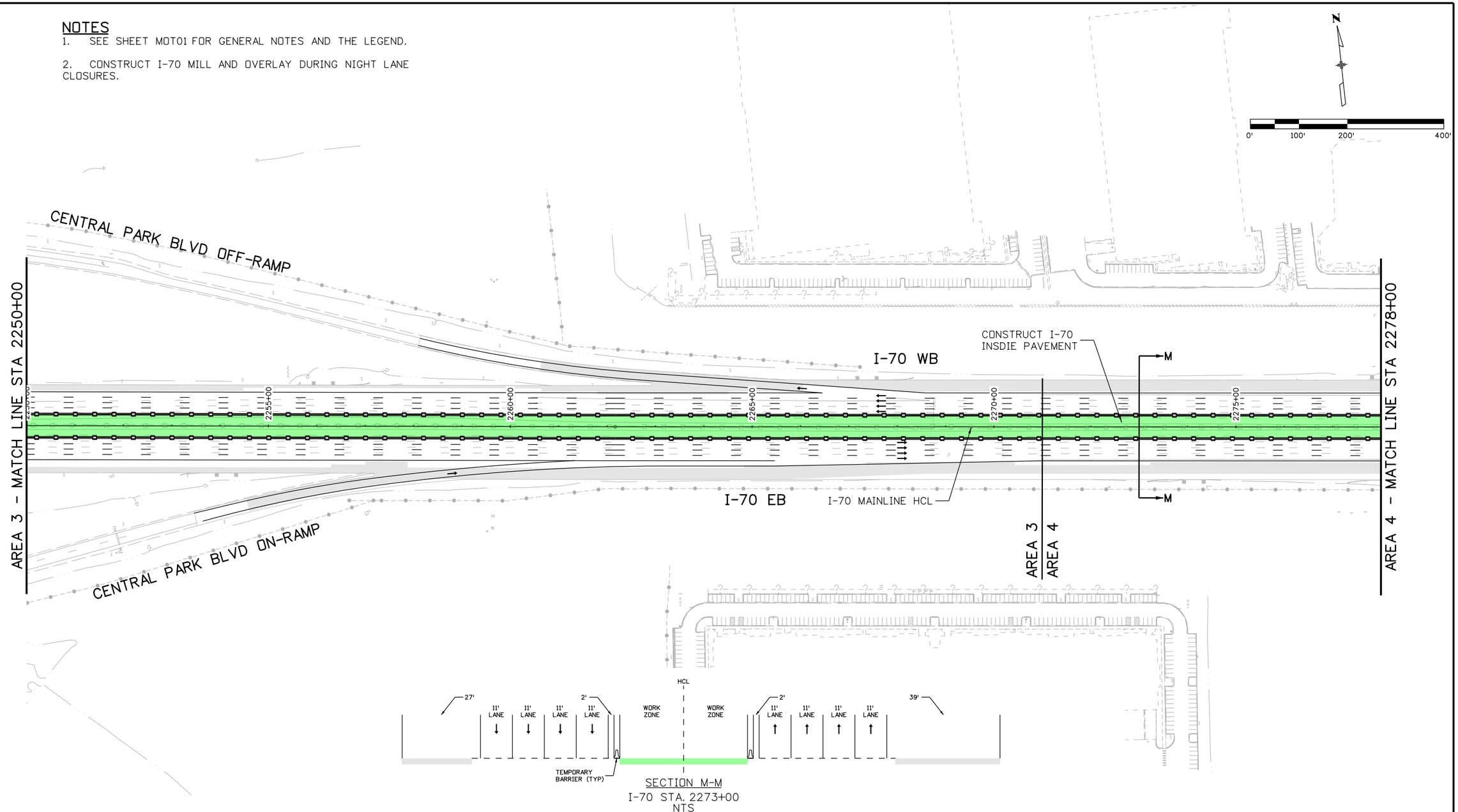
Print Date: 5/11/2017		Sheet Revisions			Colorado Department of Transportation
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 3 PHASE 2 STAGE 1			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 76 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.



SECTION M-M
I-70 STA. 2273+00
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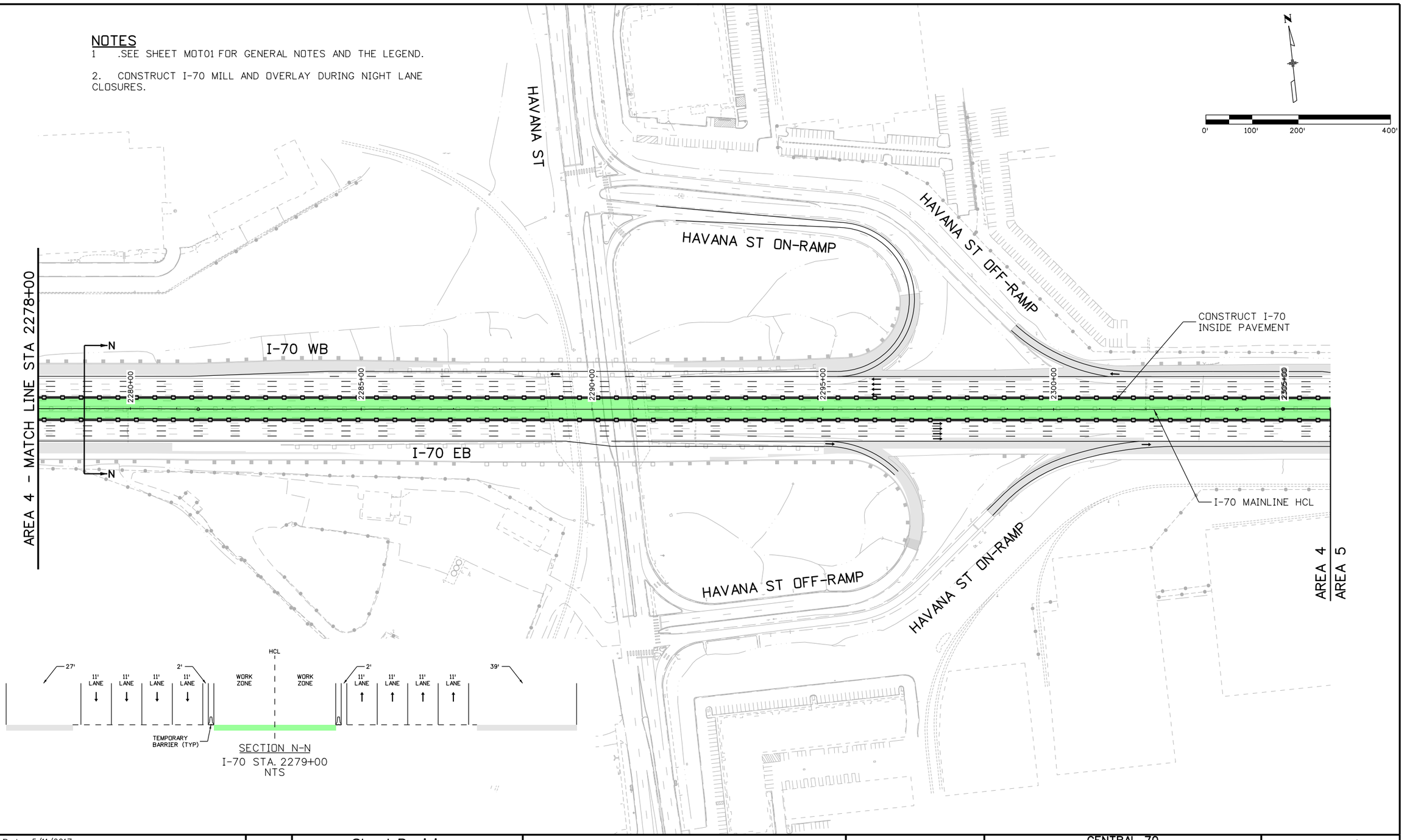
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:		FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Designer: R. MITRY	19631
	Vert. Scale: As Noted						Detailer: C. SNYDER	
	Unit Information					Void:	Sheet Subset: MOT	Subset Sheets: 77 of 83
	Unit Leader				Region 1 KJS			Sheet Number

NOTES

1 .SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.



SECTION N-N
I-70 STA. 2279+00
NTS

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	Unit Leader		

Sheet Revisions		
Date:	Comments	Init.

Colorado Department of Transportation
2000 South Holly Street
Denver, CO 80222
Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PROPOSAL
No Revisions:
Revised:
Void:

CENTRAL 70
MAINTENANCE OF TRAFFIC
AREA 4
PHASE 2 STAGE 1

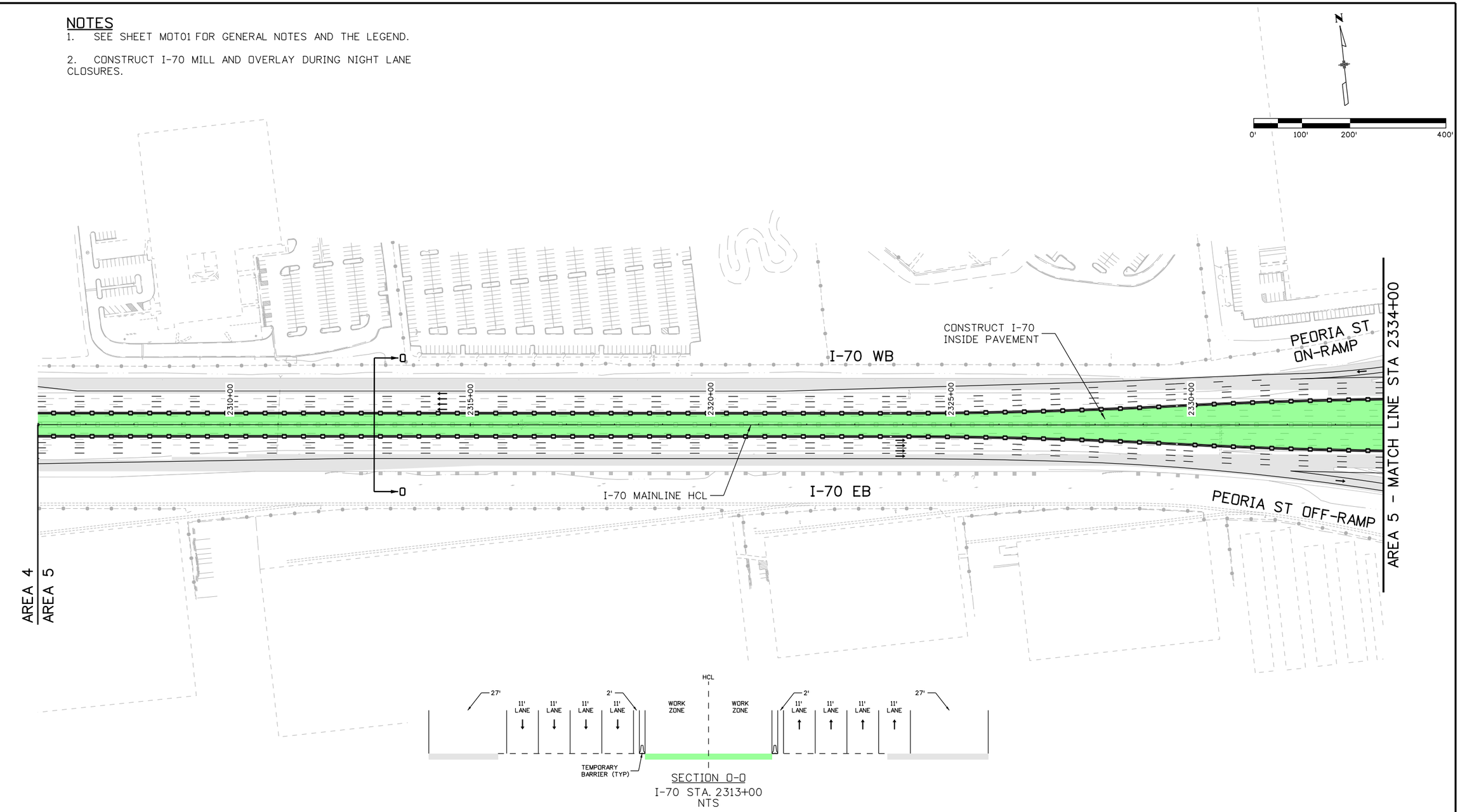
Designer:	R. MITRY	Structure Numbers	
Detailer:	C. SNYDER		
Sheet Subset:	MOT	Subset Sheets: 78 of 83	

Project No./Code
FBR 0704-234
19631
Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.



SECTION O-O
I-70 STA. 2313+00
NTS

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Print Date: 5/11/2017		Sheet Revisions			Colorado Department of Transportation	PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 5 PHASE 2 STAGE 1	Project No./Code
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:	Designer: R. MITRY	FBR 0704-234
Horiz. Scale: As Noted						Revised:	Detailer: C. SNYDER	19631
Vert. Scale: As Noted					Region 1 KJS	Void:	Sheet Subset: MOT	Sheet Number
Unit Information							Structure Numbers	
Front Range Mobility Group	Unit Leader						Subset Sheets: 79 of 83	

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.

N

0' 100' 200' 400'

PEORIA ST

PEORIA ST ON-RAMP

PEORIA ST OFF-RAMP

CONSTRUCT PEORIA WIDENING

CONSTRUCT I-70 INSIDE PAVEMENT

I-70 WB

I-70 EB

2335+00 2340+00 2345+00 2350+00 2355+00 2360+00

P P

CONSTRUCT REMAINING PORTION OF PEORIA BRIDGE

I-70 MAINLINE HCL

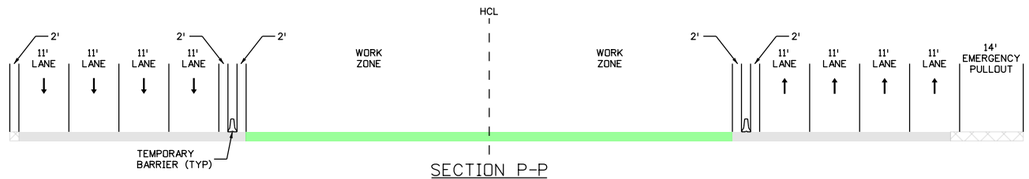
EMERGENCY PULLOUT

AREA 5 – MATCH LINE STA 2334+00

AREA 5 – MATCH LINE STA 2362+00

PEORIA ST OFF-RAMP

PEORIA ST ON-RAMP



SECTION P-P
I-70 STA. 2349+00
NTS

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Print Date: 5/11/2017		Sheet Revisions			Colorado Department of Transportation
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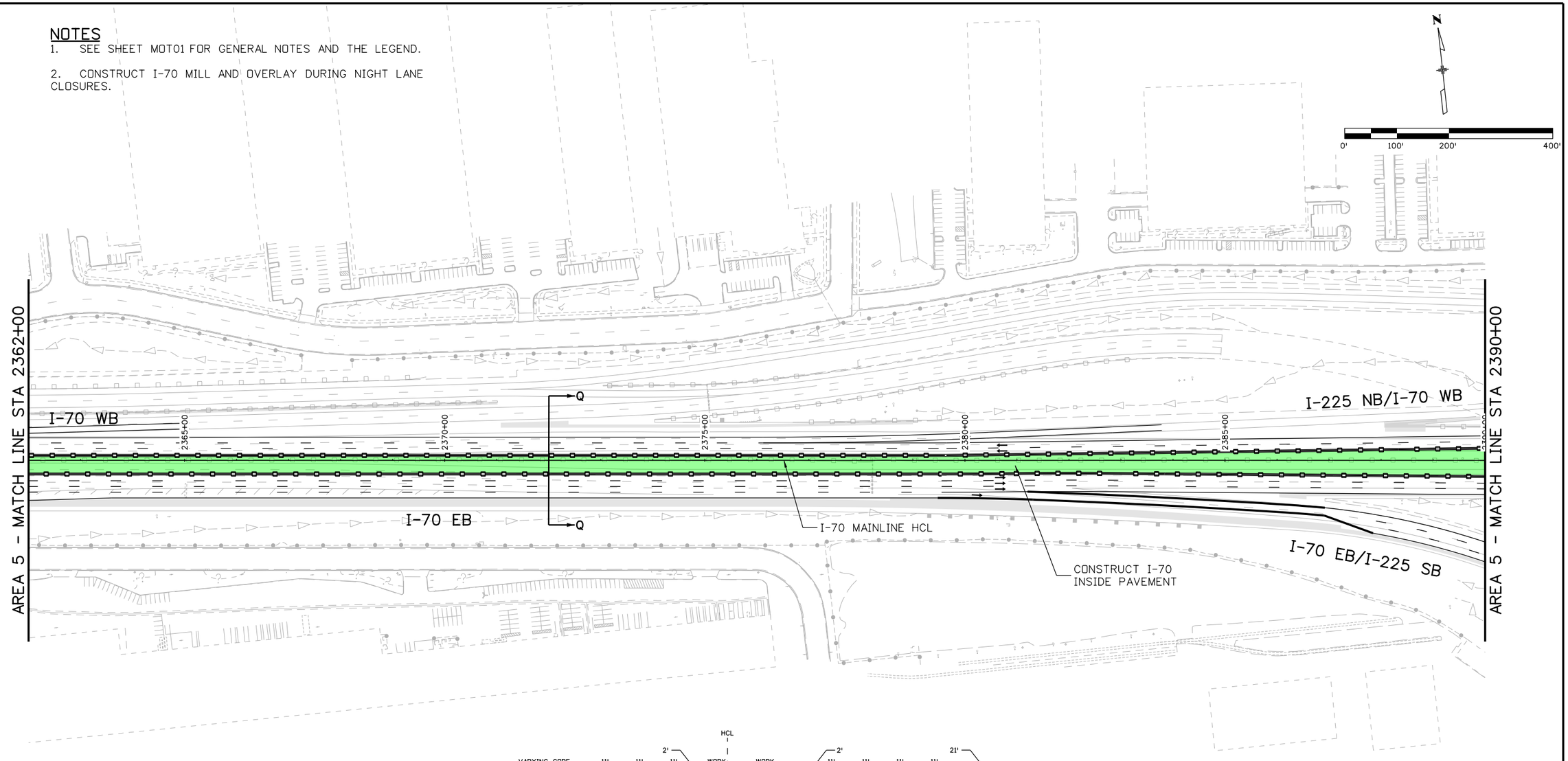
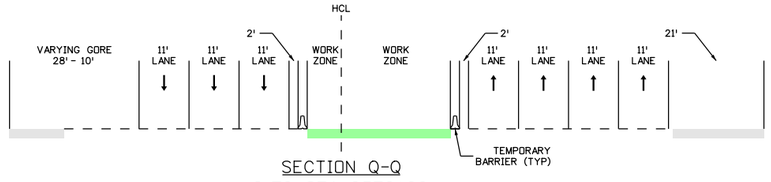
Front Range Mobility Group	Horiz. Scale: As Noted				Region 1 KJS
	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 5 PHASE 2 STAGE 1			Project No./Code
No Revisions:	Designer: R. MITRY	Structure Numbers		FBR 0704-234
Revised:	Detailer: C. SNYDER			19631
Void:	Sheet Subset: MOT	Subset Sheets: 80 of 83		Sheet Number

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.





SECTION Q-Q
I-70 STA. 2372+00
NTS

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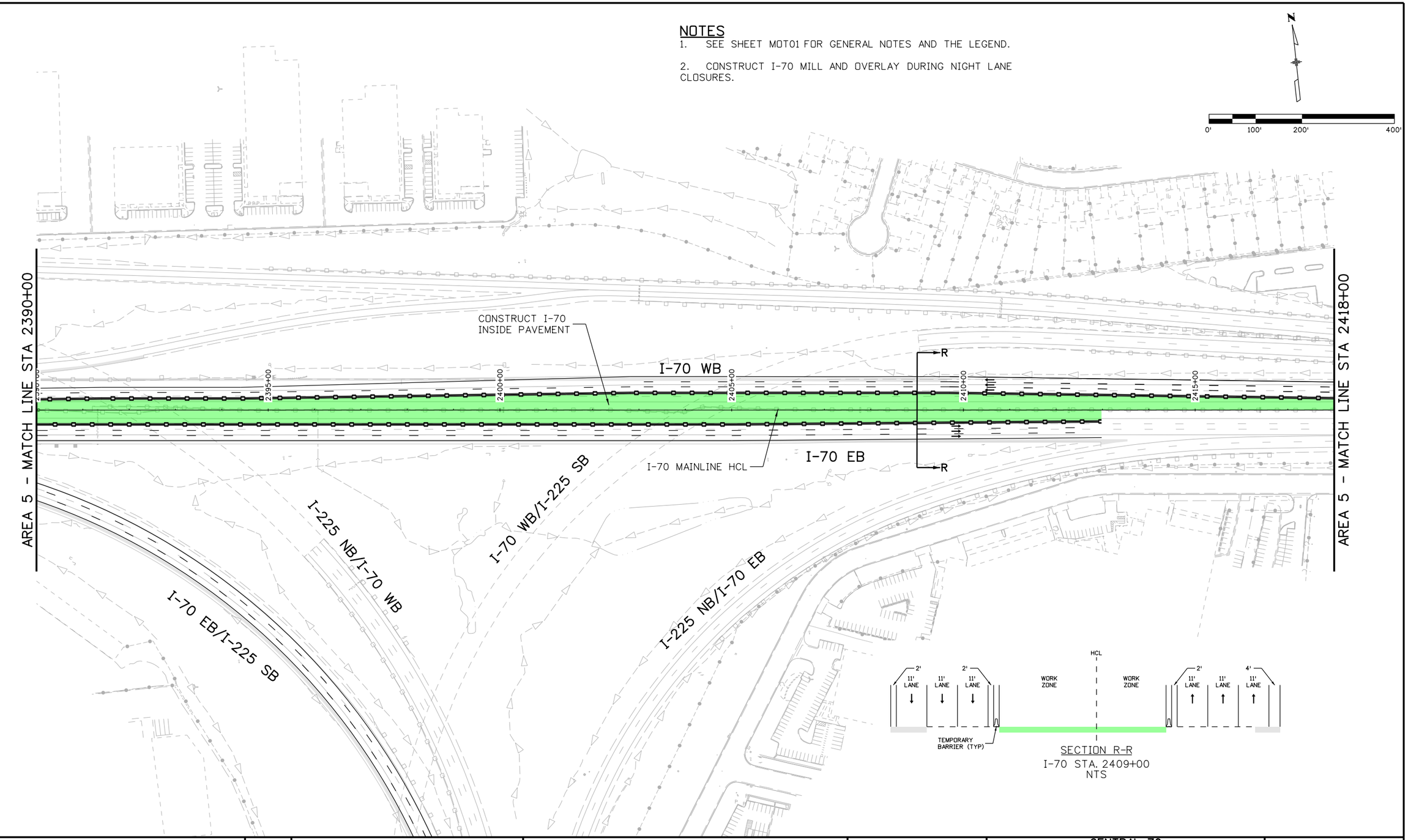
Print Date: 5/11/2017		Sheet Revisions			Colorado Department of Transportation	PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 5 PHASE 2 STAGE 1	Project No./Code
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:	Designer: R. MITRY	FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Detailer: C. SNYDER	19631
	Vert. Scale: As Noted					Void:	Sheet Subset: MOT	Sheet Number
	Unit Information				Region 1 KJS		Structure Numbers	
	Unit Leader						Subset Sheets: 81 of 83	

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.
2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.



SECTION R-R
I-70 STA. 2409+00
NTS

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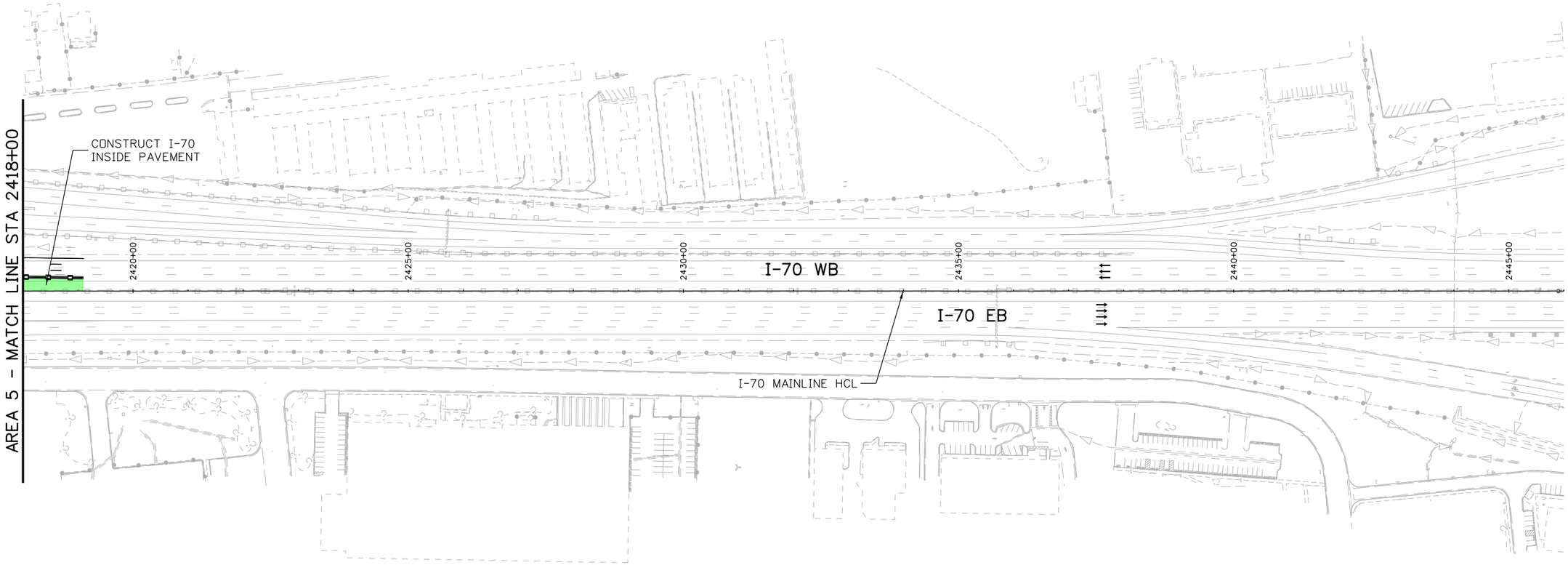
File Name: See sheet edge for information		Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:					FBR 0704-234
Front Range Mobility Group	Horiz. Scale: As Noted					Revised:	Designer: R. MITRY	Structure Numbers			19631
	Vert. Scale: As Noted						Detailer: C. SNYDER				
	Unit Information					Void:	Sheet Subset: MOT	Subset Sheets: 82 of 83			Sheet Number
	Unit Leader				Region 1 KJS						

NOTES

1. SEE SHEET MOT01 FOR GENERAL NOTES AND THE LEGEND.

2. CONSTRUCT I-70 MILL AND OVERLAY DURING NIGHT LANE CLOSURES.



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Print Date: 5/11/2017			Sheet Revisions			Colorado Department of Transportation	PROPOSAL	CENTRAL 70 MAINTENANCE OF TRAFFIC AREA 5 PHASE 2 STAGE 1			Project No./Code
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Attachment 2
Courtesy Patrol

Front Range Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

Attachment 2 - Courtesy Patrol Specifications

Introduction

FRMG will provide a Courtesy Patrol Service in order to reduce congestion and potential safety risks to motorists during Construction and the Operating Period. As an overview, FRMG will provide the following general courtesy patrol services, always acknowledging that Courtesy Patrols are the face of CDOT to the motoring public providing assistance when motorists are stranded or disabled. Courtesy Patrol overview:

- To locate a disabled vehicle on the shoulder of the highway segment and, at the motorist's election, to move the vehicle to an appropriate drop-site and there to provide the limited assistance available to FRMG (i.e. flat tire, out of gas, etc.) if such assistance will make the vehicle operational
- To locate a disabled vehicle in traffic on the highway segment and, at the motorist's election, to move the vehicle either to the shoulder of the highway segment or to an appropriate drop site, and there to provide the limited assistance available to FRMG if such assistance will make the vehicle operational
- To assist motorists, and Local Agencies or Emergency Services as requested, concerning an accident or other emergency on the highway segment. Such assistance includes, without limitation, towing or pushing vehicles as directed, protecting the scene of an accident, cleaning up debris caused by an accident, and calling and assisting local law enforcement in the event of an accident
- To remove debris or other hazards from the roadway not requiring additional resources or equipment.
- To collect and report data to FRMG dispatchers and CTMC.

Courtesy Patrol Operators, vehicles, and dispatchers will adhere strictly to the following specifications.

1.1 General Requirements

A. The location and limits of the patrols will be the I-70 Mainline within the O&M limits.

B. FRMG will patrol and monitor the Project within the O&M limits every calendar day except for New Year's Day, Thanksgiving Day, and Christmas Day. The hours for patrol and monitoring will be 6:30am to 8pm for weekdays, and 10am to 7pm for weekends. FRMG will patrol and monitor regardless of weather conditions. Any extensions of operating hours due to emergencies, severe weather event or planned special events as identified by FRMG and accepted by the Department, or as required by the Department,

(up to 30 hours per contract year for all required vehicles, dispatch staff, and required personnel and equipment) will be the responsibility of FRMG.

C. FRMG will provide full time dedicated dispatch staff responsible for dispatch of FRMG's Courtesy Patrol Vehicles when there are Incidents, accidents, or other events requiring the services of the Courtesy Patrol Vehicles. FRMG will also interface with the Department's Mile High Courtesy Patrol program. FRMG's dispatch staff will be co-located with the Department's CTMC dispatch staff, unless otherwise agreed by the Department. FRMG's dispatch staff may also operate the CCMS as required in Section 3.2.3 of this Schedule 11 if FRMG can demonstrate to the Department's satisfaction that both functions can be carried out as per the requirements of this Schedule 11.

D. FRMG will respond with vehicle to any calls on the tolled express lane(s) or general purpose lane(s) within fifteen (15) minutes of being dispatched from the Department's call center or authorized Department representative. All vehicles will be towed to a designated drop site. Drop sites will be open at all times during the patrol and monitoring hours set out in Section 1.1.B. of Appendix B of this Schedule 11. Furthermore, Incidents or accidents will be moved to the nearest shoulder, or a location that is safe to all, to open all lanes of the tolled express lane(s) and general purpose lanes. FRMG will use flat-bed or wrecker tow trucks to remove vehicles from the scene, and these trucks will meet the requirements in this Schedule 11 and contain all the equipment that is set forth by the Colorado PUC. No gas, tire change, or jump start will be given to anyone in the Tolled Express Lane(s) and General Purpose Lanes due to the danger of the location. Cell phones will be provided for emergency uses only.

E. FRMG will provide the Courtesy Patrol Service vehicles needed to perform the assistance services mentioned above.

F. FRMG will comply with all laws regarding travel on the shoulders of any highway areas.

1.2 Specific Work Requirements

A. Work Requirements:
FRMG will provide such services according to the following requirements:

1. All services will, at all times, be provided by FRMG free of any charge to, or payment from, the disabled motorists or any other person or entity, public or private. FRMG will refuse any offers of other payment or gratuities of any kind.
2. FRMG will provide the services to disabled motorists only after FRMG explains to the motorist the services to be provided (including the drop site, and that the services are free of charge), and only after requesting and obtaining the motorist's consent to such services. The services may be refused by the motorist at any time.

3. Subject to the motorist's consent, it is preferable for FRMG to move the vehicle from traffic or from the shoulder (whichever is applicable) off of the highway to a drop site before providing additional services, in order to eliminate any hazard or congestion that might result if FRMG provided service in traffic or on the shoulder.
4. FRMG will move a disabled vehicle that is in traffic to the shoulder of the highway and provide limited assistance to the vehicle on the shoulder, as an alternative to having the vehicle moved from the highway to a drop site.
5. FRMG will provide service(s) chosen by the motorist; however, FRMG will not provide any service not described herein.
6. FRMG will report all occurrences causing traffic congestion, all Incidents requiring FRMG to be in and out of service, and each beginning and ending shift to the Department when the event occurs.

B. Drop Sites:
FRMG will obtain the right to use suitable "drop sites" near the Project.
A "Drop site" is defined as any business location to which the FRMG can tow (and leave) the disabled vehicle, and from which the motorist of the disabled vehicle can safely make arrangements to be picked up and/or to have the vehicle repaired, subject to the specific conditions described below.

1. SPECIFIC DROP SITE CONDITIONS: Drop sites will satisfy all of the following specific conditions:

    a. The site(s) will be located as close as reasonably possible to the highway, and within the Project limits.
    b. The sites will be well lighted and must have a working phone (pay or business) available to the public on the premises.
    c. It is preferable, but not required, that each business drop site be able to provide assistance to the disabled vehicle, e.g. full service gas stations, tire stores, or other repair facilities.
    d. Businesses used as drop site(s) must allow a disabled vehicle to remain on site, free of charge, for at least three hours, in order to provide sufficient time for the motorist to make suitable arrangements.
    e. FRMG will have written evidence from the owner/operator of the business of FRMG's right to use that business as a drop site.

2. GENERAL DROP SITE REQUIREMENTS: FRMG will also comply with the following general requirements concerning drop sites:

    a. FRMG will not receive any payment or compensation of any kind from such businesses in connection with, or as a result of, the program services, including for any repairs made to the vehicle by the business.

b. The particular Drop Sites used by FRMG may vary from hour to hour, depending on the conditions at each site during the hours of operation of the patrol.

c. FRMG will provide a list of Drop Sites, listed by hour each Drop Site is available for use, to the Colorado State Patrol and to any local law enforcement agency with jurisdiction over such sites immediately upon commencement of the O&M Work. FRMG will also provide any modification of such list to such agencies and the Department within one (1) working day of that modification.

d. As described above, FRMG will obtain the motorist's consent to move the motorist and the disabled vehicle to a Drop Site. FRMG will explain to the motorist that they have only three hours at the Drop Site to make suitable arrangements or their vehicle can be towed away at their expense.

e. The Department will not be responsible for any motorist injury or vehicle damage resulting from FRMG's selection or use of a particular Drop Site.

f. FRMG will not leave a motorist and/or a disabled vehicle at a particular Drop Site if, under the circumstances, that Drop Site presents an unreasonable risk of harm to the motorist or vehicle.

3. WORK PROHIBITIONS: The success of this Courtesy Patrol program relies heavily on public relations and on the public's perception of the program's purposes and operation and, therefore, on the conduct of FRMG and its operators in performing the program services.

The Department has determined that all of the actions listed below would create a negative public image, present a problem for local law enforcement concerning traffic management, and interfere with the operation and success of the program. Therefore, at all times during the performance of the Courtesy Patrol Services, FRMG, its operators, and its employees will not:

1. Solicit membership in any commercial/business organization or association, including vehicle repair or service associations.
2. Recommend or pressure motorists to use any towing service other than the Courtesy Patrol for a disabled vehicle.
3. Recommend, or pressure motorists to use, any business (including Drop Site businesses) for service on a disabled vehicle.
4. Radio for an alternative towing service, except when specifically asked by a motorist to do so, after the free Courtesy Patrol Services have been offered and explained to the motorist.
5. Tow a vehicle to a location other than the shoulder of the highway segment, or to the designated Drop Site nearest the vehicle location.

6. Interfere with a private sector towing service that is already present at the immediate location of a disabled vehicle. When FRMG arrives at the vehicle in such circumstances, FRMG should stop and offer assistance only to the motorist.
7. Patrol near another Courtesy Patrol Services vehicle off the Project limits.
8. Stay at the scene of an accident on the highway segment after the local law enforcement authorities have arrived at the scene, unless requested by local authorities to assist at the accident scene.
9. Refuse the orders of a law enforcement officer, or any directions the Department, or his/her designee, as provided to the FRMG.
10. Tow a disabled vehicle while the motorist, or other occupants of the disabled vehicle, are in the towed vehicle, or leave any unattended occupants on the freeway while towing the vehicle. Patrol staff will contact FRMG dispatcher and request alternate transport of such occupants (e.g. other Courtesy Patrol Service vehicle or police vehicle).
11. Accept tips, money, or any other payment or compensation of any kind from the disabled motorists for the services provided.
12. Patrol with any other person in the patrol vehicle, unless that person is directly associated with the FRMG.
13. Commit traffic violations of any kind including without limitation, speeding, or illegal lane changes.
14. Perform any act that provides an unfair competitive advantage to any private tow service.
15. Use the vehicle's yellow warning lights other than as authorized by law. The yellow warning lights will be activated only when the vehicle is operating on the roadway to eliminate hazards to other traffic, as required by Colorado Revised Statutes 42-4-214.
16. Complete services as a private tow service when services were initiated as Courtesy Patrol Service. This includes staying at the scene of an Incident until the end of patrol hours in a FRMG assigned shift, removing Courtesy Patrol Service signs, and then performing services as a private tow service for a fee. Courtesy Patrol Service signs will be put in-place before entering, and removed and upon leaving, the freeway.

FRMG will notify the Department of any of its operators/employees who perform such actions and FRMG will take immediate action to remove such operators/employees from further performance of program services.

C. PATROLLING: FRMG will dispatch the appropriate number of Courtesy Patrol Service vehicles to patrol the Project and to meet the response timeline as set out in Section 1.1.D of this Appendix B. The operators/drivers of patrol vehicles will be sufficiently spaced to adequately provide continuous coverage. The Courtesy Patrol Service vehicle(s) will patrol the designated highway segment for disabled vehicles in need of assistance and, upon finding such vehicles, remove such vehicles from the traveled portion of the highway segment and/or providing assistance to such vehicles as quickly as possible.

When a disabled vehicle incident/accident is discovered, the patrol vehicle will respond as follows:

1. **Arriving At a Disabled Vehicle on the Shoulder:** When a FRMG operator finds a disabled vehicle on the shoulder of a highway segment, the operator will pull directly behind the vehicle. However, the operator will not turn on the towing vehicle's yellow warning lights unless the disabled vehicle or the towing vehicle poses a hazard to other motorists.

   The operator will communicate data collection requirements to the CTMC dispatch for detection (if the operator is the first to identify the Incident) and verification (location of the incident based on the initial radio report).

   The operator will then exit the patrol vehicle, distribute Department's program brochure, and offer the program services to the motorist. Following directives provided by the Department, the operator will explain to the motorist:

   a. The Courtesy Patrol is a Department program;
   b. The program is publicly funded;
   c. The services are free of charge to the motorist;
   d. Quick clearance Benefits;
   e. The motorist has the option to refuse or accept the service;
   f. Only particular services may be provided to the motorist (as defined below);
   g. The nature of the Drop Site(s) available;
   h. The motorist has the option to leave his/her vehicle on the shoulder of the freeway or to be taken to a Drop Site; and
   i. Law enforcement may provide authorization to override a motorist's refusal to move the vehicle.

FRMG's operator will then request the motorist's consent, to such service, and must obtain such consent, in writing, before providing service.

The FRMG's operator will offer to allow the motorist to use the mobile telephone equipment in the Courtesy Patrol Service vehicle, and the motorist will be allowed up to five minutes of local calls at no charge to the motorist.

If the motorist refuses the service, FRMG's operator will contact the CTMC dispatch to determine if the operator should leave the scene to continue patrolling or protect the vehicle until law enforcement arrives.

If the motorist consents to service and if the operator can make the vehicle operational by providing the limited assistance available to the FRMGs operator, then the operator will proceed as follows:

a. If the motorist does not consent to have the vehicle moved, and the operator can render service on the shoulder with minimal hazards created, then the operator will render such service on the shoulder for a period not to exceed 10 minutes. If the operator cannot make the vehicle operational within 10 minutes then, with the motorist's consent, the operator will move the disabled vehicle and motorist to the Drop Site nearest the location of the vehicle. If the motorist does not consent to moving the disabled vehicle and the operator has offered all available options of the Courtesy Program to the motorist, the operator will notify his/her supervisor and the appropriate law enforcement agency then leave the scene immediately and continue patrolling, unless dispatch and/or law enforcement direct them to stay on scene.
b. If the motorist does consent to have the vehicle moved, it is recommended that the vehicle be moved to the nearest Drop Site to provide assistance.

After the vehicle is moved to the shoulder or if the operator provides assistance on the shoulder the operator will notify CTMC dispatch that the lane is clear. When the disabled vehicle and the motorist are moved safely to the Drop Site and/or assistance provided at the Drop Site, the operator will notify the CTMC dispatch that the incident has been removed from the roadway and shoulder. The operator will immediately return to patrolling.

2. **Arriving At a Disabled Vehicle in Traffic:** When FRMG's operator finds a disabled vehicle in traffic, the operator will pull directly behind the vehicle as soon as possible, and turn on the tow vehicle's yellow warning lights.

   FRMG's operator will communicate data collection requirements to the CTMC dispatch for detection (if the operator is the first to identify the Incident) and verification (location of the incident based on the initial radio report).

   FRMG's operator will then ask for the motorist's consent to move the disabled vehicle, and the motorist, to a Drop Site (first choice), or to the shoulder of the highway segment (second choice). If the motorist consents, the operator will take appropriate action and inform the CTMC dispatcher of the incident's status, when the blocked lane has been cleared, and when the incident has been removed from the roadway and shoulder. FRMG's operator will then exit the vehicle and explain the Department's program to the motorist, and the services available.

If the motorist refuses, the operator will immediately contact local law enforcement to report the disabled vehicle in traffic, and the operator will stay directly behind the disabled vehicle with yellow warning lights activated until the vehicle is moved from traffic or until a local law enforcement officer arrives. The operator will follow the instructions of the local law enforcement officer and inform the CTMC dispatcher of the incident's status.

3. **Arriving At an Accident:** When the operator finds an accident on the highway, the operator will pull directly behind the vehicle(s) as soon as possible and turn on the yellow warning lights. The operator should then carefully exit the patrol vehicle and discuss the situation with the motorist(s).

   The operator will communicate data collection requirements to the CTMC dispatch for detection (if the operator is the first to identify the Incident) and verification (location of the Incident based on the initial radio report).

   If there are injuries, the operator will not attempt to move the vehicle(s), but rather immediately call 911 and discuss further action with local law enforcement. The operator will follow all instructions made by local law enforcement and inform the CTMC dispatcher of the Incident's status.

   If there are no injuries (accident involves only property damage) but the vehicle(s) cannot be safely driven, the operator will explain the program to the motorists and ask the motorist's consent to move the vehicles from the traveled portion, median, or ramp of the highway and inform the CTMC dispatcher of the Incident's status.

   If the motorist does not consent, then the operator will stay immediately behind the vehicles until local law enforcement arrives, will assist law enforcement as requested, and inform the CTMC dispatcher of the Incident's status.

   If the motorist consents, the operator will request additional Courtesy Patrol assistance before taking further action. (The operator should not move one of the vehicles if that means the other disabled vehicle will remain alone in traffic, but instead protect the accident scene by staying directly behind both vehicles until assistance arrives). If the motorists have already fulfilled the requirements of Colorado Revised Statutes 42-4-1603, concerning exchanging identification/information, then when assistance arrives, the operator(s) should move the disabled vehicles to the nearest Drop Site if damages appear to total less than $1,000.00 (indexed). If the motorist(s) have not exchanged such information, then the operator(s) will move the vehicles to the nearest suitable location for that purpose in accordance with C.R.S. 42-4-1602(2).

Under no circumstances will an operator attempt to repair an accident vehicle in an attempt to make it mobile.

The operator will communicate data collection requirement to the CTMC dispatch when the Incident has been moved from the travel lanes and when the Incident has been removed from the roadway and shoulder.

1.3 Specific Equipment Requirements

The Courtesy Patrol Service roving fleet will contain at a minimum 50% towing vehicles, the remainder of the fleet (maximum of 50%) will be motorist assistance vehicles.

A. The Courtesy Patrol Service vehicles will be equipped, at a minimum, with the following:

Towing Vehicles:

1. Wheel lift towing equipment, including safety straps with a minimum lift rating of 3,000 pounds;
2. Hydraulic boom lift capability with a static rating of 5,000 pounds;
3. Winch cable with an 8,000 pound rating on the first layer of cable;
4. Towing slings rated at 3,000 pounds;
5. Tow chains of 5/16" alloy or OEM specs, and J.T. hook assembly;
6. Yellow/amber warning lights with front to rear (360 degree) directional flashing, with on/off switch in cab;
7. Power outlets ("hot boxes"), front mounted , with outlets compatible with 12-volt booster cables;
8. Heavy duty, 60+-amp battery;
9. Two-way radio communications with base office;
10. Cellular telephone;
11. Cab Lighting;
12. Rear work lights;
13. Safety D-ring on rear of truck;
14. Floor jack on rollers with a 2-ton rating;
15. All equipment necessary to operate the towing vehicles during winter driving conditions (i.e. chains, studded snow tires, etc.);
16. Wrap around push bumpers; and
17. Automated Vehicle Location (AVL).

Motorist Assistance Vehicles:

1. Winch cable with a 12,000 pound rating on the first layer of cable;
2. Tow chains of 5/16" alloy or OEM specs, and J.T. hook assembly;
3. Two (2) tow straps rated at 53,000 pounds, minimum;

4. Yellow/amber warning lights with front to rear (360 degree) directional flashing, with on/off switch in cab;
5. Power outlets ("hot boxes"), front mounted , with outlets compatible with 12-volt booster cables;
6. Heavy duty, 60+-amp battery;
7. Two-way radio communications with base office;
8. Cellular telephone;
9. Cab Lighting;
10. Rear work lights;
11. Safety D-ring on rear of truck;
12. Floor jack on rollers with a 2-ton rating;
13. All equipment necessary to operate the motorist assistance vehicles during winter driving conditions (i.e. chains, studded snow tires, etc.);
14. Wrap around push bumpers;
15. Automated Vehicle Location (AVL); and
16. Child restraints in accordance with C.R.S. 42-4-236.

B. In addition to the specific vehicle equipment described above, at the start of a shift, the Courtesy Patrol Service vehicles will contain each of the following items in order to ensure adequate service to disabled vehicles. These items will be promptly replenished prior to the next shift, and as needed:

Towing Vehicle:

1. Unleaded gasoline (5 gallons) available in an easy access gas transfer system;
2. Safety chains measuring a minimum of 5 ft. (1 each);
3. Radiator water (5 gallons). Anti-freeze will be added to the water when needed to keep the water in a liquid form;
4. Four way lug wrench (metric) (1 each);
5. Four way lug wrench (standard) (1 each);
6. Rechargeable air bottle (100 psi capacity), hoses and fittings to fit tire valve stems (1 each);
7. Flashlight and spare batteries (1 each);
8. Booster cables, 25 ft. long minimum, 3-gauge copper wire with heavy-duty clamps with one end adapted to truck's power outlets (1 set);
9. Funnel, multipurpose, flexible spout (1 each);
10. 36-inch highly visual orange traffic cones with reflectorized bands (5 each);
11. Reflector vest for the operator (1 each) (Type III night and day time);
12. First aid kit, 16 units (1 kit);
13. Fire extinguisher, 1OABC (1 each);
14. Hand broom (1 each);

15. Snow shovel (1 each);
16. Traction sand (20lbs);
17. Flares, 30 minute (3 each);
18. Reflective Triangular Warning devices (3 each);
19. Dry floor; and
20. Personal protective equipment such as gloves, glasses, etc.

Motorist Assistance Vehicle:

1. Unleaded gasoline (5 gallons) available in an easy access gas transfer system;
2. Safety chains measuring a minimum of 5 ft. (1 each);
3. Radiator water (5 gallons). Anti-freeze will be added to the water when needed to keep the water in a liquid form;
4. Four way lug wrench (metric) (1 each);
5. Four way lug wrench (standard) (1 each);
6. Toolbox containing:
   - Screwdrivers: Standard 1/8, 3/16, ¼, 5/16, (1 each), Phillips head #1 and #2 (1 each),
   - Star Driver (1 set),
   - Needle nose pliers (1 pair),
   - Adjustable rib joint pliers—2 inch minimum capacity (1 pair),
   - Adjustable wrenches, 8 inch (1 each) and 12 inch (1 each),
   - 5 pound hammer (1 each)
   - Rubber mallet (1 each)
   - Electrical tape (20 yards)
   - Duct Tape (20 yards)
   - Tire pressure gauge (1 each)
   - Mechanic's wire (25 foot roll)
   - Bolt cutter—24 inch or larger (1 pair), and
   - Complete set of box wrenches, metric and standard (1 set each).
7. Rechargeable air bottle (100 psi capacity), hoses and fittings to fit tire valve stems (1 each);
8. Flashlight and spare batteries (1 each);
9. Booster cables, 25 ft. long minimum, 3-gauge copper wire with heavy-duty clamps with one end adapted to truck's power outlets (1 set);
10. Funnel, multipurpose, flexible spout (1 each);
11. 36-inch highly visual orange traffic cones with reflectorized bands (5 each);
12. Reflector vest for the operator (1 each) (Type III night and day time);
13. First aid kit, 16 units (1 kit);
14. Drinking water, individually sealed bottles, minimum 16 oz. (12 each);

15. Fire extinguisher, 1OABC (1 each);
16. Hand broom (1 each);
17. Snow shovel (1 each);
18. Traction sand (20lbs);
19. Flares, 30 minute (3 each);
20. Reflective Triangular Warning devices (3 each);
21. Dry floor; and
22. Personal protective equipment such as gloves, glasses, etc.

A. FRMG's operators will wear Department approved uniforms. Uniforms will include, at a minimum, shirts covering the chest and armpits, full length pants, and protective footwear. FRMG will submit uniform samples for review and Acceptance of the Department prior to beginning work and in the event changes are proposed. The FRMGs operators will wear high visibility safety apparel. These items will be provided and maintained by FRMG. FRMG's operators will wear hats with FRMG logos at all times while patrolling.

B. FRMG's operators will not smoke during patrol operations and/or while assisting motorists.

C. FRMG's operators will not use, be under the influence of, or have in their possession any alcohol, marijuana, or illegal substances during patrol operations. Operators will not carry firearms, or any device whose primary function is as a weapon, either on their person or in the towing vehicle.

D. FRMG's operators will express a positive, helpful, cooperative attitude when dealing with motorists.

E. Any new operator assigned by FRMG to the program, will be properly trained in the courtesy patrol program and field operations. The new operator will accompany a current operator, experienced with the Mile High Courtesy Patrol, for at least five shifts prior to patrolling a highway.

F. Any new operator assigned by the FRMG to the courtesy patrol program will complete required FRMG training, which will be consistent with training on the Mile High Courtesy Patrol program, prior to patrolling a highway segment.

1.4 General Equipment and Operator Requirements

FRMG will comply with the general equipment and operator requirements described in this section.

FRMG will provide the Courtesy Patrol Service vehicles needed to meet the Performance Requirements in this Schedule 11. The Courtesy Patrol Service vehicle(s) will meet the following requirements at all times during the O&M Period During Construction and Operating Period.

A. Tow Trucks: Tow truck will be Colorado licensed, including Public Utility Commission licenses, and be an insured Class A tow truck with a minimum gross vehicle rating of 10,000 pounds, dual wheel chassis and four (4) ton recovery equipment rating. Flatbed "roll back" service trucks may be used in-lieu-of boom type wrecker trucks. Flatbed trucks must be equivalent in capacity to specified boom type trucks (excluding vertical lift) to safely handle the scope of work.

B. Motorist Assistance Vehicle: Motorist assistance vehicles will be at minimum, a full size, one ton crew cab 4 door, long bed pickup truck with a minimum gross vehicle rating of 10,000 pounds, insured, equipped with and capable of carrying the equipment specified.

C. All Courtesy Patrol Service vehicles will be completely operational, in sound mechanical condition, and in full compliance with applicable legal requirements at all times, for the performance of the program services.

D. The Courtesy Patrol Service vehicle's exterior will be reasonably clean at the beginning of each shift, free of road grime, grease, and articles/equipment not needed for the program. No body damage and/or broken glass will be permitted on the vehicle at the start of a shift.

E. The inside of the vehicle will be kept clean. The seat and floor will be free of dirt, grease and any other substance that may transfer to someone's clothing by contact. The seat will not be torn. Exposed springs, seat stuffing or damaged upholstery will not be permitted. Torn dashboards, missing screws, hanging hoses or wire, or any other unsightly items inside the cab will not be permitted.

F. FRMG will maintain a backup Courtesy Patrol Service vehicle at all times and will use the backup to replace any disabled or otherwise unavailable Courtesy Patrol Service vehicle.

G. The towing vehicles and motorist assistance vehicles must be a single color, as Accepted by the Department.

H. The vehicle will display a 15 inch by 26 inch (minimum) Courtesy Patrol logo sign on each door at all times during performance of program services. FRMG will have signs accepted by the Department to verify logo and branding consistency with the Department's Mile High Courtesy Patrol Program. FRMG name, phone number, and/or logo will not be

permitted anywhere on the vehicle, unless completely covered with the Courtesy Patrol Service signs during performance of program services. All private information including, but not limited to logos, contact information, etc. will be completely covered at all times while a vehicle is in service.

I. The Courtesy Patrol Service signs will be removed from the vehicle at all times when the vehicle is used for purposes other than the Courtesy Patrol Service program. FRMG will cover or remove future branding/sponsorship information when vehicles are not in service for Courtesy Patrol Service activities.

J. FRMG will only be required to perform services up to the capacities of their equipment. If situations are encountered outside of their capacities, the operators will:

1. If on shoulder, offer use of cellular phone.
2. If in roadway, alert motorists by activating yellow warning lights and contacting the responsible law enforcement agency.
3. When a police officer is at the scene, return to patrolling, unless otherwise ordered.
4. When cellular phones are provided, their usage must be reasonable to the situation. FRMG will have the right to control unreasonable requests (such as calls outside the 303, 720, or 719 area codes). FRMG will provide the cellular phone numbers to the Department upon request.

1.5 Safety of Vehicle Occupants

FRMG will make provisions to transport all occupants of a disabled vehicle to the shoulder of the road or to the Drop Site. Under no circumstances are any occupants or pets to be left unprotected in the disabled vehicle while the vehicle and operator are transported to the shoulder of the road or a Drop Site

1.6 Radio Procedures

The Department has developed and will provide radio procedures for use by the FRMG's operators, unless FRMG has developed radio procedures that are otherwise Approved by the Department. The Department may periodically update procedures, where such updated procedures will be provided to FRMG in writing. A schedule for implementation of the updated procedures will be provided by the Department for FRMG to follow, unless alternate arrangements are approved by the Department.

FRMG will provide all the radios required for the Courtesy Patrol Services program within the Project.

1.7 Mail-In Cards

FRMG will give every assisted motorist a mail-in card, and a program brochure. The card will aid the Department in tracking those services provided to the motorist and the public's reaction to the program. The Department will provide FRMG with the mail-in cards and program brochures. If mail-in cards and/or brochures are updated, FRMG will distribute the most recent version.

1.8 Paperwork

FRMG will be required to complete an electronic log of each motorist assist and a log of total miles driven each shift for each operator. Motorist assist logs will also include data collection points of detection, verification, lane clearance, and roadway clearance times. FRMG's vehicles that are required to use express toll lanes will also complete a toll log. The logs will be accurate and completed at the end of each shift. FRMG will submit these logs electronically through the AVL system in chronological order for each operator.

1.9 Training and Operational Meetings

All operators will receive orientation training provided by the FRMG and accepted by the Department, prior to the operator performing Courtesy Patrol Services duties. FRMG will not allow operators not having this training to perform any duties of the Courtesy Patrol Services program.

Front Range
Mobility Group

APPENDIX F

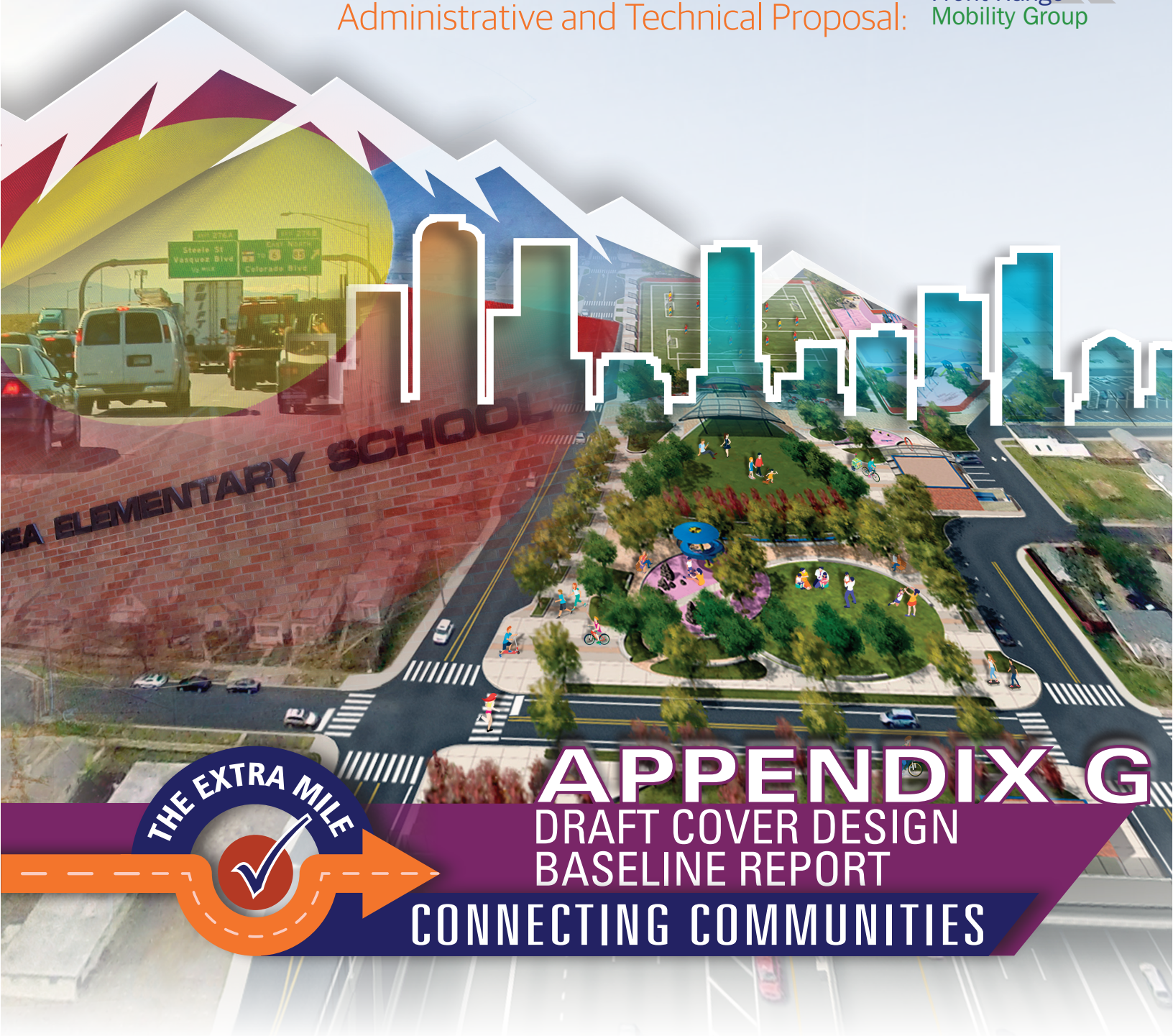
Part 2 of DRAFT TRANSPORTATION MANAGEMENT PLAN

VOLUME 2 – TECHNICAL SUBMISSIONS
Binder 11 of 18

CENTRAL 70 PROJECT

PUBLIC DISCLOSURE
Administrative and Technical Proposal:

Front Range Mobility Group



THE EXTRA MILE

APPENDIX G

DRAFT COVER DESIGN BASELINE REPORT

CONNECTING COMMUNITIES

Draft Cover Design Baseline Report

For

Central 70 Project

Contract #

Prepared By:

Front Range Mobility Group

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List of Acronyms

AID	Automatic incident detection
AHJ	Authority Having Jurisdiction
CCMS	Command Control and Monitoring System
CFD	Computational Fluid Dynamics
CFS	Cubic feet per second
CTMC	Colorado Transportation Management Center
CVS	Cover Ventilation System
DMS	Dynamic message signs
DSRC	Dedicated Short Range Communications
EPA	Environmental Protection Agency
FCC	Federal Communication Commission
FDAS	Fire Detection and Alarm System
FFFS	FRMG's proposed Fixed Firefighting System
FHWA	Federal Highway Administration
FRMG	Front Range Mobility Group
GUI	Graphical User Interface'
HVAC	Heating, Ventilation, and Air Conditioning
ICD	Interface Control Document
ITS	Intelligent Transportation System
LED	Light emitting diode
LHD	Linear heat detection
LUS	Lane-use signals
MEP	Mechanical-Electrical-Plumbing
PM	Particulate Matter
RFC	Release for Construction
RSU	Road Side Units
RWC	Rijkswaterstaat
SCADA	Supervisory Control and Data Acquisition

SIL	Safety Integrity Level
TDH	Total dynamic head
UPS	Uninterruptable Power System
VFD	Variable frequency drive

1. Introduction

Front Range Mobility Group's (FRMG) Cover Design Baseline Report provides a system description for each of the Mechanical-Electrical-Plumbing (MEP) and Intelligent Transportation Systems (ITS) subsystems for the Lowered Section portion of the Cover. The descriptions include concept proposals, design criteria, performance, durability, and maintenance requirements. A Final Cover Design Baseline Report will be submitted for Acceptance in accordance with the Project Schedule 10 Section 12.

For this report, the following definitions are used:

"Cover"	means the Elements to be constructed by Developer within the limits depicted in the I-70 Cover Plans, which (except to the extent otherwise specified in this Agreement) includes both "Planning Area 1" and "Planning Area 2," as depicted in the I-70 Cover Plans.
"Cover MEP System"	means the mechanical, electrical, and plumbing system and ITS and communications systems identified in Section 12 of Schedule 10 (Design and Construction Requirements) required for the Cover and the Lowered Section between Brighton Blvd. and Dahlia St.
"Lowered Section"	means the segment of the I-70 Mainline between Brighton Boulevard and Dahlia Street where the proposed vertical profile is modified below existing ground. ***NOTE:*** *For the purposes of this report, when referencing the Lowered Section, it is referring specifically to the covered portion of the Lowered Section.*

1.a System Block Diagrams

This section provides system block diagrams for the various subsystems for operating and monitoring the Cover MEP Systems, along with Cover-related elements of corridor ITS external to the Cover (referred to as Project ITS). These subsystems are connected and integrated through the Command Control and Monitoring System (CCMS), the functionality of which is described in subsequent sections. The CCMS and staffing will reside at the Colorado Transportation Management Center (CTMC), which will serve as the primary control center. CCMS operations also will be available from a backup control center located at the southeast corner of the Cover. The backup control center will provide the necessary facilities and equipment to locally operate the Cover MEP Systems and related elements of the Project ITS, if CCMS operations and control from the CTMC is not available. The backup control center also will be available to provide on-site operation of the Cover MEP Systems during emergency situations. Block diagrams are included in Attachment 1, along with an Overall Cover MEP Location Plan (**Attachment 1, Figure 1**).

CCMS: The CCMS architecture will utilize a programmable logic controller-based Supervisory Control and Data Acquisition (SCADA) system that will interface with the subsystems specified in Schedule 10, Section 12 as part of the Cover MEP System. Communications links provided between the CCMS and the CTMC will enable sharing information (including video) and the promotion of integrated operations of the Cover MEP System and the Project ITS components located outside the Cover. Direct field interfaces will also be provided between the CCMS and the lane-use signals (LUS) and dynamic message signs (DMS) at the Lowered Section entry portals and to the ramp meter at the westbound Vasquez Blvd. entrance ramp so normal LUS/DMS metering operations at these locations can be overridden from the CCMS. These communication links are illustrated in **Attachment 1, Figure 2**.

Ventilation: The Cover Ventilation System (CVS) block diagram includes emergency ventilation fans, sound attenuators, ductwork, dampers, and actuators to describe the functionality of the ventilation system. During an Emergency Fire Scenario or a congested traffic scenario in the eastbound or westbound Lowered Section, the corresponding dampers will be opened and closed. For a fire event in either Lowered Section, the duty emergency ventilation fan will be activated, and the corresponding fan damper(s) will be opened to exhaust the incident Lowered Section. The single line and arrows on the block diagram indicate the airflow paths where the air travels through the sound attenuators, transitions, and the plantroom plenum louver. The diagram in **Attachment 1, Figure 3** shows a standby fan to be used when the duty fan is out of service or fails to operate.

Fixed Firefighting System (FFFS): FRMG's proposed Fixed Firefighting System (FFFS) system block diagram shown in **Attachment 1, Figure 4** includes the fire pumps (duty and standby), pump control panels, check valves, isolation valves, zone valves, main pipe, distribution pipe, fire pump room, zone valve rooms, and zones. During a fire scenario, the linear heat detection cable will trigger the incident zone valve to open, along with the adjacent zone valve, and the pump will be activated. The diagram shows how the Lowered Section will be zoned at every 100 feet to provide a total of 20 zones: 10 in the eastbound Lowered Section and 10 in the westbound Lowered Section.

Fire Detection and Alarm System: The Fire Detection and Alarm System (FDAS) includes the modular fire alarm control system, monitor module, linear heat cable, and end of line box. The block diagram in **Attachment 1, Figure 5** depicts the installation of linear heat cable adjacent to the fire suppression branch piping with a monitor module at one end and an end-of-line box at the opposite end of each zone. During a fire scenario, the linear heat cable will break, which will trigger the zone module to activate the fire suppression system for the two applicable zones, opening and closing the corresponding Lowered Section dampers, fan damper, and emergency ventilation fan.

Power Supply: FRMG's interpretation and design approach for the requirements in Schedule 10, Section 12, paragraph 12.18.2 are outlined below under the corresponding italicized requirements:

1. *The main electrical distribution will be configured, interconnected, and controlled to allow all services to the Cover to remain operational in the event of a single power supply transformer failure in the substation at either end of the Cover.*

FRMG will coordinate with Xcel Energy to provide two utility feeds and pad mounted transformers serving a double-ended switchboard (main-tie-tie-main) as required at each end of the Lowered Section. All services to the Cover MEP Systems are considered essential; therefore, system reliability is of high importance.

2. *Main switchboards will be configured with interlocking automatic transfer switch(es) to allow for Emergency standby generator installation to be connected to serve all essential services supplies to the Cover.*

Each double-ended switchboard will be backed up by a standby generator via electrically operated circuit breakers that engage the generator in the event of loss of power on both Xcel transformers.

3. *Diesel generators will be provided for backup purposes in order to run the Cover in the event of a failure of both electrical supplies.*

Diesel-driven standby generators will be provided at each double-ended substation to back up all services and allow the Cover MEP Systems to remain operational in the event of the failure of both Xcel transformers at either of the double-ended switchboard.

Based on the approach discussed above, the Cover electrical buildings will each have two independent Xcel medium voltage services as required in the Schedule 10, Section 12 of the Project Agreement. Each electrical building service will be composed of a main-tie-tie-main switchboard with a generator connected to the switchboard between the two tie circuit breakers. The two main and two tie circuit breakers will be electrically operated to switch between power sources in the event of a loss of power**. This configuration allows each section of the switchboard to be isolated for maintenance without impacting Cover MEP System operations**. A plant room building will be provided adjacent to the Cover that will house the backup control center and CVS. The electrical distribution for the plant room building will be similar to the Cover electrical buildings and will provide power to the Cover FFFS pump room. The single-line diagrams for these systems is provided in **Attachment 1, Figures 6-9**.

The design criteria in Schedule 10, Section 12 is based upon a longitudinal CVS concept, utilizing multiple jet fans at each Portal. As defined in ATC-26, FRMG's design approach utilizes **a semi-transverse ventilation system, which significantly reduces the power requirements for the CVS.** This concept moves the large power-consuming motors to a plant room building located off of (but adjacent to) the Cover. This leaves an electrical service load in the substation buildings only for lighting, uninterruptable power supply power for the ITS systems, and general purpose power. An alternate electrical distribution concept will be proposed during design to provide one double-ended substation (main-tie-tie-main) and generator at the plant room building adjacent to the Cover, with a distribution system to the Cover electrical buildings. This will allow the Xcel service feeders and generator(s) to be

consolidated in one area for maintenance with appropriate fire protection and redundancies to prevent a single point of failure. This concept is also included in **Attachment 1, Figure 9**.

Data Communication Systems: The preliminary data communication architecture as required per Schedule 10, Section 12 is provided in **Attachment 1, Figure 10**. The data communication system as shown in the figure will provide reliable, high-bandwidth, fault-tolerant communication links between the Cover MEP Systems throughout the Lowered Section and its immediate approaches, other plant rooms, lighting and power control systems, service buildings, and the CCMS at the backup control center. The data communication system will be integrated with the Project ITS communication network infrastructure at the backup control center (primary network interface node) and the southwest electrical room (secondary network interface node), thus providing logically redundant communication paths to the Cover MEP Systems from the CCMS at the CTMC. This will allow complete fault-tolerant operational control over all the Cover MEP Systems from the CTMC.

The Department will install firewalls at the required locations where the Lowered Section data communication system interfaces with the Project ITS data communication system, serving as the demarcation point between the Cover communications network and CDOT's network.

Other communication links and connections include:

- Direct field interfaces between the CCMS and the LUS and DMS at the Cover entry portals, and to the ramp meter at the westbound Vasquez Blvd. entrance ramp such that normal LUS/DMS/metering operations at these locations can be overridden from the CCMS.
- Direct communication link to the Denver Fire Department (i.e., station/control room) for transmitting fire alarms.

1.b Logic and Development Plan for CCMS Interfaces with Other Systems or Software

As shown in the overall CCMS block diagram (**Attachment 1, Figure 1**), the CCMS connects to and interfaces with multiple SCADA-based subsystems in the Lowered Section and with Project ITS elements outside the Lowered Section. Many of the subsystems have associated software and operational logic for automated control based on inputs from one or more primary monitoring devices and sensors in the Cover. For example, the ventilation subsystem adjusts operations automatically, based on real-time inputs from a variety of environmental sensors to maintain acceptable levels of vehicle emission contaminants within the Lowered Section. Moreover, the operation of these subsystems and the information from their associated monitoring devices can be expected to affect (and be affected by) one another.

This holistic view of Cover MEP System operations is provided by the CCMS and the necessary integration accomplished via interfaces with all the control subsystems and monitoring components. The plan for defining these interfaces includes the following activities:

- Develop the overall CCMS operational logic based on a number of scenarios (as discussed in a subsequent subsection on “System Operation”).
- Develop business process mapping for the scenarios — that is, visual representations of the steps, connections, inputs and information flows, decisions points, and outputs required for the CCMS to achieve the desired operation and results. This mapping also identifies when the specific activities take place, the degree of automation in the decision-making, the level of manual intervention required, and under what circumstances.
- Develop data flow diagrams for the CCMS based on the business processing mapping, providing a graphical representation of the flow of data through the CCMS between control subsystems and monitoring components.
- Develop an Interface Control Document (ICD), defining the inputs and outputs associated with CCMS operations (based on the DFDs) and associated interfaces between Cover MEP subsystems, Project ITS subsystems, and the CCMS. The ICD will define the associated standards and protocols. The level of detail required in the ICD will depend on the CCMS and subsystem vendors selected. It is possible that several of the installed subsystems will be turnkey in nature, with the result that many of the associated interfaces will have already been defined by the vendor (provided the operation of these subsystems conform to the Schedule 10 Section 12 requirements and scenarios). If multiple suppliers and subsystem vendors are involved, FRMG will develop more detailed ICD to describe proper flows of information and interfaces to achieve the required level of operation and functional requirements as specified in Schedule 10, Section 12.

1.c Proposed Ventilation System Type and Supplier

The proposed ventilation system type for the Lowered Section is semi-transverse ventilation. This system provides a duty fan and a standby fan, located outside of the Lowered Section, rather than multiple longitudinal fans mounted within the Lowered Section. A variable frequency drive controller will be provided to allow the fan to be started with reduced impact to the electrical system and allow for modulation of the fan speed for operation or maintenance purposes. The semi-transverse ventilation scheme to extract smoke and gases is composed of exhaust transverse ducts with damper modules, located between the structural girders that make up the Lowered Section. The ventilation system is composed of 10 transverse ducts for each Lowered Section bore, each with six damper modules located directly above the roadway. Thus, there are a total of 60 damper modules per Lowered Section or 120 damper modules in both parts of the Lowered Section. The operation of the dampers depends on whether a fire event or congested traffic event occurs. The required ventilation capacity was determined by using a Computational Fluid Dynamics (CFD) model. The total capacity of the ventilation system is 450 kcfm, which was a result of the ATC 26 CFD analysis. The CFD analysis assessed the performance of exhaust capacity starting at 250 kcfm and working up. It was determined that the minimum required flow rate to maintain a tenable environment is 450 kcfm with the proposed flat Lowered Section ceiling. The density and makeup of the vehicular traffic in the

Lowered Section that was used in FRMG's CFD analysis was exactly as detailed in Schedule 10, Section 12.

1.c.i Ventilation Design Process

The goal of a semi-transverse ventilation system is to limit the spread of smoke to within a short section of the Lowered Section. Smoke should not propagate longitudinally along the Lowered Section for a long distance, thus enabling passengers who are able to self-rescue to walk to the nearest Portal or cross passageway door to reach a point of safety. In addition, the height of the smoke layer and temperature within the Lowered Section must be maintained within the prescribed limits. The time taken to walk to the nearest exit point (and, if applicable, to wait in line while attempting to reach a point of safety) is based upon a well-established quantitative approach used on tunnels around the world. This total time is referred to as the egress time. The effectiveness of the Lowered Section safety systems is directly dependent upon maintaining a tenable environment for passengers and first rescuers for at least the total time of egress. It should be noted that the Lowered Section will be constructed with a zoned Fixed Firefighting System (FFFS) system and Fire Detection and Alarm Systems (FDAS) that can rapidly identify the exact location of a fire and reduce the speed of smoke propagation through the Lowered Section. However, the FFFS and its suppression impact have not been simulated in FRMG's analysis, so the results should be considered conservative.

1.c.ii Approach to Cover Portal Pressure Condition

Consideration of the required adverse Portal condition significantly influences the design of ventilation system for the Cover. The boundary condition for the Emergency Fire Scenario consists of headwind at the west Portal. The wind profile for the Lowered Section assumes a 1/7th power law with zero velocity at the datum level and reaching the maximum velocity of 6 m/s at a reference height of 100 feet. The profile of the wind is generally represented by using the 1/7th power law, as it approximates the atmospheric boundary layer well. It is a standard practice in CFD to represent the wind profile in this fashion. The wind profile power law determines the relationship between atmospheric wind speed at one height and that of another reference height. It is given by:

$$\frac{u}{u_r} = \left(\frac{z}{z_r}\right)^{\alpha}$$

where u is the wind speed, z is the height and u_r is the known wind speed at a reference height z_r. α is an empirically derived coefficient which for normal conditions is approximately 1/7th.

The wind velocity is based on the prevailing wind direction and velocity at Denver International Airport between 1997 and 2014; this wind rose was provided by the National Climatic Data Center website. Thus, the corresponding dynamic pressure is achieved at the Portal by directly prescribing the velocity profile as indicated above at the Lowered Section Portal boundary.

1.d Proposed FFFS Type and Supplier

FRMG's proposed FFFS design meets the criteria set out in Schedule 10, Section 12.14. The FFFS will limit the peak heat release rate, preventing the spread of the fire by reducing temperatures in its vicinity and improving conditions for fire department intervention. **The FFFS system equipment manufacturer(s) will be finalized during system design.**

The proposed FFFS is designed to suppress a fire with a potential growth to 120MW. The FFFS is designed to operate effectively with the CVS. The FFFS is a deluge system and is sized to allow for two active zones, each 100 feet in length, for a total length of 200 feet. Due to the overall length of the Lowered Section, there are a total of 20 zones (10 in each direction), and each zone covers approximately 9,200 square feet. The deluge system is sized at 0.30 gallons per minute/square feet (gpm/ft^2), providing 2,760 gpm of water to each zone and a total of 5,520 gpm for both active zones. The zone configuration and discharge density of the deluge system meets the requirements of NFPA 502 and international practice for road Lowered Section design. Suppression nozzles will be spaced to provide a sufficient and homogeneous distribution flow pattern in the area to be protected. Together with the FDAS, the FFFS is designed and configured to support the effective operation of the CVS as described in section 1.m of this report.

The FFFS is designed with two 450 HP electric motor driven pumps with reduced voltage starters; one is duty, one standby. **This configuration allows a pump to be taken out of service for maintenance without impacting the FFFS system operation.** The pumps have been sized for 5,520 gpm at 110 pounds per inch (psi) and selected for 110% of the full design flow rate. The jockey pump was sized for 30 gpm and 185 psig total dynamic head (TDH). Provisions to eliminate surge and water hammer effects in valves and pipework systems have been made. The pumps and pipe work will be designed to provide acceptable flow rate and pressure at each nozzle location during full system deployment. The pump station will be provided with a minimum of isolation valves; safety valves for each pump, set at 115% of the operating pump pressure; diverter valves; manifolds; filters to be 100% redundant or self-cleaning and provide a bypass for blockage, flow meters; pressure gauges; controls; and surge prevention devices.

The main distribution pipe work is a wet pipe that runs along the length of the Lowered Section. It will be installed below the freeze zone, with the following notable design features in accordance with the RFP requirements, NFPA 502 and the Denver Fire Code:

- The pipe will be ductile iron, standard 1/16 inch-thick cement lining inside, 1 mil bituminous coating outside, exterior coating of low-density polyethylene tube or sheet, using Class C polyethylene film, in accordance with AWWA C105. An alternative Polyvinyl Chloride (PVC), Pressure Pipe, 14" through 48" for water distribution system meeting Standard AWWA C905 per NFPA 24 Table 10.1.1.1 can be used for the main underground distribution pipe.

- Main distribution wet pipe above the freeze level will be heat traced to be maintained at no lower than 39 degrees Fahrenheit. The main pipe will then have branches to each valve room.
- The pipe work upstream of each zone valve will be dry pipe that will feed the suppression nozzles above the traffic lanes.
- The dry pipe will be ductile iron, standard 1/16 inch-thick cement lining inside, 1 mm bituminous coating outside, exterior coating of low density polyethylene tube or sheet, using Class C polyethylene film, in accordance with AWWA C106.
- Dry standpipes will be installed in both the eastbound and westbound bores and located in similar locations in each bore, at each cross bore door, and on the opposite wall. The piping will be cross-connected at bore door locations such that either bore can be supplied by either main. **Isolation valves will be provided to enable sections of the system to be shut down for maintenance without shutting the entire system down**. A hose connection will be provided at each cross bore door, in bore, located adjacent to the door. The dry standpipe is sized for a flow of two hydrants operating simultaneously at 750 gpm each, for a total flow rate of 1500 gpm. The minimum residual pressure at the hydraulically most remote 2.5 inch outlet will be 100 psi.

1.e FDAS Type, Model and Supplier

The FDAS has been designed in accordance with NFPA 502. The FDAS consists of automatic linear heat detection (LHD) and manual call points. **We will finalize the FDAS system equipment manufacturer(s) during system design.**

Three LHD cables will be installed within each Lowered Section bore in order to detect within the zones covered by the FFFS. Manual call points will be placed at maximum spacing of 100 feet within the Lowered Section to be aligned with the zone piping. The raising of an alarm condition within the Lowered Section will allow the CCMS operator to review the incident using CCTV prior to activation of the ventilation system or fire suppression system.

The fire alarm warning system will be based on audio/visual signals using fire-resistant, weatherproof sounders and strobes. Light strobes will be integrated with the sounders. Upon detection of a fire, a multi-tone intermittent audio alarm will be sounded by the sounders, along with a visual alarm by the light strobes. The alarm may be silenced by operator intervention or automatically after a set number of minutes.

Point smoke and heat detectors will be included within the Portal buildings. Audio/Visual devices, pull stations, and manual call points will be included within the Portal buildings.

Detectors will be monitored and controlled by the fire alarm control panels within the Portal buildings. FDAS systems will be addressable and will be designed and installed in accordance with requirements of NFPA 72.

A stair from the I-70 roadway level to the backup command center at the plant room building will be provided for use by Denver Fire Department personnel. **A protected room will be located**

at the roadway level near each portal for Fire Department use to review FDAS status and for ease of system troubleshooting and maintenance.

1.f CCTV Camera System Type, Model and Supplier

Final selection of the CCTV camera system manufacturer and model will be made during system design. The selected system will be compatible with CDOT's existing video management system. These CCTV camera locations will provide full coverage within the Lowered Section with minimal blind spots. For example, an operator will be able to identify a stopped vehicle in the Cover Lowered Section, although in some instances it might not be possible to view the entire vehicle when all cameras are in their "home" positions. The cameras will be mounted over the running lanes in groups of three. The middle camera in each group will use thermal technology per Schedule 10, Section 12.

The CCTV camera assemblies in the Lowered Section will include pan, tilt, and zoom capabilities and will have integrated wash/wipe functionality. The CCTV cameras will be integrated into the AID/CCMS for primary operational monitoring and into CDOT's video management system. Access to the video streams and controls to each CCTV camera will be available from the CTMC and the backup control center. Camera controls will be available to both AID/CCMS and CTMC ITS operators, based on established operational protocols.

The CCMS will have video recording capability. Recordings from all CCTV cameras in the Cover will be retained on video recording systems, compatible with CDOT's the Department's video management system, at the CTMC for a minimum of 30 calendar days. This will allow for the analysis of incidents that might have taken place before being overwritten (unless specifically marked for retention by an operator).

The CCTV cameras in the Cover will also be used as part of the automatic incident detection (AID) system.

1.g Operator Interface System

As previously discussed in Section 1.b of this report, the various Cover MEP System devices and subsystems will be integrated into the CCMS, providing the necessary interface between these subsystems and with the system operators. The Operator Interface will primarily be a Graphical User Interface (GUI) and will include a graphical representation of the Cover and the approaches thereto, such as tables showing pertinent operations data and events (including any alarms), and a streaming CCTV video feed. This information will be displayed on the workstations with multiple displays in the backup control center and the CTMC. Cover MEP System functionality, monitoring, and control can all be performed from the CTMC.

The graphical representation of the Cover and approaches will have multiple layers the operator can choose to view and monitor, singularly or in combination. It is envisioned that these layers will include the following:

- **Ventilation System**, including locations (via graphical icons) of the CVS fans and environmental sensors. The icons will also show (via color coding) the current mode of operations (e.g., normal, congested or emergency for the fans) and status/alarm/fault conditions. “Clicking” a device icon will provide additional information in a pop-up window, such as the speed, airflow direction, vibration levels and motor temperature levels of each fan. It also will show the Cover temperature and visibility, CO, and N02 levels at each environmental sensor. The window also will let the operator manually change the fan speeds as required (i.e., override automated operations, permitting maintenance personnel to access devices located in the plenum).
- **FFFS**, including locations of the FFFS zones and alarm indications whenever a fire is detected (either via the automated fire detection components or the manual control points). Alarms will be provided to the operator via the GUI whenever any element of the FDAS becomes faulty, and another alarm will sound if the fault condition will cause the Lowered Section to operate below the agreed minimum operational thresholds. Manual override of automatic operation of FFFS will be available through the user interface.
- **Lighting System**, including the locations of Cover lighting fixtures, luminance photometers, and pavement roadway luminance sensors. The status of these devices and any alarm conditions (e.g., designed illuminance levels are not being met) will be conveyed via a color code. Clicking a lighting element icon will provide additional status information in a pop-up window, such as the dimming level and the roadway luminance. The window also will allow the operator to manually control the lighting as required (i.e., override automated operations).
- **Power System**, including each substation and generator at the electrical rooms and plant building. The status and control of the main and tie circuit breakers and the associated generators will be conveyed via a color code. Clicking a power element icon will provide additional status information in a pop-up window, such as if the circuit breaker is open or closed, or if the generator is running. The window also will allow the operator to manually open or close a circuit breaker and start or stop the generator.
- **Emergency Communications**, including the locations and status of various emergency communications and ITS devices inside the Lowered Section. These include the emergency roadside telephones, radio rebroadcast components, voice alarm/public address devices, and emergency way-finding signage. The status of these devices and any alarm conditions (e.g., emergency roadside telephone being picked up and activated) will be conveyed via a color code. Clicking an Emergency Communications icon will provide additional status information in a pop-up window; it also will allow the operator to manually change the displays of the emergency way-finding signage and to broadcast a message over the public address system.
- **CCTV/ITS**, including the locations and status of the CCTV cameras, along with the Portal LUS and DMS. The Cover cameras will be used as part of the AID system and will also provide video feeds to the CCMS and CTMS. The video feeds will be displayed on operator workstations with multiple displays at the backup control center and on existing video display system(s) at the CTMC. The status of these devices and any alarm

conditions (e.g., single stationary vehicle, wrong-way vehicle, congested traffic flow) will be conveyed via a color code. Clicking a CCTV/ITS element icon will provide additional status information in a pop-up window, such as (in the case of the detection system) the traffic speed and flow. The icons for the DMS and LUS will show their current messages and displays (e.g., Green Arrow, Red X, blank). Clicking a DMS or LUS icon will bring up a window that lets the operator manually change the message or display as required (i.e., override automated operations). Under normal operational conditions, the video images will be displayed in a separate window within the GUI on a rotating basis between cameras. Clicking on a camera icon will provide a pop-up window displaying video from that camera. It also will allow operation of the pan, tilt, zoom, and wash/wipe controls of the camera assembly. In case of an emergency detected by the supporting Cover MEP subsystems (e.g., the AID detecting a traffic incident/wrong-way vehicle in the Cover or the FDAS detecting a fire incident in the Cover), the CCMS will automatically bring up the closest camera to the incident location and pan/tilt the camera to view the location for deployment of appropriate incident management protocols.

- **Drainage System**, including the locations and status/any alarms (via color code) of various drainage components related to the Cover operations. Clicking on any of these icons will provide additional information regarding the status of the drainage system components such as level sensors, pumps, and valves. These windows also will allow an operator to manually change the drainage settings as required (i.e., override automated operations) or notify maintenance teams.
- **Power Distribution System**, including the locations and statuses of the incoming main supplies, Uninterruptible Power Supply (UPS), and emergency standby generators. Alarms will be generated (via a color code of the power distribution icons) in the event of any faults, or if any (or all) of the incoming main supplies have failed, and if any Cover systems are being powered solely from the UPS or the emergency standby generator.
- **Plant Rooms and Other Cover Facilities**, including locations of plant buildings (including the backup control center); status of all plant room equipment (such as HVAC, lighting, intruder alarm, and building fire alarm), the Cover cross bore doors; and other emergency exit doors. Alarms will be generated (via an icon color code) whenever any plant room doors have been opened (e.g., intruder alarm); Cover cross bore doors have been opened (e.g., traffic incident); or an attribute of a plant room (e.g., access, lighting, temperature/HVAC, fire alarm) or a related attribute becomes faulty.

Examples of the GUI screens and layers will developed during design and included in the Final Cover Design Baseline Report.

1.h Monitoring and Control System

The CCMS will providing a holistic view of the Cover MEP System operations, linking and interfacing the various devices and systems together, promoting automated operations of the Cover facilities and providing a single point for real-time monitoring by staff, including the ability to override automated operations when necessary. (With respect to the monitoring of Cover operations, refer to the previous section on the Operator Interface.)

Table 1 below provides a summary of the various Cover MEP System operational components and subsystems, their functions and locations, primary sources of data for automated operations (via the CCMS), and other sources of information (e.g., fault monitoring, other systems) that might impact and modify automated CCMS operations.

Table 1. Summary of the Cover MEP System

System	Function	Components and Locations	Primary Source of Operational Information	Other Related Components/Sources of Information
Environmental/ Ventilation	Cover ventilation (per bore) – to maintain vehicle emitted pollutants to within acceptable levels; and to discharge smoke and gases via the plant room exhaust during an emergency condition (e.g., fire)	CVS fan located at the plant room	Environmental sensors located in the Lowered Section to monitor CO, NO_2, NO, PM and visibility Air speed and direction monitors within and at entrances to Cover	Vibration levels and motor temperature levels of each CVS fan Location of active fire event as identified by the FDAS/operator via CCTV/call from emergency roadside telephone
Fixed Fire Fighting System	Control fire and limit peak heat release rate and smoke production Reduce temperatures in the vicinity of the fire Maintain reasonable conditions for Fire Department intervention	Water supply, distribution pipework, valves and controls, pumps, and suppression nozzles	Fire detection and alarm system and fire pump controllers	Location of stopped vehicle/incident location as identified by the automatic incident detection/operator via CCTV/call from emergency roadside telephone
Lighting	Safe illumination for the passage of vehicular traffic at the posted speeds through the Cover Reduce visual adaptation problems in the vicinity of the Cover entrances and exits Emergency lighting to cover the safe egress of drivers via means of dedicated means of egress or cross passage doors	Light emitting diode (LED) lighting fixtures, with wireless dimming control capabilities, throughout the Cover	Luminance photometers Portal photometers Pavement roadway luminance sensors	Traffic incident as identified by AID/operator via CCTV Fire condition as identified by FDAS/operator via CCTV/call from emergency roadside telephone Status of Way-Finding Signs
Emergency Egress	Provide the safe evacuation of drivers and passengers in an emergency, either by the means of dedicated means of	Emergency way-finding signage at various locations in the Lowered Section	Whenever an emergency is identified from other systems and components (fire, significant buildup of pollutants). The	

System	Function	Components and Locations	Primary Source of Operational Information	Other Related Components/Sources of Information
	egress or via cross passage doors		appropriate signs will be internally illuminated (one or both directions) to show a safe route	
Driver/User Communications in the Cover	Provide messages and alerts to drivers while in Lowered Section Support radio communications between maintenance staff and emergency responders as needed	Radio rebroadcast, voice alarm/public address system Dedicated Short Range Communications	Activated whenever important information must be conveyed to drivers in the Lowered Section (e.g., emergency, warning of downstream traffic conditions)	May be automated as part of a predefined Emergency Response Plan; or manual activation and message generation/broadcast by an operator in accordance with predefined rules and statements
ITS/Driver Communications Outside the Cover	Provide information to drivers approaching the Cover regarding traffic flow conditions, incidents, and emergency situations/Closures. Control traffic on the westbound entrance ramp from Vasquez Blvd.	Dynamic Message Signs and Lane-Use Signals at the Lowered Section portals and upstream of the portals (maximum ½-mile spacing). Ramp Metering station at westbound entrance ramp from Vasquez Blvd.	Automated Incident Detection Fire Detection and Alarm System	Abnormal conditions as identified by operator via CCTV
Drainage	Trigger alarms/notifications to CCMS for Faults with pumps and related components Overflow conditions at the capture collection system Overflow conditions impacting the Cover	Pumps, Hydrocarbon sensors, level sensors for capture collection system at drainage pump station	Sensors at drainage pump station	Abnormal conditions as identified by operator via CCTV in the Lowered Section

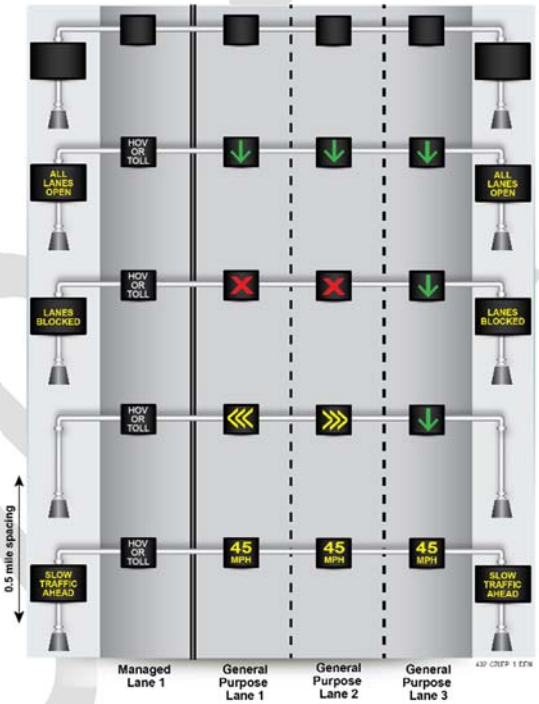
As discussed in the previous section on the Operator Interface, the CCMS will automatically provide alarms whenever any of these systems or components are not properly functioning. Moreover, the GUI will permit manual override of automatic operations for system operations by operators at the CTMC or at the backup Cover control center in the plant building. Manual

changes will be subjected to a number of “rules” embedded in the CCMS to prevent an operator from initiating a dangerous state of operational conditions. They will also support the development of the CCMS logic and the associated ICD.

1.i Proposed System Operation

The Concept of Operations for the Project (Version 8) provides several examples of Active Traffic Management operational scenarios — figures showing typical DMS messages and LUS displays (e.g., Red X, Green Arrow, Yellow Chevrons) — for a variety of traffic flow conditions (e.g., free flow, GP lane blocked, TEL blocked, multiple lanes blocked, severe congestion resulting in a queue, construction zone). An example of these diagrams is shown in Figure 1 below.

Figure 1. Example of Typical DMS and LUS Displays



These scenarios and the associated diagrams in the project Concept of Operations address the operation Project ITS elements. Accordingly, the Final Cover Design Baseline Report will expand upon the operational scenarios for Cover operations, encompassing all elements of Cover MEP System. It is envisioned that these Cover operational scenario will include (but not be limited to) the following:

- Normal operating conditions (no incidents, alarms, or congestion)
- Single stationary vehicle in the Lowered Section

- Minor incident (multiple vehicles) in one of the general purpose lanes
- Minor incident (multiple vehicles) in the Tolled Express Lane
- Congested traffic flow in the Lowered Section
- Congested traffic flow downstream of the Lowered Section
- Wrong-way vehicle in the Lowered Section
- Work zone in the Lowered Section, including maintenance activities
- Fire requiring closure of one of the bores and emergency evacuation
- Fire/other emergency requiring closure of both bores and emergency evacuation
- Multiple failure conditions (e.g., ventilation, power/lighting)

The scenarios noted above are representative examples for the purpose of this Draft Cover Baseline Report. Additions and updates to these scenarios will be made in final design for the Department's Acceptance, in coordination with all stakeholders, and included in the Final Cover Design Baseline Report.

The scenario diagrams will mimic (where possible) the operator GUI, and they will include the approaches to the Cover, including the Portal DMS/LUS and three additional upstream DMS/LUS locations. The diagrams will show the locations of incidents/fires, suggested DMS messages and LUS displays, ventilation and lighting conditions, way-finding signage displays, and ramp metering operation. In addition to the diagrams, accompanying text will identify how the problem was identified, which stakeholders are contacted (and how they are contacted), the extent to which CCMS operations are automated throughout the scenario, and where and when manual intervention and override might be necessary. These operational scenarios also will form the basis for developing the Emergency Response Plan, as well as development of the business processing mapping and data flow diagrams discussed previously in the subsection "Logic and Development Plan."

Temporary operation during construction for the Cover MEP Systems will be minimal due to FRMG's ATC 65, which shifts the new roadway north. The Cover MEP Systems will be commissioned and operational in accordance with Schedule 10, Section 12 and NFPA 502 when the westbound lanes are opened. The standby generator for the plant building room might need to be temporarily located outside of the limits of the overhead viaduct for clearance purposes. The fan room in the plant room building may be built in two stages to avoid the piles supporting the overhead viaduct.

1.j Hydraulic and Pneumatic Calculations

The calculation sheet included in Attachment 2 is a provisional assessment of the hydraulic performance of the FFFS used to confirm that pumps are adequately sized. Other details recorded in the calculation sheet are provisional and are included only to allow the sizing of the pumps.

The FFFS pump station will be equipped with isolating valves; safety valves for each pump, set at 115% of the operating pump pressure; diverter valves; manifolds; filters between the tanks and pump sets to be 100% redundant or self-cleaning and provide a bypass for blockages, flow

meters, pressure gauges, controls, and surge prevention devices. The pump rooms and valve pits will also have infrared heaters to maintain the rooms above 39°F at all times to prevent freezing. The rooms will also be equipped with adequate drainage and ventilation. The electrical and ITS rooms will be designed with a dry pipe firefighting system.

1.k Computational Fluid Dynamics (CFD)

CFD simulations were performed to evaluate the tenability in the Lowered Section for the design fire scenario and congested operations. The results of the CFD analysis with an operating semi-transverse ventilation system are summarized in the CFD ventilation report. The simulations presented in the report are transient simulations where the continuous change in the tenability of the Lowered Section is investigated. It is important to continuously monitor conditions in the Lowered Section, because the goal of the simulations is to estimate the length of the time the ventilation system is able to effectively provide a safe egress path for evacuating passengers during an emergency.

The requirements and assessment criteria used in the Lowered Section CFD modeling are summarized as follows:

- Visibility to doors and walls of no less than of 33 ft. is the minimum required for escape.
- The maximum tenable air temperature is 120°F.
- A height clear of smoke of at least 8.2 ft. is required above any point on the evacuation path.

The design for the Emergency Fire Scenario in the Lowered Section is 30 MW (or 102.4 MBTU/hr) as per Section of Schedule 10, Section 12.13.4(b)(III). The fire growth is based on a medium fire growth curve with a growth rate of $\alpha = 12\frac{W}{s^2}$. The fire reaches a peak heat release rate value of 30 MW at 1599.9 seconds (or 26.7 min).

For the Congested Traffic Emissions Scenario, the permissible exposure limits for each bore will be in accordance with Environmental Protection Agency (EPA) and Federal Highway Administration (FHWA) standards. Maximum limit levels for normal traffic operations are given in **Table 2** below.

Table 2. Maximum Pollutant Levels

Pollutant	Maximum Limit
Carbon Monoxide, CO	120 ppm
Nitrogen Dioxide, NO_2	1 ppm
Nitric Oxide, NO	15 ppm
Particulate Matter, PM	0.007 m-1 extinction coefficient

The following points summarize the CFD model and methodology:

- The Fire Dynamics Simulator v 6.2 (FDS) — CFD software developed by the National Institute of Standards and Technology (NIST) — was used to model the fire scenarios.
- The model uses a structured Cartesian mesh with a varying resolution of 0.5 ft to 1.5 ft. The total number of grid cells is 3.02 million cells for the 30 MW design fire (102.36 MBTU/hr).
- A Large Eddy Simulation approach was used with the Deardorff eddy viscosity subgrid turbulence model.

The boundary condition for the CFD model consists of headwind at the west Portal. This has been discussed in 1.b.ii, earlier in this report.

A semi-transverse ventilation exhaust flow scheme is simulated, with a total fan capacity of 450 kcfm and transverse ducts with dampers within the Lowered Section.

For the Emergency Fire Scenario, a CFD simulation was performed, corresponding to three transverse ducts used for exhaust with 450 kcfm ventilation capacity. The CFD model parameters and results are summarized in the ATC 26 CFD Ventilation Report.

For the congested traffic fire scenario, all 10 transverse ducts are used for exhaust at the Lowered Section ceiling, with a total exhaust capacity of 450 kcfm. This corresponds to opening 40 damper modules per Lowered Section or 80 damper modules in total in both parts of the Lowered Section in this scenario. The CFD model parameters and results are summarized in the ATC 26 CFD Ventilation Report. The time required for passengers to evacuate during a fire emergency is called the egress time. This calculation is included in Appendix C of the ATC 26 CFD Ventilation Report (Attachment 3). The simulated fire was located at the west Portal; hence, the passengers egress to the east. It is assumed that there are three cross passage doors in the Lowered Section, two of which are close to either Portal; the third cross passage door is located at the center of the Lowered Section. The cross passage door near the fire at the west Portal is assumed to be unavailable due to the proximity of the fire. The cross passage door at the east Portal is assumed to be unused, as it is expected that passengers will simply egress via the open east Portal. Hence, the two exits used for egress are the center cross passage and the east Portal. It is assumed that there are two passengers in every vehicle in the Lowered Section. Thus, there are a total of 444 passengers corresponding to 222 vehicles in all the six lanes.

Based on the calculation, the time required to evacuate all 444 passengers using the east Portal and the center cross passage is 6.1 minutes. Hence, for safe egress of the passengers during a fire emergency, the ventilation system must provide a tenable egress path in terms of smoke visibility for a minimum of 6.1 minutes. With the ventilation system operating, for the worst-case scenario with wind, the entire non-incident half of the Lowered Section potentially would be tenable for up to 9.5 minutes from the start of the fire. For up to 13.5 minutes, there would be a tenable path in the Lowered Section to exit to the Portal. Thus, as per NFPA 502 and Central 70 Project Design Criteria, a height clear of smoke of at least 8.2 feet is provided on the evacuation

path during egress. In addition, when the ventilation system is operating, the maximum tenable air temperature in the Lowered Section does not exceed the NFPA 502 requirement of 120°F.

1.l Cover Ventilation System (CVS)

The details of the CVS are provided in this section, corresponding to two scenarios: an Emergency Fire Scenario and Congested Traffic Emissions Scenario. For each, the damper operation is different. In addition, for the Emergency Fire Scenario, ventilation is utilized only in the incident Lowered Section. For the Congested Traffic Emissions Scenario, the vehicular emissions are exhausted from both the eastbound and westbound of the Lowered Section.

Emergency Fire Scenario:

The layout of the damper modules at the Lowered Section Cover consists of 10 transverse ventilation ducts spaced approximately 100 feet apart. The transverse ventilation duct nearest the west Portal is 50 feet from the Portal; the duct nearest to the east Portal is 100 feet from the Portal. The ventilation exhaust is facilitated by a series of fire-rated dampers located at the base of the ventilation duct and consists of six damper modules within each exhaust duct. The ventilation scheme corresponding to the 30 MW fire scenario utilizes all six damper modules of the exhaust duct in the incident Lowered Section.

In the CFD simulations undertaken, smoke is exhausted via three transverse ducts (18 damper modules), using a total 450 kcfm ventilation capacity. The premise is to attempt to confine the smoke to as small a region as possible, thus enabling safe egress. Using the CFD simulations, an estimate of the time available for safe egress of passengers is provided. The semi-transverse ventilation aims to confine the smoke to a region in the vicinity of the fire source so the required time for egress is available for evacuation of passengers to a designated point of safety.

Transient CFD simulations were performed to assess tenability in the Lowered Section region for the Emergency Fire Scenario. The transient simulations provide an estimate of how the smoke spreads and the tenability changes in the Lowered Section with time, based on the prescribed heat released rate with a medium fire growth curve and a design peak heat release rate of 30 MW (102.36 MBTU/hr) at the west Portal for the assumed Lowered Section boundary conditions. The amount of smoke increases as the fire size increases, and the accumulated smoke at the Lowered Section Cover moves longitudinally along the Lowered Section before leaving the Lowered Section through the Portal boundaries. Detailed transient simulations have been performed with an adverse wind condition applied at the west Portal.

When a 450 kcfm semi-transverse ventilation system is used, smoke spread is confined to one-half of the Lowered Section region until 9.5 minutes from start of fire, and a tenable path of egress in the Lowered Section is available for 13 minutes. This is sufficient time for users to self-rescue and evacuate the Lowered Section and reach a point of safety, because it takes 6.1 minutes for passengers to evacuate the Lowered Section, based upon egress calculations presented in Appendix C of the ATC 26 CFD Ventilation Report.

Congested Traffic Emissions Scenario:

For congested operations simulations with *no* fire in the Lowered Section, analyses were made regarding emissions from traffic disperse pollutants such as Nitrogen Dioxide (NO_2), Nitric Oxide (NO), Carbon Monoxide (CO), and Particulate Matter (PM, consisting of PM2.5 and PM10) accumulating in the Lowered Section over time. Particle pollution (a.k.a. particulate matter or PM) is the term for a mixture of solid particles and liquid droplets in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. PM10 are inhalable particles with diameters generally 10 micrometers or less, while PM2.5 are fine inhalable particles that are generally 2.5 micrometers or less. These noxious gases and the microscopic particles are considered harmful to public health and to the environment.

In the CFD simulation, the Lowered Section traffic was assumed to be stagnant. The effect of the moving traffic would be to dilute the Lowered Section environment by entraining fresh air, due to the piston effect of traffic reducing the ppm concentrations of the pollutants. Therefore, assuming traffic to be stagnant or not moving is a conservative assumption. The 450 kcfm semi-transverse ventilation was used in conjunction with all transverse duct openings (but only four of the six available damper modules open per exhaust duct in each Lowered Section), using a total of 80 damper modules in both parts of the Lowered Section to exhaust air from the Cover structure.

It was assumed that the ventilation system is operational 120 seconds after the congestion begins. The CFD simulation was run for a total of 30 minutes, a time frame that ensures monitoring of conditions in the Lowered Section for a sufficient period to confirm that a safe environment can be maintained. Based on the results of the CFD simulation as described in the ATC 26 CFD Ventilation Report, after 30 minutes, the ppm concentrations of NO_2, NO, and CO would be maintained below the prescribed limits of 1 ppm, 15 ppm, and 120 ppm respectively. After 30 minutes, the extinction coefficient of particulate matter in the Lowered Section would also be below the corresponding extinction coefficient limit of 0.007 m^{-1}.

Thus the Lowered Section environment can be considered tenable and safe when the ventilation system is operational during traffic congestion as required by Schedule 10, Section 12 to maintain tenability in the Lowered Section for the duration of the simulation. This shows that the ventilation system would successfully remove excess pollutants in the Lowered Section environment and continuously maintain a tenable environment for a prolonged length of time.

1.m Proposed Approach to Demonstrating FFFS Performance

NFPA 502 states that mist, deluge, and foam are viable options. Per the Ventilation and Fire Life Safety Report done by Atkins for this project, it was determined a deluge system would meet the criteria outlined in Section 6.2.1 of the report. A deluge system has been selected for the Cover, with a flow rate of 0.30 gpm/ft2 in accordance with Section 7.4 of NFPA 15. The Fire System Performance Report will be provided prior to Release for Construction (RFC) Documents.

Identification by the control room and CCTV or detection via linear heat detection will allow the suppression system to be activated within three minutes of alarm being raised. This will limit fire growth and support effective function of the CVS. The relatively low airspeeds produced by the semi-transverse ventilation system support effective operation of the FFFS. A Fire System Performance Report will be developed for Acceptance prior to RFC.

1.n Analysis of Safety Functions

Analysis of safety function will be undertaken in accordance with the risk-based conceptual framework set out in IEC61508-1. This process will be undertaken by FRMG, with active participation from the Department and the Authority Having Jurisdiction (AHJ) to confirm and agree upon requirements for life safety systems. This process will be initiated with a Safety Integrity Level (SIL) determination report issued to the Department for review. The SIL determination report will propose Safety Integrity Level requirements for each safety function. Once the functional safety requirements are established and agreed upon, the FRMG design will be developed to achieve the required level of functional safety.

In FRMG's analysis of safety functions, the life safety control system would be considered along with the physical plant and equipment (detection, lighting, ventilation, suppression). Should a SIL rating be required for any of the safety systems, the system would need to be implemented using suitably designed and independently certified programmable logic controllers. The fire suppression system may be considered a life safety system and will be specifically addressed in the SIL determination report. FRMG will consider the potential for single points of failure that prevent the safety systems from operating in an emergency situation. The analysis will consider the requirement for software and hardware to be fault-tolerant, such that no single fault signal can prevent the system from operating. FRMG will consider simulation of faults in the hardware to prove the redundancy implemented to avoid single points of failure. Ongoing tests to ensure the reliability of the system will be carried out at appropriate intervals for any safety-critical equipment.

Where required, functional safety assessments will be applied to all phases of the overall and equipment and software safety life cycles, including documentation, verification, and management of functional safety. All relevant claims of compliance made by suppliers and other parties responsible for achieving functional safety would be included in any functional safety assessment.

The output of functional safety assessments, and the level of independence of those undertaking the assessments, will be in accordance with IEC61508-1.

1.o Proposed Approach to Passive Fire Protection

The Rijkswaterstaat (RWS) time-temperature curve has been applied to the design of the Lowered Section lining in accordance with NFPA 502, which requires the fire performance of the Lowered Section lining to be capable of withstanding the time-temperature exposure

represented by the RWS time-temperature curve. Either passive fire protection boards or cementitious spray can be used.

1.p Lighting

Lighting within the Cover of the Lowered Section is designed in accordance with the Illuminating Engineers Society RP-22-11 for the full length of the Cover. The design meets the following objectives:

- Provide safe illumination for the passage of vehicular traffic at the posted speeds through the Cover
- Reduce visual adaptation problems caused by the external luminance of the external scene when approaching the Cover by increased threshold illumination, ensuring that stationary traffic or other obstructions are visible to approaching traffic
- Provide exit lighting as needed to cope with visual adaptation problems for drivers leaving the Cover
- Provide emergency lighting to cover the safe egress of drivers in an emergency, either by dedicated means of egress or via cross passage doors
- **Reduce maintenance costs and associated health and safety risks by mitigating/controlling maintenance procedures and their frequency**
- Reduce energy costs associated with the lighting systems
- Allow full control of the lighting systems to allow step-less dimming control between the lighting zones

Design and development of the Cover general and emergency lighting will be performed by using AGi32 design software to meet the assessed Urban Lowered Section, Scene 4 from Figure 3 in RP-22-11. The lighting design will address the increased complication due to the east-west orientation of the Cover by providing two threshold zones and two transition zones and will meet the threshold illumination level of 26 cd/ft². Due to the relatively short length of the Lowered Section, an Interior Zone, as defined by RP-22-11, is not required. Nighttime lighting will be reduced to 0.9cd/ft².

Emergency lighting within the Cover traffic zone will be a subset of the general lighting. Power to the emergency lighting will be fed from an uninterruptable power supply (UPS) for a minimum of 90 minutes during emergency events in the Cover. A minimum illumination level of 1 foot-candle will be provided on the path of egress within the Cover. Power conductors and a conduit system feeding the emergency (and general) lighting exposed in the Lowered Section will be installed in a fire-survivable system to meet the requirements of NFPA 502, Chapter 12.1.2. Connections to the light fixtures will be suitable for an IP66 environment.

The lighting system will be composed of light-emitting diode (LED) fixtures specifically designed for use in a Lowered Section and suitable for a corrosive environment. The optics will be in IP66 enclosures and will have symmetrical light distribution. A color rendering factor of >60Ra (14) will be provided for the LEDs. The LEDs will have a minimum L80 lumen depreciation factor at a

minimum of 80,000 hours and a mortality of B10 at 80,000 hours. The fixtures will be mounted above the centerline of each lane and fixed to the ceiling of the Cover.

The lighting control system will be integrated into each light fixture and utilize a wireless mesh network that will identify faults and alarms at each light fixture for **ease of troubleshooting and maintenance.** Wireless access points will be provided at each end of each Portal to receive the wireless controls and upload to the fiber optic network for transmission back to the CCMS control server. The lighting control system will be able to dim from 1-100% and be controlled via inputs from photometers located within the first 65 feet of each Portal to measure the external scene luminance.

Walls with a high reflectance coatings (>30%) will be provided in the Lowered Section to increase the inter-reflected component and reduce the quantity of light fixtures needed to meet the project requirements. A light-colored concrete for the Cover roadway will further help to reduce the quantity of light fixtures installed in the Cover.

1.q Emergency Way-Finding Signing

Signing for Cover operations includes the following:

- Emergency Way-Finding Signing: These signs will be located in multiple locations within the Cover of the Lowered Section to aid the evacuation of users in the event of an incident in the Lowered Section. Each of the signs will be internally illuminated with two faces — the sign on one face pointing to the entrance Portal, the sign on the second face pointing to the exit Portal. The internal illumination of these signs will automatically controlled by the CCMS, with manual override by operators at the CTMS or the backup control center, such that in the event of an incident, only the signs that show a safe route will be illuminated at any time.

1.r ITS and Communication System

In addition to the data communication system, CCTV video system, and Emergency Way-Finding Signing (each previously identified herein), the Cover ITS also will include the following components and subsystems:

- Emergency Roadside Telephones: Emergency roadside telephones will be installed in the Cover and on its immediate approaches in both directions. They will be connected directly to a telephone on the operator's desk at the CTMC and at the backup control center.
- Radio Rebroadcast System, which will allow:
    - Emergency services personnel to communicate by radio with their commanders and one another while inside the Cover
    - Operations and maintenance staff to communicate by radio with their operations center and with one another while in the Cover
    - Users in the Cover to make and receive cellular telephone calls

  - Users to receive domestic radio broadcasts using their in-car radios; it will be possible to interrupt these broadcasts and replace them with an appropriate emergency public safety message

The radio rebroadcast system will conform to NFPA 72 and will ensure that there is no interference to any radio or other electronic services outside the Cover. The specific manufacturer will be finalized during system design, including necessary licenses.

- Voice Alarm/Public Address (VA/PA) System: This will allow Cover operations staff to make emergency public safety announcements in the Cover and on its immediate approaches, and to be clearly heard and understood by commuters at all points in the Cover and within 25 feet of the Portal under conditions of background noise likely to be experienced (e.g., with or without the CVS running and with or without traffic flowing). The VA/PA system will be designed and installed in accordance with NFPA 72. The functionality and manufacturer of the VA/PA system will be finalized during system design.
- Lane-Use Signals (LUS): LUS will be mounted over each lane on gantries at the entry Portal of each bore as elements of Project ITS. These signs will be of the same make and model as the other LUS installed within Project ITS. These Portal LUS will be primarily controlled by the CTMS — with override capability by the CCMS — to close selected lanes (using a RED X) or all lanes (i.e., close the Cover) as might be necessary due to crashes, fire situations, or other emergencies. The operation of the upstream LUS will be coordinated with the Portal LUS in accordance with defined operating procedures and scenarios. For example, if a Cover lane is closed, upstream LUS over this lane will also show Red X or Yellow chevrons, depending on its longitudinal location.
- Dynamic Message Signs (DMS): DMS will be installed at the entrances to both entry portals within the Cover (co-located with LUS) as elements of Project ITS. These full-color, full-matrix signs will be of the same make as the other DMS installed within Project ITS, with the specified dimensions of 18 feet wide, 8.5 feet tall, and 4 feet deep, These Portal DMS will be primarily controlled by the CTMS (with override capability by the CCMS) to advise motorists of traffic flow and other conditions in the Cover (e.g., describing why one or more lanes is closed). The operation of the upstream DMS will be coordinated with the Portal DMS in accordance with defined operating procedures and scenarios.
- Automatic Incident Detection (AID) System: AID capability within the Cover and its immediate approaches will be provided. The detection system will provide the following:
  - Traffic speed and flow data (data also integrated into the CTMS software)
  - Detection and alarm for a single stationary vehicle in the Cover
  - Detection and alarm for congested traffic flow in the Cover
  - Detection and alarm for congested traffic flow downstream of the Cover
  - Detection and alarm for a vehicle traveling in the wrong direction within or approaching the Cover

Alarms will register on the Cover GUI at the CTMC and at the backup control center to alert operators. The alarms will also automatically initiate response plans in accordance with predefined operational scenarios. It is envisioned that the vehicle detection and AID system will be based on the CCTV camera system in the Cover and on its approaches. The specific manufacturer and algorithms will be finalized during system design.

- Dedicated Short Range Communications (DSRC): DSRC radios, Road Side Units (RSU) will be installed to provide complete DSRC coverage in the Cover and constant communication to the CTMC. Radio frequency interference will be assessed at each install location in the Cover to prevent degradation of the DSRC channel quality by other licensed and/or unlicensed device transmissions and interference in the operation frequency band of 5.85 – 5.925 GHz. The DSRC radios, RSU will be compliant with Federal Communication Commission (FCC) service rules, requirements, and regulations. The specific vendor will be finalized during system design.

1.s Drainage

Drainage within the Lowered Section is in compliance with the requirements of NFPA 502 Section 7.12, and RFP Schedule 10 Section 12.21 (to include NFPA 820 and NFPA 70) as is described below.

All drainage outside the Lowered Section will be captured for the 100-year storm level prior to entering the Lowered Section. Inlets upstream of the Lowered Section will be designed to capture the 100-year storm with a clogging factor. A small portion of overland drainage from outside the Lowered Section will be captured within it.

Drainage of the Lowered Section will consist of inlets to capture flows in the outside shoulders along the length of the Lowered Section in accordance with the requirements of Schedule 10 Section 12.21. The drainage system is designed to capture the 100-year storm level, which exceeds firefighting flows. During an incident condition, the drainage system is capable of capturing a spill of 500 gallons and the firefighting flows of 5,500 gallons per minute (gpm) and routing it through the drainage collection system to FRMG's pump station for the Lowered Section. The drainage system will be constructed of concrete pipes, manholes and inlets rated for HS-20 loading.

The pump station is located adjacent to the low point on the northwest corner of York Street and 46th Avenue. The pump station is designed with a pumping capacity of 200 cubic feet per second (cfs) and will include sensors to detect hydrocarbons. The pump station will have a grit chamber where the drainage system enters the stilling basin, allowing for removal of the larger total suspended solids. The pump station will discharge to a water quality pond on the same parcel. The water quality pond will have an integrated oil interceptor to capture and isolate a fuel spill within the Lowered Section and provide additional water quality improvement prior to discharge to the existing drainage system in York Street.

In addition, drainage from the top of the Cover will be captured in either of the landscape drains, which will be located around the soccer field and in other low points. These flows will be

conveyed off the Cover section to adjacent storm sewer systems. A second underdrain system will capture drainage that infiltrates through the Cover material and be captured on top of the waterproof membrane and conveyed to the adjacent storm sewer systems.

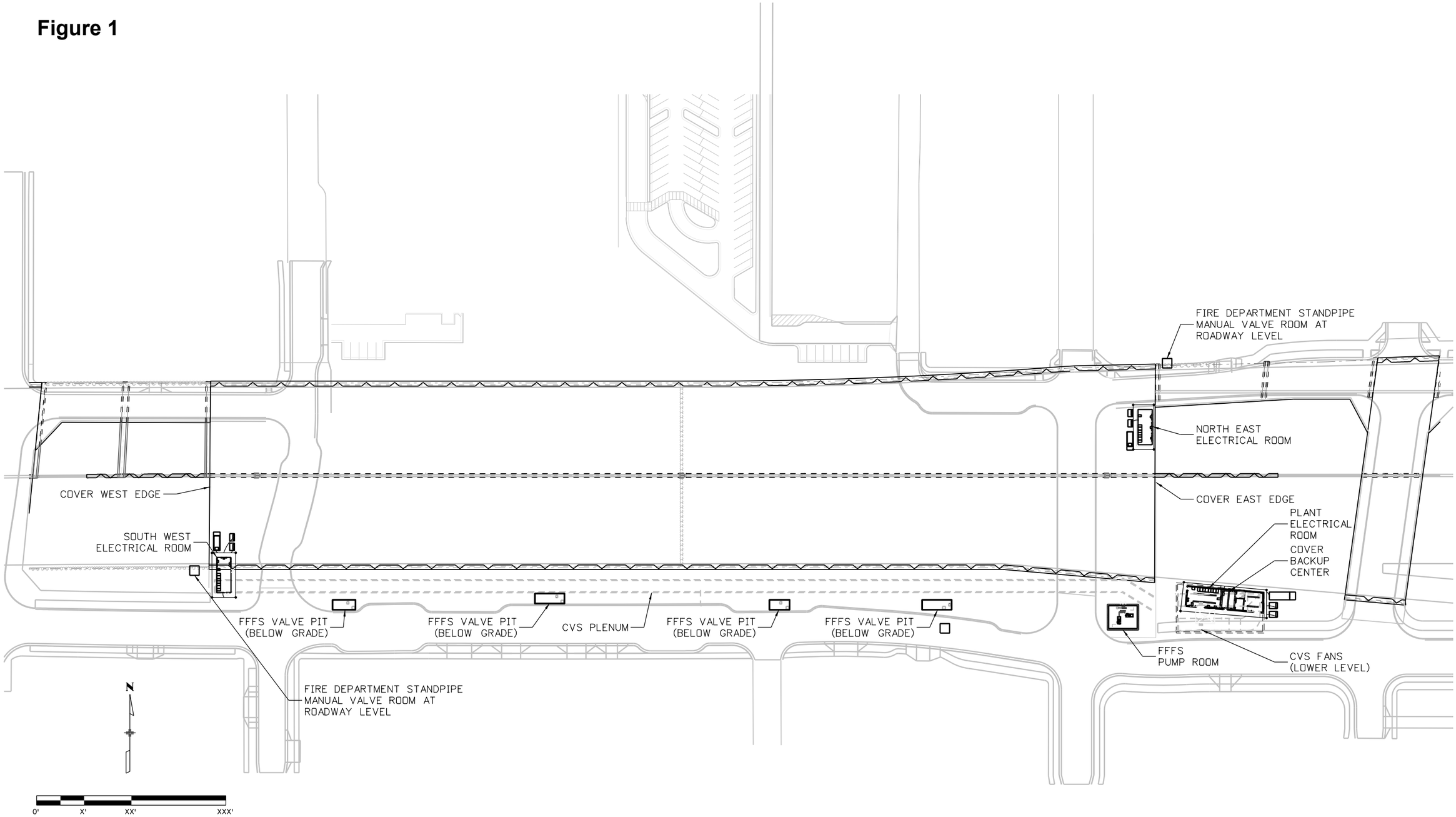
Attachment 1
System Block Diagrams

Front Range
Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

Figure 1



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Unit Information
Unit Leader

Front Range Mobility Group

Sheet Revisions		
Date:	Comments	Init.

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PROPOSAL
No Revisions:
Revised:
Void:

CENTRAL 70
OVERALL COVER MEP
LOCATION PLAN

Designer:
Detailer:
Sheet Subset:
Structure Numbers
Subset Sheets: of

Project No./Code
FBR 0704-234
19631
Sheet Number

Figure 2

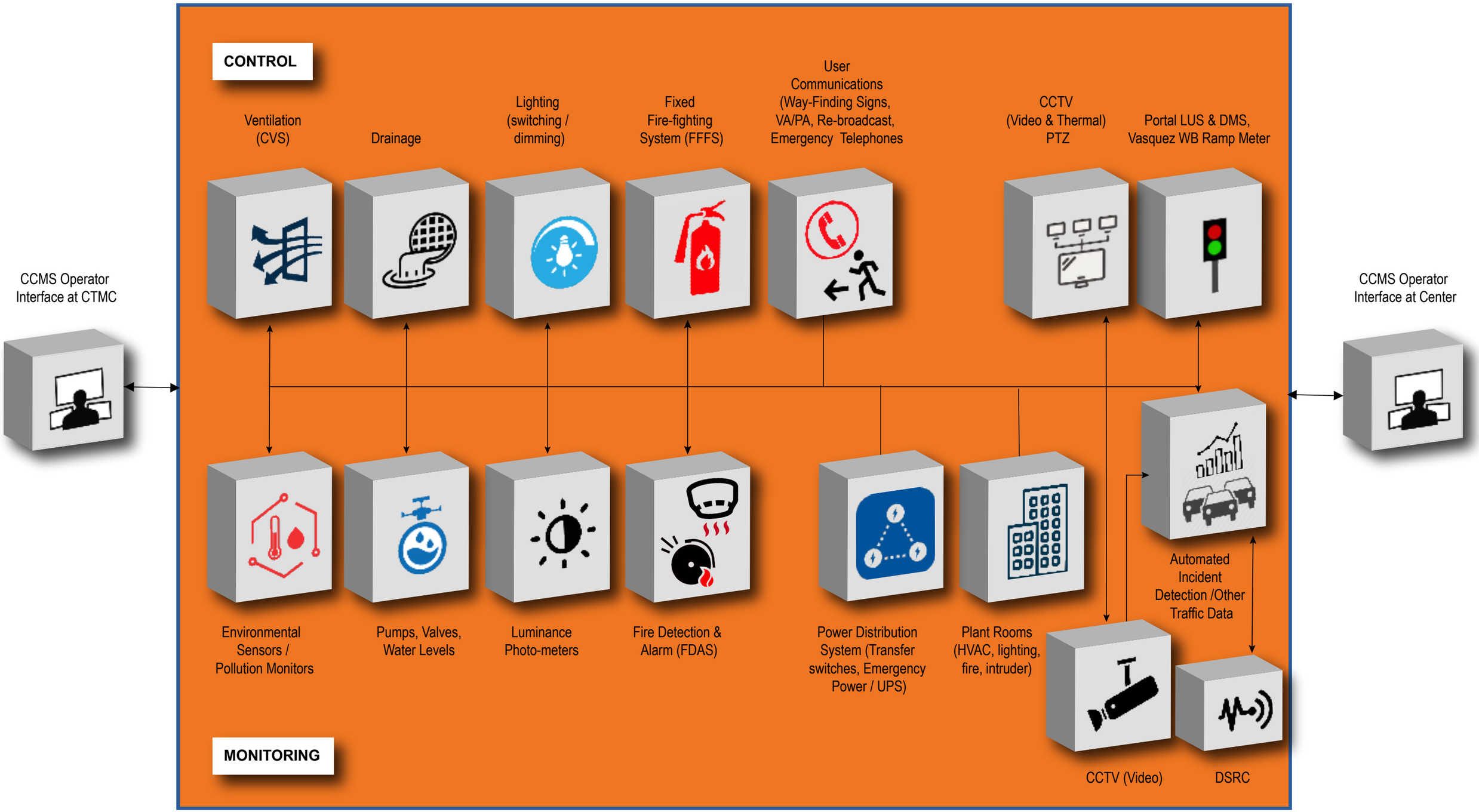
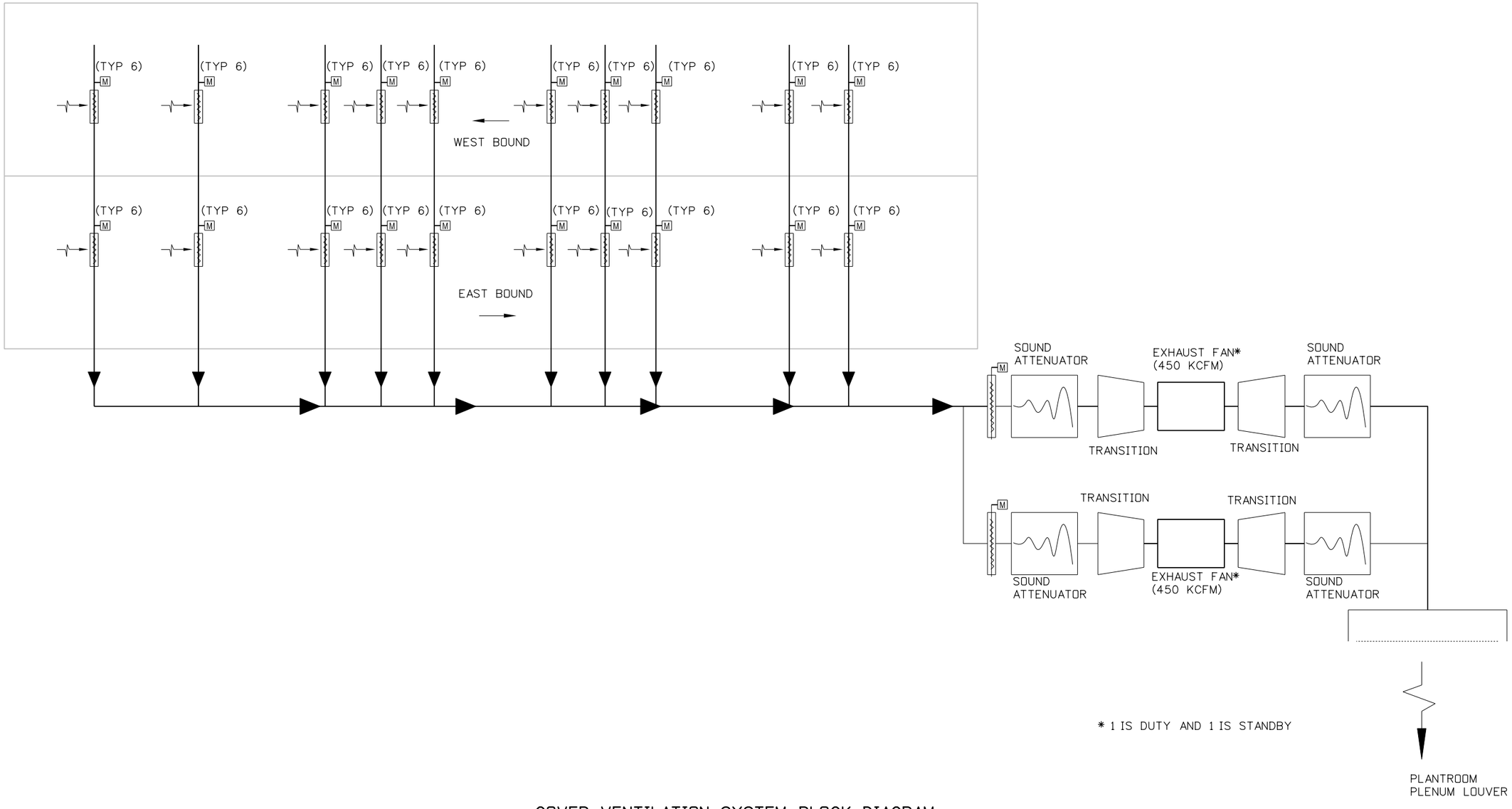

CONTROL
Ventilation (CVS)
Drainage
Lighting (switching / dimming)
Fixed Fire-fighting System (FFFS)
User Communications (Way-Finding Signs, VA/PA, Re-broadcast, Emergency Telephones
CCTV (Video & Thermal) PTZ
Portal LUS & DMS, Vasquez WB Ramp Meter
CCMS Operator Interface at CTMC
CCMS Operator Interface at Center
Automated Incident Detection /Other Traffic Data
Environmental Sensors / Pollution Monitors
Pumps, Valves, Water Levels
Luminance Photo-meters
Fire Detection & Alarm (FDAS)
Power Distribution System (Transfer switches, Emergency Power / UPS)
Plant Rooms (HVAC, lighting, fire, intruder)
CCTV (Video)
DSRC
MONITORING

Figure 3

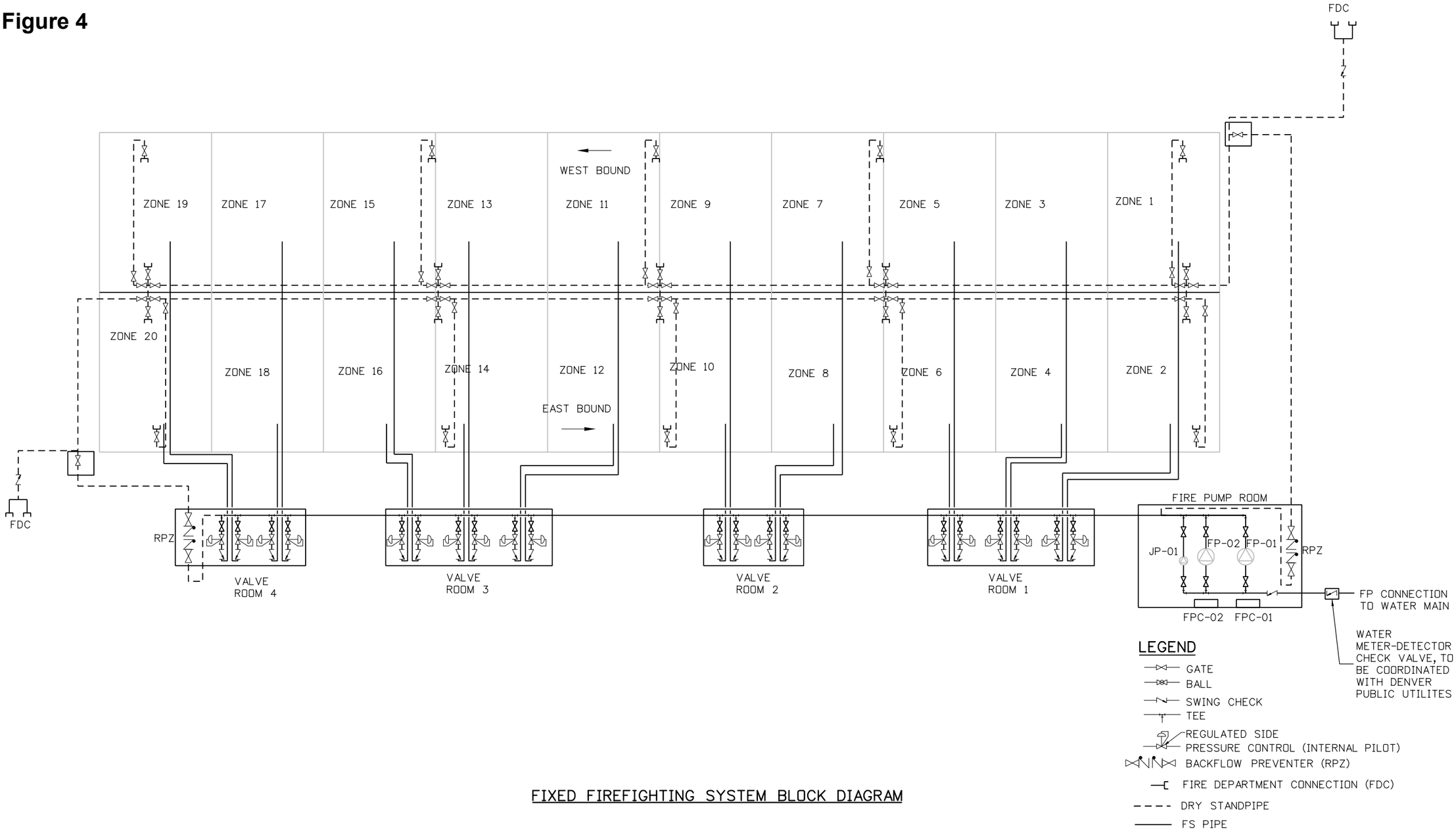


COVER VENTILATION SYSTEM BLOCK DIAGRAM

Print Date: 5/24/2017	Sheet Revisions			Colorado Department of Transportation	PROPOSAL	CENTRAL 70	Project No./Code
File Name: See sheet edge for information	Date:	Comments	Init.	2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:	VENTILATION BLOCK DIAGRAM	FBR 0704-234
Horiz. Scale: As Noted					Revised:	Designer: / Detailer: / Structure Numbers	19631
Vert. Scale: As Noted				Region 1 KJS	Void:	Sheet Subset: MEP 04 / Subset Sheets: of	Sheet Number
Unit Information							
Unit Leader							

Front Range Mobility Group

Figure 4



FIXED FIREFIGHTING SYSTEM BLOCK DIAGRAM

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	Unit Information						
	Unit Leader				Region 1 KJS		

Project No./Code
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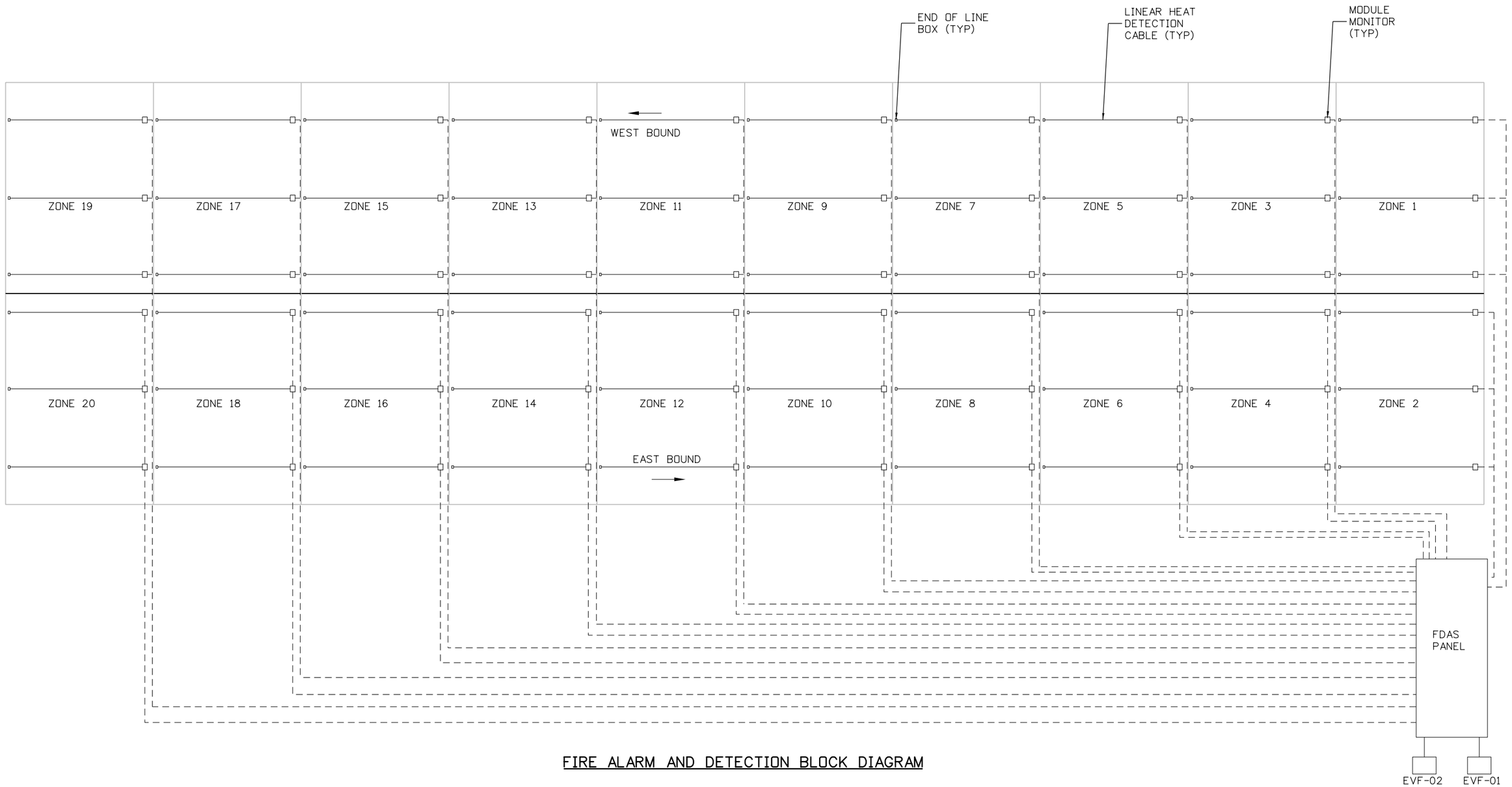
19631
Sheet Number

Figure 5

NOTES
ALL DAMPERS SHALL BE CONNECTED TO FDFAS PANEL.



FIRE ALARM AND DETECTION BLOCK DIAGRAM

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Print Date: 5/24/2017
File Name: See sheet edge for information
Horiz. Scale: As Noted
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Unit Information
Unit Leader

Front Range Mobility Group

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Region 1 KJS

PROPOSAL
No Revisions:
Revised:
Void:

CENTRAL 70
FIRE DETECTION
FIREALARM BLOCK DIAGRAM

Designer:
Detailer:
Sheet Subset: MEP 11
Structure Numbers:
Subset Sheets: of

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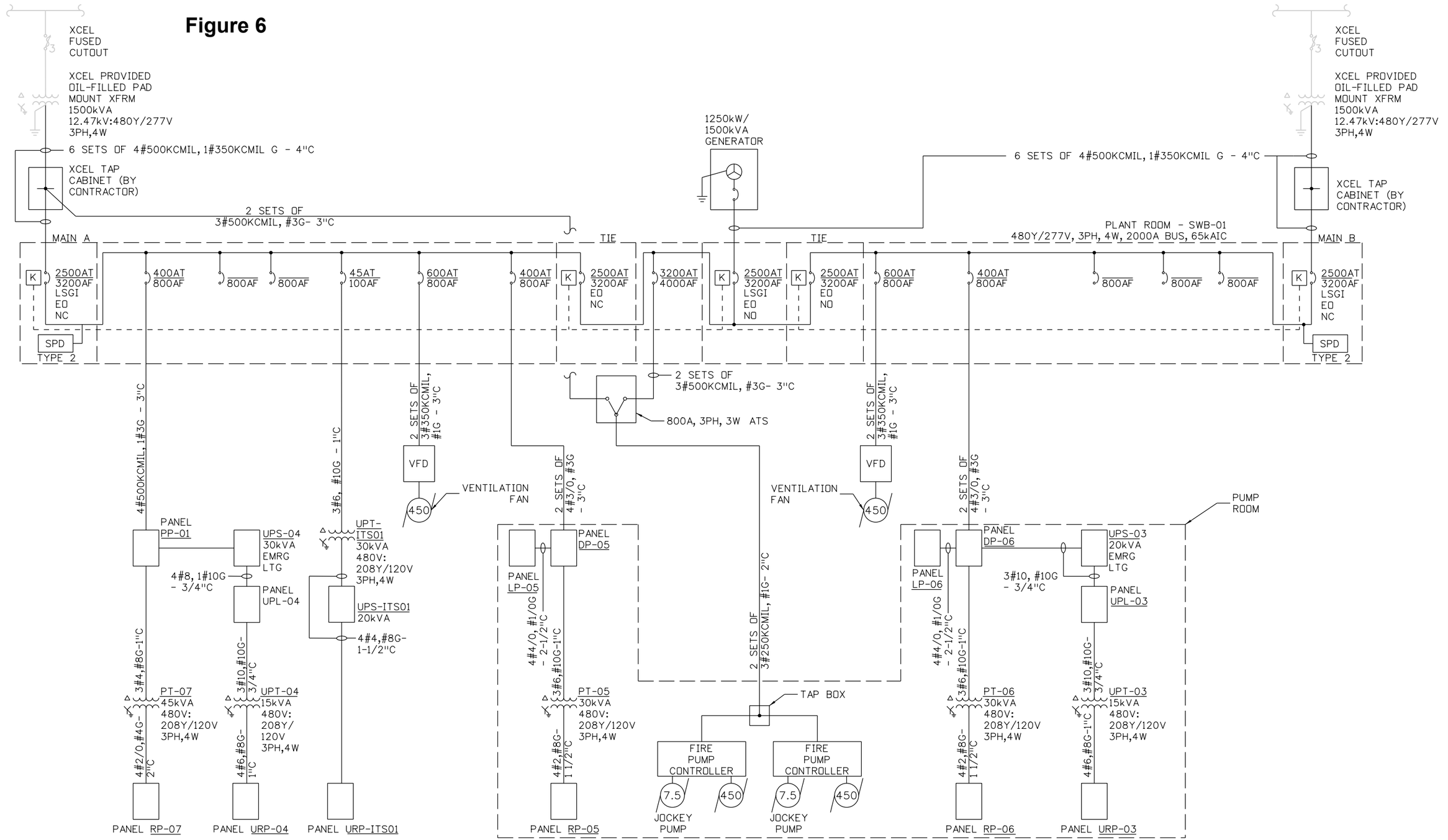
FBR 0704-234
19631
Sheet Number

Figure 6



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	Vert. Scale: As Noted				
	Unit Information				
	Unit Leader				

PROPOSAL	CENTRAL 70 PLANT ROOM SINGLE LINE DIAGRAM			Project No./Code
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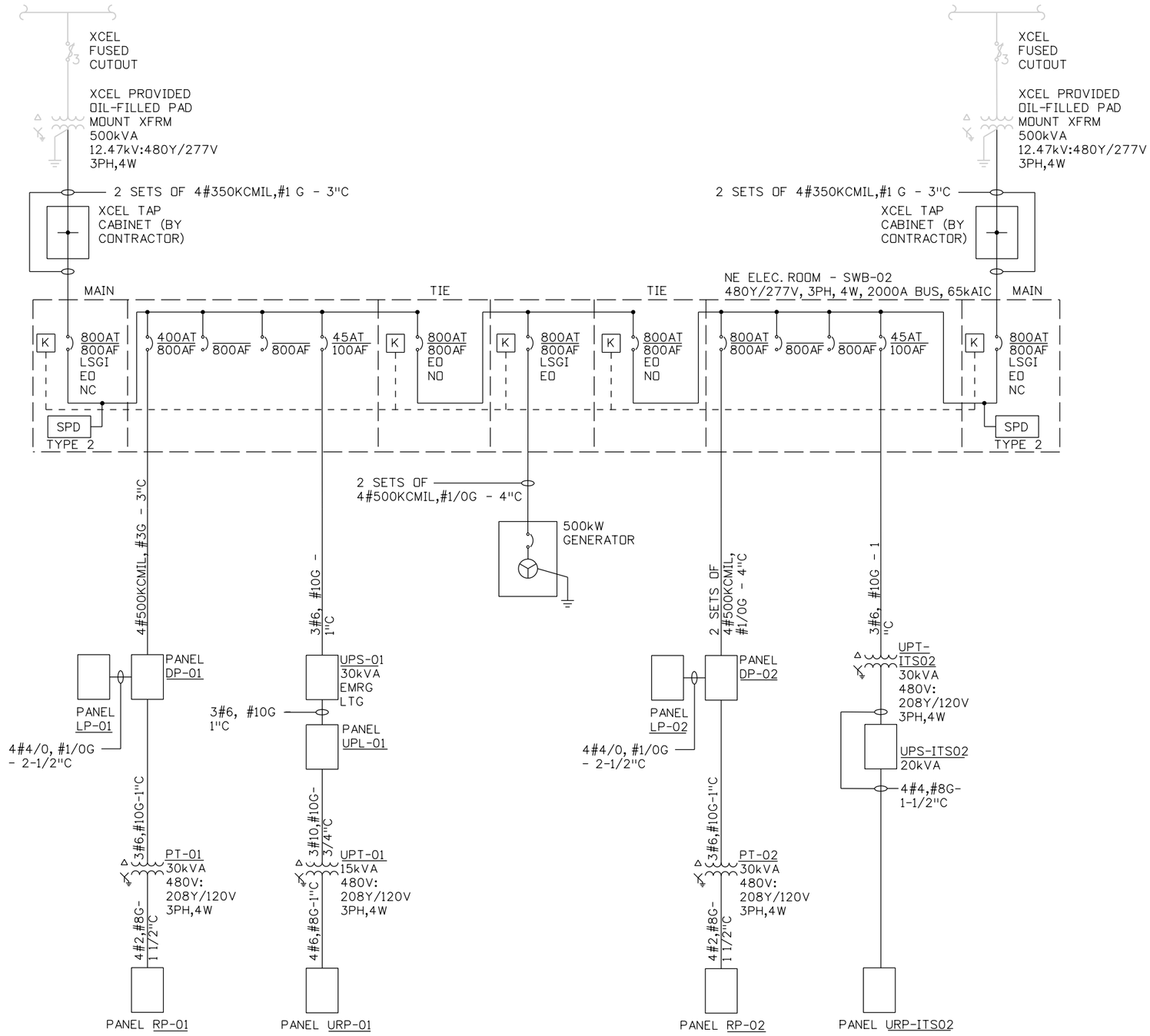
Figure 7



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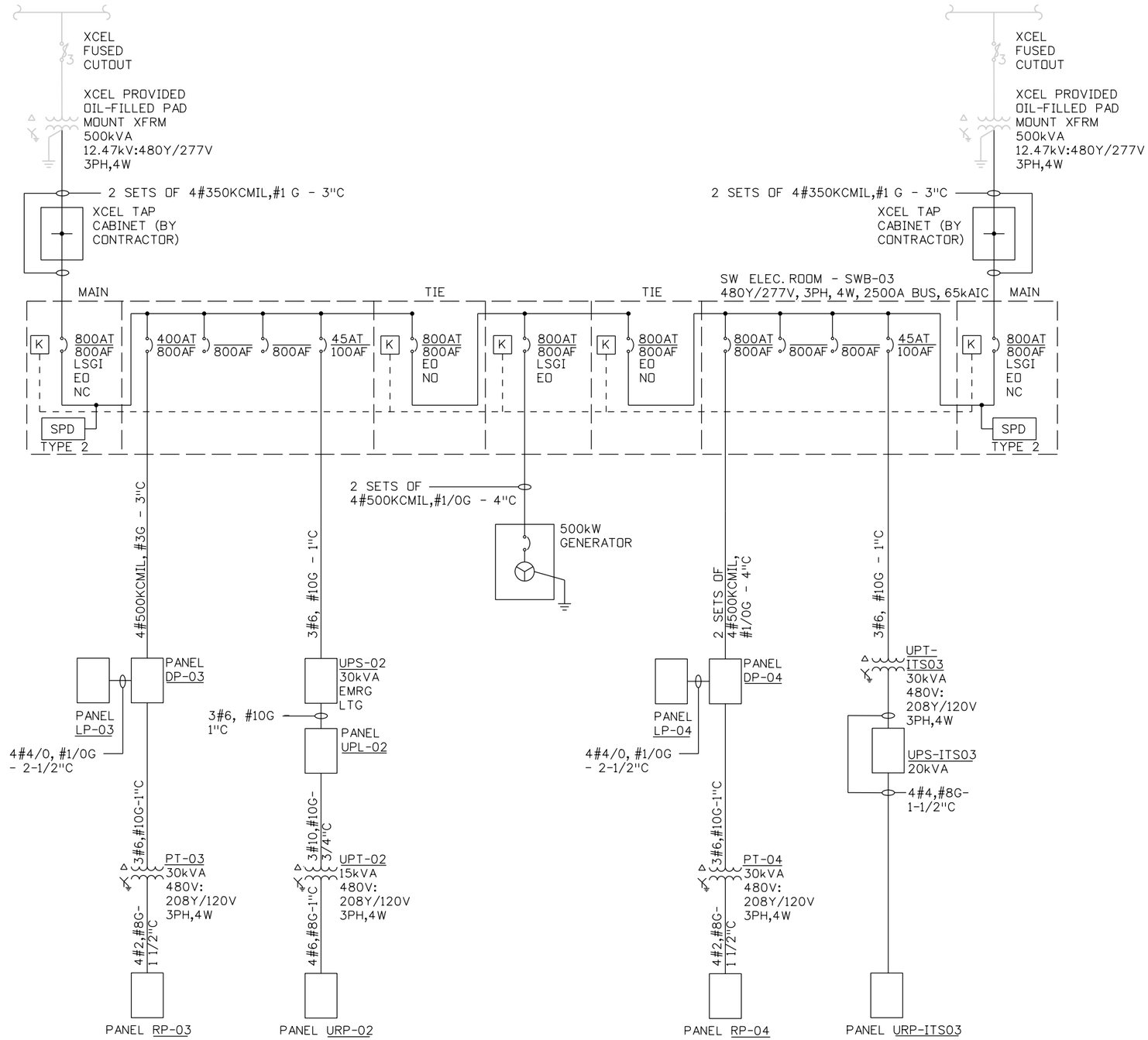
	Unit Leader								

Figure 8



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Unit Leader

Front Range Mobility Group

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CENTRAL 70
SW ELECTRICAL ROOM
SINGLE LINE DIAGRAM

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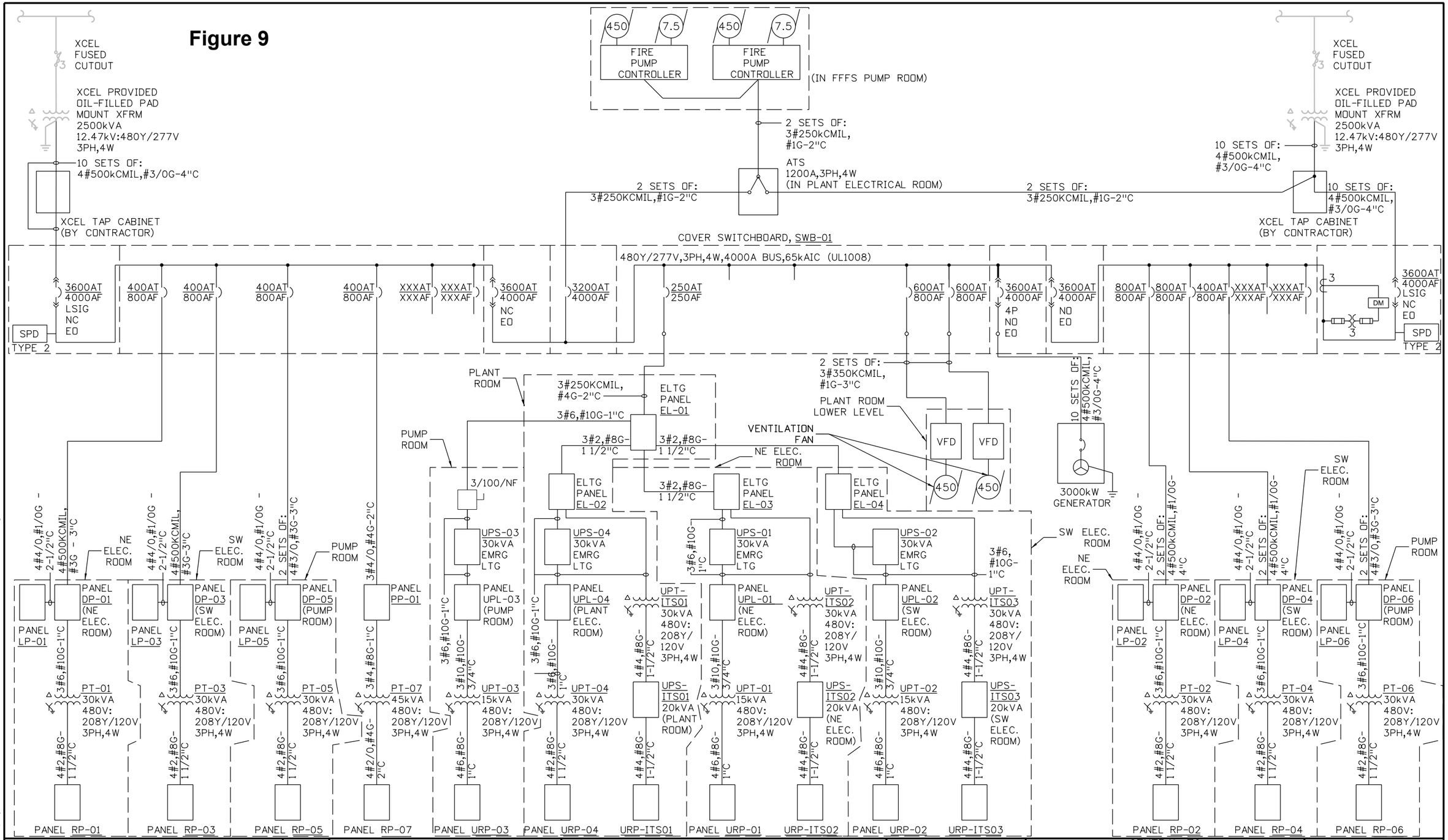
Sheet Number

Figure 9



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Front Range Mobility Group	Horiz. Scale: As Noted		
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	Unit Information		
	Unit Leader		

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CENTRAL 70
ALTERNATE CONSOLIDATED SINGLE LINE DIAGRAM

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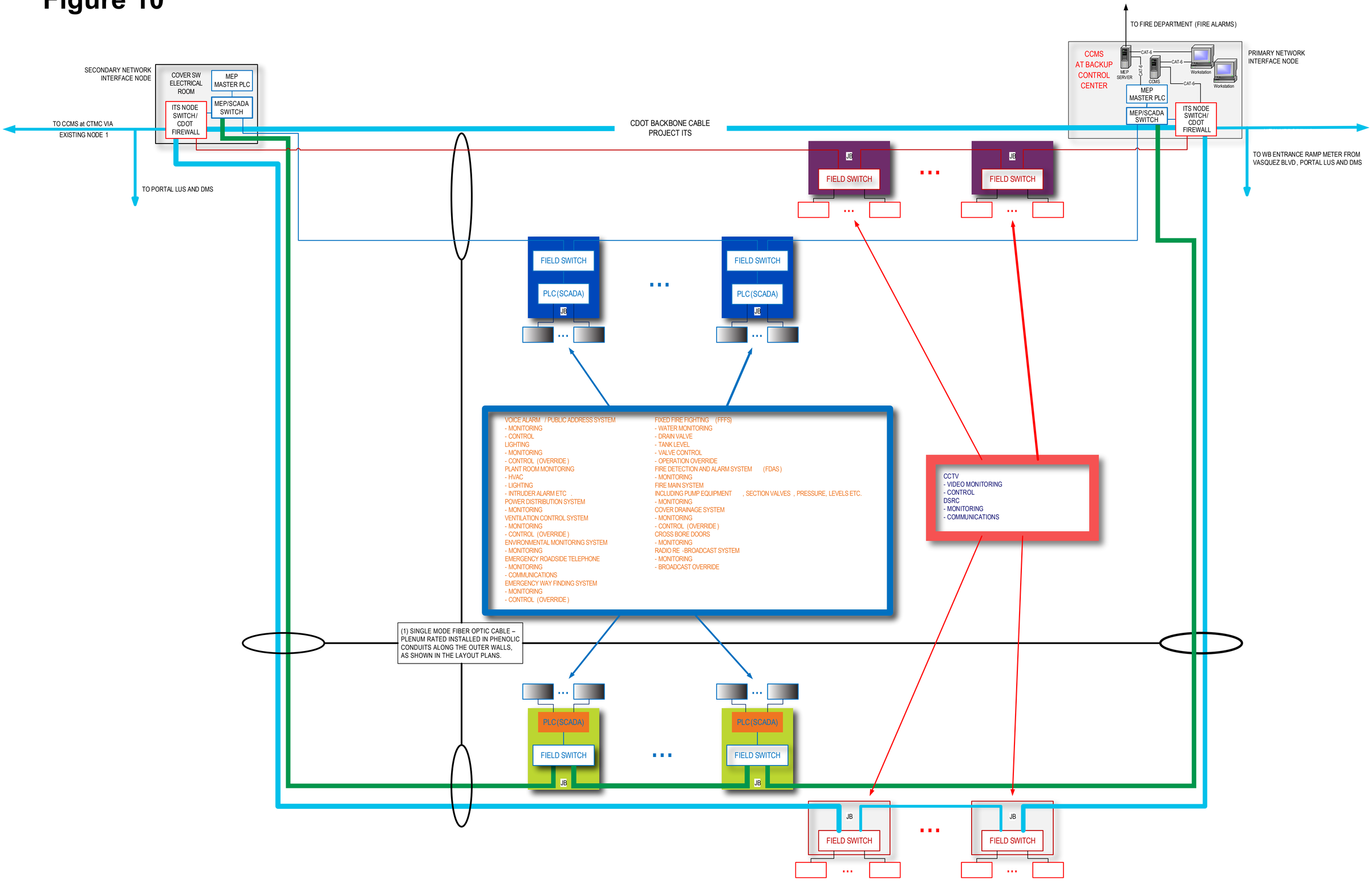
Detailer:
Sheet Subset:
Structure Numbers
Subset Sheets: of

Project No./Code
FBR 0704-234
19631
Sheet Number

Figure 10


SECONDARY NETWORK INTERFACE NODE
COVER SW ELECTRICAL ROOM
MEP MASTER PLC
MEP/SCADA SWITCH
ITS NODE SWITCH/ CDOT FIREWALL
TO CCMS at CTMC VIA EXISTING NODE 1
TO PORTAL LUS AND DMS
CDOT BACKBONE CABLE PROJECT ITS
TO FIRE DEPARTMENT (FIRE ALARMS)
CCMS AT BACKUP CONTROL CENTER
CAT-6
MEP SERVER
COMS
Workstation
Workstation
MEP MASTER PLC
MEP/SCADA SWITCH
ITS NODE SWITCH/ CDOT FIREWALL
PRIMARY NETWORK INTERFACE NODE
TO WB ENTRANCE RAMP METER FROM VASQUEZ BLVD , PORTAL LUS AND DMS
JB
FIELD SWITCH
FIELD SWITCH
FIELD SWITCH
PLC (SCADA)
JB
FIELD SWITCH
PLC (SCADA)
JB
VOICE ALARM / PUBLIC ADDRESS SYSTEM
- MONITORING
- CONTROL
LIGHTING
- MONITORING
- CONTROL (OVERRIDE)
PLANT ROOM MONITORING
- HVAC
- LIGHTING
- INTRUDER ALARM ETC .
POWER DISTRIBUTION SYSTEM
- MONITORING
VENTILATION CONTROL SYSTEM
- MONITORING
- CONTROL (OVERRIDE)
ENVIRONMENTAL MONITORING SYSTEM
- MONITORING
EMERGENCY ROADSIDE TELEPHONE
- MONITORING
- COMMUNICATIONS
EMERGENCY WAY FINDING SYSTEM
- MONITORING
- CONTROL (OVERRIDE)
FIXED FIRE FIGHTING (FFFS)
- WATER MONITORING
- DRAIN VALVE
- TANK LEVEL
- VALVE CONTROL
- OPERATION OVERRIDE
FIRE DETECTION AND ALARM SYSTEM (FDAS)
- MONITORING
FIRE MAIN SYSTEM
INCLUDING PUMP EQUIPMENT , SECTION VALVES , PRESSURE, LEVELS ETC.
- MONITORING
COVER DRAINAGE SYSTEM
- MONITORING
- CONTROL (OVERRIDE)
CROSS BORE DOORS
- MONITORING
RADIO RE -BROADCAST SYSTEM
- MONITORING
- BROADCAST OVERRIDE
CCTV
- VIDEO MONITORING
- CONTROL
DSRC
- MONITORING
- COMMUNICATIONS
(1) SINGLE MODE FIBER OPTIC CABLE – PLENUM RATED INSTALLED IN PHENOLIC CONDUITS ALONG THE OUTER WALLS, AS SHOWN IN THE LAYOUT PLANS.
PLC (SCADA)
FIELD SWITCH
JB
PLC (SCADA)
FIELD SWITCH
JB
JB
FIELD SWITCH
JB
FIELD SWITCH

Attachment 2
Hydraulic Performance-FFFS Calculation

Front Range
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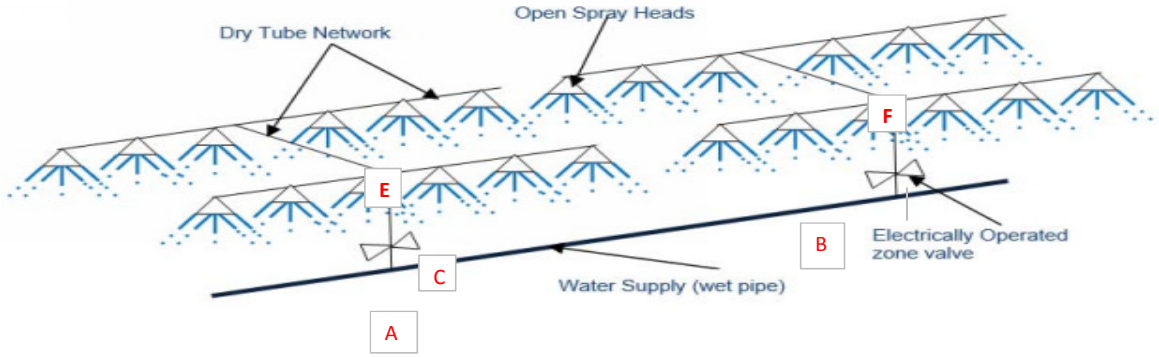
Objective: The objective is to calculate the pressure losses for the fire protection pipe for the 1000 ft Central 70 tunnel.
The system consists of 10 sprinkler zones per bore, two operating at any given time. One directly over the fire zone plus the one adjecent zones, for the 1000 ft Central 70 tunnel.with a total capacity of 5520 gpm /two zone area (ft²)

5520 gpm Required water flow rate

Tunnel Dimensions:

Width	Height	Length	Zone Area	Required flow rate/ zone
92.0 ft	18.0 ft	1000 ft	9200 ft²	2760 gpm



Explanation of Components in Schematic for Loss Calculation:

A, B	T-combining flow
C, D	valve
E,F	Zones (total of 10 zones/ bore)

Each of the 2 fire zones 2760 gpm of water spray.
The main fire pipe line shall be sized at 16 in.
Each zone pipe shall be sized at 12 in.
Each sprinkler head shall be sized for 0.30 gpm/ft^2
The total head loss is 100 psi

Dimensions

Main Pipe size	16.0 in	diameter
max length	2000 ft	
height	18 ft	
Tunnel Length	1000 ft	
Total equivalent length (with 30% SF)	2623 ft	
2 pumps, (1 standby)	450 hp	

SF- Safety Factor

Available Main pressure @ 5520 gpm is 40 psi at location 3 (hydrant 4437) at 7288 gpm the Pr =20 psi
Suction Pressure =PR-FL-Backflow device-Elevation loss
FL=4.52*Q^1.85/(C^1.85*d^4.87)=1.75 psi
Q=8280 gpm (150% of 5520 gpm)

C=	110	
d=	16	
Pr=	20	psi
FL=	1.75	psi
Backflow Device=	0	psi
Elevation Losses=	8.66	psi
Suction Pressure=	9.59	psi

T.E.L of main pipe	20	psi
Control valve losses	20	psi
Nozzle	20.90	psi
T.E.L of Branch pipe	5	psi

K=	25.2

gpm=	115.2	Tyco Model TN-25

Total	75.49	psi
Plus 30% SF	98.13	psi

Attachment 3
CFD Ventilation Report

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Attachment 3
CFD Ventilation Report

CFD VENTILATION REPORT

CENTRAL 70 – DETAILED ALTERNATIVE TECHNICAL CONCEPT (ATC) 26.1

October 20, 2016

Front Range Mobility Group

Document History

This document has been issued and amended as follows:

Version	Date	Description	Originator	Checker	Back-checker	Verified by
1.0	10/6/2016	Issue	S. Doddi	B. Bassi	N. Nayan	B.Bassi

Contents

Tables

Figures

Acronyms and Abbreviations

AHJ	-	Authority Having Jurisdiction
Btu/hr	-	British Thermal Units per hour
CFD	-	Computational Fluid Dynamics
FDS	-	Fire Dynamics Simulator
HRR	-	Heat Release Rate
kcfm	-	1,000 cubic feet per minute
lbf	-	Pound-force
m^3/s	-	Cubic meters per second
N	-	Newton
NIST	-	National Institute of Standards and Technology
PM	-	Particulate Matter
NO_2	-	Nitrogen Dioxide
NO	-	Nitric Oxide
CO	-	Carbon Monoxide
ppm	-	Parts Per Million

SECTION 1

1 Introduction

The construction of a 4-acre cover over I-70 is a defining feature of the lowered highway concept for I-70. The location of the cover is between Clayton Street and Columbine Street and is nearly 1000 ft in length. The enclosed tunnel under the cover consists of two sections separated by a dividing wall - a westbound covered section and an eastbound covered section with six traffic lanes in each section.

This ventilation, fire and life safety report aims at investigating the tenability in the tunnel regions during an emergency fire scenario and during congested traffic operations using a semi-transverse ventilation approach in order to provide tenability and ensure adequate ventilation to dilute and remove vehicle exhaust gases. Computational Fluid Dynamics (CFD) simulations are performed to evaluate the tenability for the design fire scenario and to calculate the effective dilution of noxious gases and particulate matter during periods of heavy traffic volumes. The results of the CFD analysis with an operating semi-transverse ventilation system are summarized in this report. All the simulations presented in the report are transient simulations where the continuous change in the tenability of the tunnel is investigated. It is important to continuously monitor the conditions in the tunnel since the goal of the simulations is to estimate the length of the time that the ventilation system is able to effectively provide a safe egress path for evacuating passengers during an emergency.

Because the operation of the tunnel during normal or congested traffic conditions, and the operation during a fire scenario are discrete or unconnected scenarios, the report has been split into two primary parts. Details, analysis and conclusions for the design 30 MW fire scenario are provided in Section-2. The congested traffic scenario analysis and conclusions are described in Section-3 of the report.

In the US, the primary reference document used to define the safety requirements and prescribe the minimum tenability criteria is the National Fire Protection Association (NFPA) Standard for Road Tunnels, Bridges, and Other Limited Access Highways (NFPA 502). The current version of this document is the 2014 edition and this analysis has been undertaken to ensure compliance with this document and CDOT standards.

The aim of using a semi-transverse ventilation approach is to limit the spread of smoke to within a short section of tunnel. The smoke should not propagate longitudinally along the tunnel for a long distance, thus enabling passengers that are able to self-rescue to walk to the nearest portal or cross passageway door and reach a point of safety. In addition, the height of the smoke layer and temperature within the tunnel must be maintained to within limits prescribed. The time taken to walk to the nearest exit point and if applicable, wait in line while attempting to reach a point of safety is based upon a well-established numerical approach used on tunnels around the world. This total time is often referred to as the egress time. The effectiveness of the tunnel safety systems is directly dependent upon maintaining a tenable environment for passengers and first rescuers for at least the total time of egress. It should be noted that the tunnel will be constructed with a zoned, fixed firefighting and suppression (FFFS) system in place and modern fire detection systems that can rapidly identify the exact location of a fire and reduce the speed of smoke propagation through the tunnel. However, the FFFS or the impact of suppression has not been simulated in this analysis and the results should be considered conservative.

For normal or congested operations, the effectiveness of the ventilation system is measured against the ability to exhaust and dilute gases from vehicle emissions. During normal traffic operation, there is sufficient dilution provided by the fresh air entraining into to the tunnels due to the piston action caused by the movement of the traffic in the tunnels. However, for congested traffic, as assumed in this report when the traffic is stagnant or not moving, no external fresh air is induced to assist with dilution of the tunnel air polluted from the noxious gases emitted from traffic vehicles. Hence, mechanical ventilation is required to maintain a tenable environment because with passage of time, increased amount of pollutants emitted from traffic vehicles are mixed with the tunnel air thus increasing the concentration of pollutants in air. The semi-transverse ventilation system composed of exhaust dampers fitted to the ventilation ducts that run along the cover of tunnels is able to continually extract the emissions from both the tunnels if the traffic is congested. It is important to maintain the pollutant levels of NO_2, NO, CO and Particulate Matter (PM) below the prescribed limits during congested traffic by operating the semi-transverse ventilation system in the congested operations mode. The effectiveness of the ventilation system in keeping the tunnel environment tenable during congested traffic is investigated in this report.

SECTION 2

2 Design Fire Scenario

2.1 Introduction

During an emergency fire scenario, a semi-transverse ventilation scheme composed of exhaust transverse ducts with damper modules, located between the exposed structural girders that make up the cover of the tunnel are used to extract smoke and hot gases. The ventilation system comprises of 10 transverse ducts, each with 6 damper modules at the cover of each tunnel bore located directly above the roadway. The CFD model has been coordinated with the girder layouts and the mechanical design so that tunnel dimensions and exhaust locations accurately reflect the latest design. The total capacity of the ventilation system is 350 kcfm and this was arrived at as part of the preliminary ATC CFD analysis. The analysis undertaken as part of the preliminary ATC assessed the performance of an exhaust capacity starting at 250 kcfm and it was found that the minimum required flow rate in order to maintain a tenable environment is 350 kcfm. The traffic density and the make up the vehicular traffic in the tunnel is exactly as detailed in Atkins' Ventilation and Fire Life Safety report [5].

2.2 Applicable Standards and Criteria

The primary standard is the Central 70 Project Design Criteria [1], and NFPA 502 [2] used as indicated by the Fire Life Safety Criteria.

The requirements and assessment criteria used in the tunnel CFD modeling are summarized as follows:

- Visibility to doors and walls of no less than of 33 ft. is the minimum required for escape.
- The maximum tenable air temperature is 120°F
- A height clear of smoke of at least 8.2 ft. is required above any point on the evacuation path

2.3 Objective

Evaluate the tenability in the tunnel for a 30 MW emergency fire event in the presence of wind. A semi-transverse ventilation system with a 350 kcfm capacity is used to mitigate the smoke. The objective is to use the ventilation system is to create a tenable environment in the tunnel for passenger egress. The fire size, growth rate and other parameters are consistent with Schedule 10, Section 12 of the Project Agreement with appropriate reference documents and additional information was obtained from Schedule 29 Fire Analysis and Ventilation Design Documentation for the Cover MEP systems.

The 350 kcfm used for the total exhaust capacity of the semi-transverse ventilation system is based on simulations performed during the preliminary ATC CFD analysis. Simulations with ventilation capacities of 250 kcfm, 300 kcfm and 350 kcfm were run in the preliminary stage to determine the minimum capacity required for smoke control in the event of fire. Based on this preliminary work, it was determined that a minimum ventilation capacity of 350 kcfm is required to control smoke in the tunnel during a fire emergency. The current report uses the value of 350 kcfm for the ventilation capacity to perform detailed simulations and validate the estimated ventilation capacity and provide a tenable environment in the tunnel. The study performed here

mirrors the work done by the client's team for the jet fan concept. With the concept of jet fans in place, it was determined by the client's team that 14 jet fans (out of 16 total, 2 redundant) each with 225 lbf thrust (69.7 kcfm) are required to provide a tenable environment in the tunnel in order to prevent backlayering using this longitudinal ventilation system. The installation of the jet fans are in a niche with a slightly raised ceiling at the portal. The present concept of semi-transverse ventilation system with a total capacity of 350 kcfm (118 m^3/s) consists of a system of 10 transverse ducts spread along the tunnel to confine the fire locally using selective dampers that are opened. In addition, the semi-transverse ventilation is able to control smoke in both the tunnels during congested operations as discussed in Section 3 of this report.

2.4 Design Fire

The design for the emergency fire scenario in the tunnel is 30 MW (or 102.4 Mbtu/hr) as per Section 12.13.4(b)(III) of the Project Agreement, Schedule 10, Section 12 [1]. The fire growth is based on a medium fire growth curve with a growth rate of $\alpha = 12\ W/s^2$.

Figure 1 below shows the heat release rate (HRR) of the fire with time. The fire reaches a peak heat release rate value of 30 MW at 1599.9 seconds (or 26.7 min).

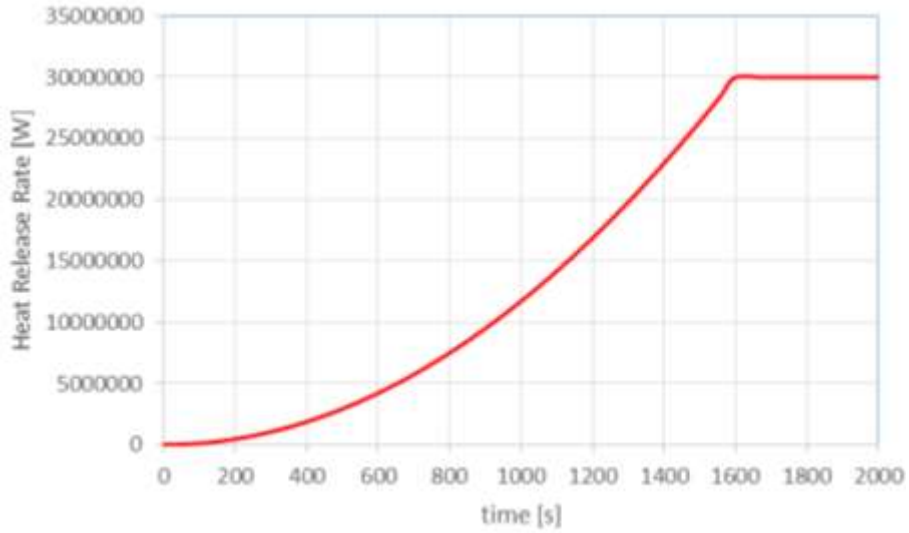


Figure 1. Medium fire growth is curve shown with a peak heat release rate of 30 MW (102.36 MBtu/hr).

2.5 CFD Model and Methodology

The following points summarize the model and methodology:

- The Fire Dynamics Simulator v 6.2 (FDS) [3] – CFD software developed by the National Institute of Standards and Technology (NIST) – is used to model the fire scenarios
- The model uses a structured Cartesian mesh with a varying resolution of 0.5 ft to 1.5 ft. The total number of grid cells is 3.02 Million cells for the 30 MW design fire (102.36 MBtu/hr).
- A Large Eddy Simulation approach is used with the Deardorff eddy viscosity subgrid turbulence model

2.5.1 CFD Geometry

The tunnel geometry is built in CFD using the structural plan drawings. The tunnel has a gradient of 1.19% with the east portal at a higher elevation compared to the west portal. The north tunnel is varying width with a width of 95.1 ft (29 m) at the west portal and 114.8 ft (35 m) at the east portal. Hence the north wall of north tunnel is converging towards the west portal. Because the center dividing wall is a fire barrier, only one traffic direction tunnel is modeled. In addition, the semi-transverse ventilation ducts and dampers are also fire rated and so the fire incident is also isolated in terms of the ventilation scheme used to extract the smoke from the tunnel. The required ventilation capacity was calculated using the CFD software during the preliminary ATC phase, a required total exhaust volume flow rate of 350 kcfm was shown to be sufficient in order to effectively remove smoke.

The geometry of the CFD model is shown in Figure 2, Figure 3 and Figure 4 below. Figure 2 shows the three dimensional view with the entire north tunnel layout. Note than only one travel direction is shown below and not the entire covered section because the fire is an isolated incident affecting only the incident 'tunnel'. In addition, because we are not utilizing a longitudinal ventilation approach, smoke is not blown along the tunnel and out of the portals, thus reducing the likelihood of smoke recirculation into the non-incident travel direction tunnel. The fire source is located at the west portal and the traffic is backed up behind the incident vehicle. Figure 3 represents a plan view of the tunnel. The three exhaust transverse ducts located in the vicinity of the fire source at the tunnel cover are spread over one quarter of the tunnel longitudinal distance and the design approach is to limit the spread of smoke to this region for the egress duration and beyond. Figure 4 shows the end view of the tunnel looking west. The east portal is seen in the figure. The girders located at the tunnel cover are also shown. Note that the space between the girders provides room for the smoke reservoir as the smoke rises up during the fire event.

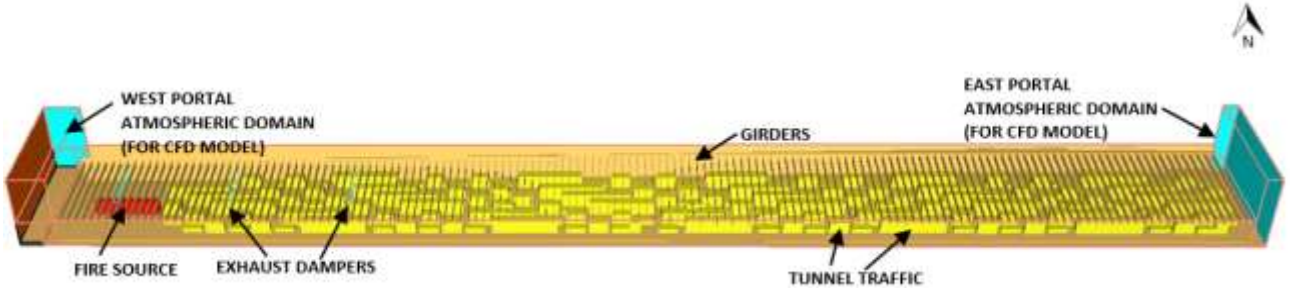


Figure 2. The CFD model geometry is shown with the 30 MW fire at west portal and the traffic backed up behind it.

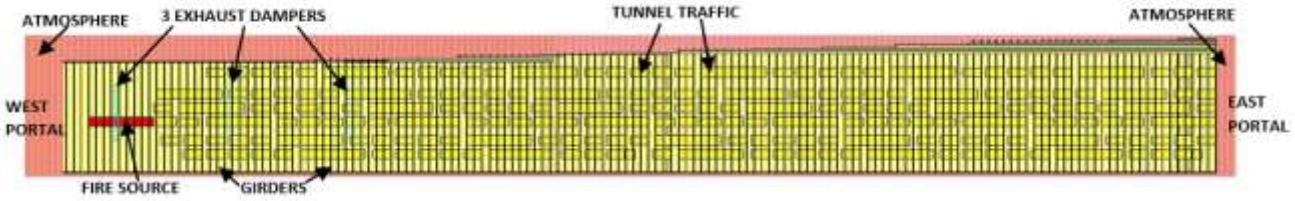


Figure 3. Plan view of the tunnel showing the 30 MW fire source at west portal, the converging tunnel wall and the girders.

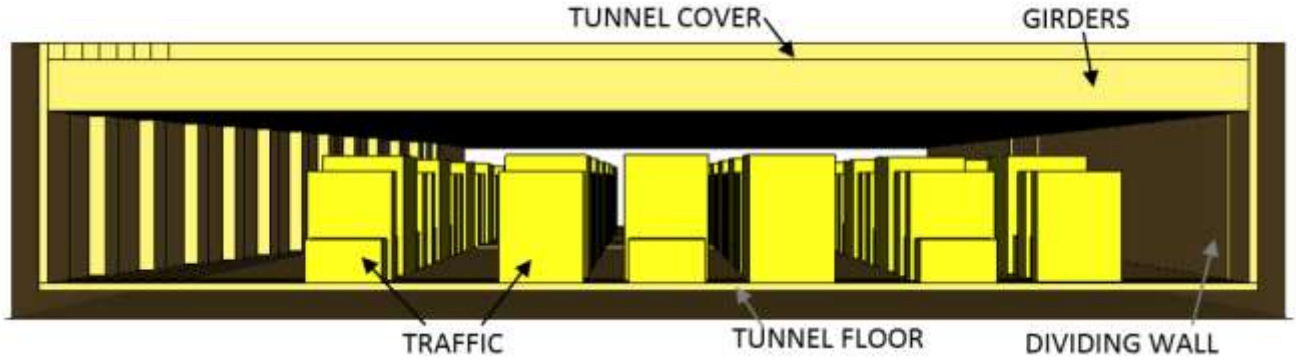


Figure 4. End view of the tunnel looking west

2.5.2 Ventilation Scheme

The layout of the damper modules at the tunnel cover consists of 10 transverse ventilation ducts spaced approximately 100 ft apart. The ventilation exhaust is facilitated by a series of fire rated dampers located at the base of ventilation duct and consists of 6 damper modules. The total open area depends on the number of damper modules open. The size of each damper module is 3'-3" x 8'-2" with a total area of 26.91 ft^2. The ventilation scheme corresponding to the 30 MW fire scenario utilizes all 6 damper modules open in the damper corresponding to an open area equal to 161.5 ft^2. The transverse ventilation duct nearest to the west portal is 50 ft away from the portal and the duct nearest to the east portal is 100 ft away from the portal.

In order to gauge the best operating approach, CFD simulations were undertaken for two cases: a) smoke is exhausted via three transverse ducts and b) smoke is exhausted via five transverse ducts. The premise is to attempt to confine the smoke to as small a region as possible and thus enabling safe egress. Hence if the spread of smoke in the tunnel is controlled by the three transverse ducts, then the smoke is contained within one quarter of the tunnel. Using the CFD simulations, an estimate of the time available for safe egress of passengers is provided. The semi-transverse ventilation aims to confine the smoke to a region in the vicinity of the fire source so that the required time for egress is available for evacuation of passengers to a designated point of safety.

The use of three or five transverse ducts also impacts the efficiency of the dampers with respect to smoke capture. With three transverse ducts, a total exhaust capacity of 350 kcfm allows the dampers to be sized so that the face velocity at the dampers is 722 fpm. With five transverse ducts in operation the face velocity is limited to 433 fpm. The higher velocity is desirable as this will increase the efficiency of the smoke exhaust system. The calculated damper face velocities are detailed in Table 1 below.

Table 1. Calculated values for exhaust velocity through the damper for assumed damper sizes

Number of Open Transverse Ducts and open damper modules	Damper Module Dimensions [ft]	Total Transverse Duct Opening Area [ft^2]	Volume Flow Rate through each Open Transverse Duct [kcfm]	Face Velocity [fpm]
3 Transverse Ducts (3x6=18 open damper modules)	3.'3" x 8'-2"	161.5 ft^2	116.538 kcfm	722 ft/min
5 Transverse Ducts (5x6=30 open damper modules)	3'-3" x 8'-2"	161.5 ft^2)	70.007 kcfm	433 ft/min

2.5.3 Boundary Conditions

The boundary conditions for the emergency fire scenario consists of wind at the west portal. The wind profile for both the tunnels assumes a 1/7th power law with zero velocity at the datum level and reaching the maximum velocity of 6 m/s at a reference height of 100 ft. The profile of the wind is generally represented using the 1/7th power law as it approximates the atmospheric boundary layer well. It is a standard practice in CFD to represent the wind profile in this fashion. The wind profile power law determines the relationship between atmospheric wind speed at one height and that at another reference height. It is given by:

$$\frac{u}{u_r} = \left(\frac{z}{z_r}\right)^{\alpha}$$

where u is the wind speed, z is the height and u_r is the known wind speed at a reference height z_r. α is an empirically derived coefficient which for normal conditions is approximately 1/7.

The wind velocity is based on the prevailing wind direction and velocity at Denver International Airport between 1997 and 2014. The wind rose provided by the National Climatic Data Center website is shown in Figure 5 below.

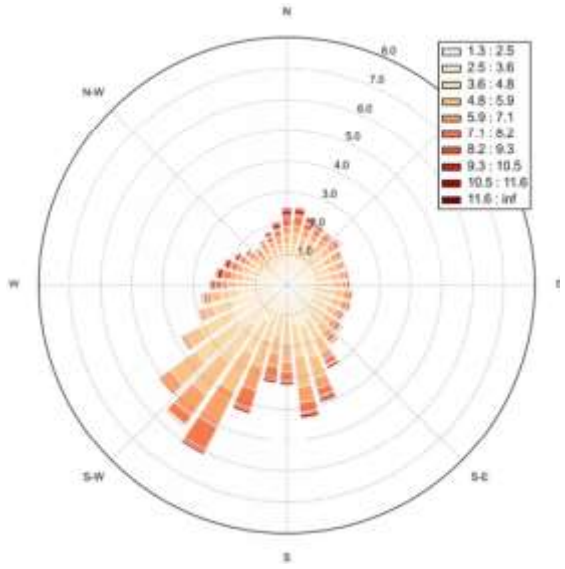


Figure 5. Wind rose data at Denver International Airport between 1997 and 2014 showing the prevailing direction and velocity (m/s) provided by the National Climatic Data Center website[4].

Based on the wind rose data above for the period of 1997 and 2014, since the prevailing wind direction is from west to east, the wind boundary condition is applied to the west portal of the CFD geometry. The magnitude of wind used in the simulation is 6 m/s based on the 95 percentile wind velocity obtained from the wind rose that is equivalent to the maximum wind velocity at the portal 95% of the time.

The location of fire in the simulation is assumed to be at the west portal because it is the most onerous condition based on the wind direction and the tunnel gradient. As seen in Figure 5, the prevailing wind direction is from west to east. Hence, the smoke released from the fire source at the west portal is potentially pushed back into to the tunnel by the wind. This causes most of the smoke from the fire source at the west portal to remain in the tunnel. In addition, the tunnel has a gradient of 1.19% as indicated earlier in Section 2.5.1, with the east portal at a higher elevation than the west portal. Due to buoyancy, the smoke will tend to remain in the tunnel if the location of the fire is at the west portal. Hence the location of fire in the CFD simulations is assumed to be at the west portal with the traffic backed up behind as it the most onerous in terms of smoke accumulation in the tunnel.

2.6 Egress Calculations

The time required for the evacuating passengers during a fire emergency is called the egress time. This calculation is included in Appendix C. The fire is located at the west portal and hence the passengers egress to the east. It is assumed that there are three cross passage doors in the tunnel, two of which are close to either portal and the third cross passage door is located at the center of the tunnel. The cross passage door near the fire at the west portal is assumed to be unavailable due to the proximity of the fire. The cross passage door at the east portal is assumed to unused as it is expected that passengers will simply egress via the open east portal. Hence, the two exits used for egress are the center cross passage and the east portal. It is assumed that there are 2 passengers in every vehicle in the tunnel. Thus, there are a total of 444 passengers corresponding to 222 vehicles in all the 6 lanes. Based on the calculation detailed in Appendix C, the time required to evacuate all the 444 passengers using the east portal and the center cross passage is 6.1 minutes.

Hence, for safe egress of the passengers during a fire emergency, it is necessary that the ventilation system is able to provide a tenable egress path in terms of smoke visibility for at least 6.1 minutes from the start of fire.

2.7 Results

Transient CFD Simulations were performed to assess the tenability in the tunnel region for the emergency fire scenario. The transient simulations provide an estimate of how the smoke spreads and the tenability changes in the tunnel with time, based on the prescribed heat released rate with a medium fire growth curve and a design peak heat release rate of 30 MW (102.36 MBTU/hr) located at the west portal for the assume tunnel boundary conditions. The amount of smoke increases as the fire size increases and the accumulated smoke at the tunnel cover moves longitudinally along the tunnel before leaving the tunnel through the portal boundaries. Detailed transient simulations have been performed with Wind applied at the tunnel portal.

A semi-transverse ventilation scheme with a total fan capacity of 350 kcfm is simulated and an exhaust flow is simulated using transverse ducts with dampers at the tunnel cover located between girders. Two CFD cases have been simulated corresponding to a different number of transverse ducts used for exhaust at tunnel cover. The corresponding transient simulation results are presented in Appendix A1 and Appendix A2. The CFD model parameters and results are summarized in Table 2 and below respectively.

Table 2: Summary of 30 MW Fire Simulations Setup

Number of Transverse Ducts and Damper Modules	Operational Scenario	Total Ventilation Capacity	Wind	Results Appendix Location
Three Transverse Ducts (18 damper modules open)	30 MW Emergency Fire at West Portal	350 kcfm	Applied at West Portal Boundary	Appendix A1 for Smoke Visibility (Page A1-1 to A1-6) Appendix A1 for Temperature (Page A1-7 to A1-12)
Five Transverse Ducts (30 damper modules open)	30 MW Emergency Fire at West Portal	350 kcfm	Applied at West Portal Boundary	Appendix A2 for Smoke Visibility (Page A2-1 to A2-6) Appendix A2 for Temperature (Page A2-7 to A2-12)

The Emergency fire simulation results with 3 transverse ducts open (18 damper modules open) are presented in Appendix A1 and the emergency fire simulation results with 5 transverse ducts open (30 damper modules open) are presented in Appendix A2. Table 2 below summarizes the simulation setup details.

Table 3 summarizes the results of the CFD simulations as per the smoke visibility and temperature results presented in Appendix A1 and Appendix A2.

When there is no ventilation in place, after 6 minutes from the start of fire, the smoke spreads to one-half of the tunnel rendering one half of the tunnel untenable. However, after 6 minutes from the start of fire, the other half of the tunnel is still tenable. Then, the tenability in the tunnel quickly deteriorates as the smoke spreads fast. At 7.5 minutes from the start of fire, the entire tunnel is untenable with respect to smoke. With respect to temperature, the tunnel is still tenable after 7.5 minutes from the start of fire, but the smoke visibility is a more stringent criterion and so the tunnel is completely untenable.

When a 350 kcfm semi-transverse ventilation system is used in conjunction with only 3 transverse ducts) open (18 open damper modules), after 7.5 minutes from start of fire, the tunnel is still mostly tenable except in the vicinity of the fire source, which is expected. After 9 minutes from start of fire, the tunnel visibility in one half of the tunnel is spotty and untenable in certain regions, but the other half of the tunnel is still tenable. After 10 minutes from start of fire, two-thirds of the tunnel region is untenable, but one-third of the tunnel region nearest to the east portal is still tenable. With respect to temperature, the tunnel is still completely tenable beyond 10 minutes from start of fire, but the smoke visibility is a more stringent criterion and so two-thirds of the tunnel is untenable

When 350 kcfm semi-transverse ventilation system is used in conjunction with only 5 transverse ducts open (30 damper modules open), after 8 minutes from start of fire, the smoke spread is confined to one-half of the tunnel region. The other half of the tunnel region is still tenable. After 10 min from start of fire, nearly three-fourths of the tunnel region is untenable. However, the one-fourth of the tunnel region closest to the east portal is still tenable. With respect to temperature, the tunnel is still completely tenable after 10 min from start of fire, but the smoke visibility is a more stringent criterion and so three-fourths of the tunnel region is untenable.

Table 3: Summary of 30 MW (102.36 MBtu/hr). Fire Simulations Results

Number of Transverse Ducts and open damper modules	Time	Smoke Tenability	Temperature Tenability	Notes
Three Transverse Ducts (18 open damper modules)	0	Tenable	Tenable	Fire Starts at West Portal
	6 minutes	Entire tunnel is tenable except the immediate vicinity of the fire, this is acceptable	Tenable	Fan is operating and damper modules open
	7.5 minutes	The entire tunnel is tenable except in the immediate vicinity of the fire location, this is acceptable.	Tenable	Three transverse ducts are exhausting smoke and hot gases from the tunnel and preventing smoke spread
	9 minutes	Certain locations in the tunnel are untenable, however the non-incident -half of the tunnel remains tenable	Tenable	Smoke is no longer contained within the region of the three transverse ducts that contain open dampers. However, 9 minutes is ample time for egress for from the incident half of the tunnel
	10 minutes	2/3 of the tunnel region is untenable. 1/3 of the tunnel region near east portal is tenable.	Tenable	Smoke has spread to 2/3 of the tunnel. 1/3 of the tunnel region near east portal is still tenable, but the passengers should all have evacuated in 6.1 minutes.
Five Transverse Ducts (30 open damper modules)	t=0	Tenable	Tenable	Fire Starts near West Portal
	6 minutes	Entire tunnel is tenable except the immediate vicinity of the fire, this is acceptable		Fan is operating and damper modules open
	7.5 minutes	Entire tunnel is tenable, except the immediate vicinity of fire, this is acceptable	Tenable	Five transverse ducts are exhausting smoke and hot gases from the tunnel and preventing smoke spread
	t=8 minutes	Smoke is restricted to the incident half of the tunnel. The non-incident half of the tunnel remains tenable	Tenable	Tenability is maintained in the non-incident half of the tunnel
	9 minutes	Nearly 2/3rd of the tunnel is untenable. The non-incident 1/3rd of the tunnel near the east portal is tenable.	Tenable	Smoke has started to spread into the non-incident half of the tunnel
	t=10 minutes	Nearly 3/4 of the tunnel region is untenable. The other 1/4 of the tunnel region near east portal is tenable	Tenable	Smoke has spread to 3/4 of the tunnel. 1/4 of the tunnel region near east portal is still tenable, but the passengers should all have evacuated in 6.1 minutes.

2.8 Conclusions

In the case of the 30 MW design fire scenario, transient CFD analysis was undertaken for a total time of 10 minutes. The incident vehicle was located near the west portal of the tunnel with traffic backed up behind the incident vehicle in order to simulate the worst case scenario. A portal wind boundary condition was applied at the west portal based upon the wind rose obtained for Denver International Airport and applied to simulate the worst case condition with respect to atmospheric conditions

Additional CFD analysis using a semi-transverse ventilation system with three transverse ducts (18 open damper modules) indicates that smoke can be contained to within one quarter of the tunnel for a period of at least 7.5 minutes after start of fire. The non-incident -half of the tunnel remains tenable for a duration of 9 minutes after start of fire. This is sufficient time for users to self-rescue and evacuate the tunnel and reach a point of safety based upon the egress calculations presented in Appendix C. After 10 minutes from start of fire, one-third of the tunnel closest to the east portal remains tenable.

When the semi-transverse ventilation system is employed using five transverse ducts (30 open damper modules), then one-half of the tunnel is still tenable at 8 minutes after start of fire. After 10 minutes from start of fire, one-fourth of the tunnel closer to the east portal is still tenable. Even in this case, the evacuating passengers will have enough time to egress and evacuate the tunnel to a designated point of safety.

SECTION 3

3 Congested Traffic Emissions Scenario

3.1 Introduction

During congested operations, a semi-transverse ventilation scheme composed of exhaust dampers at the cover of the tunnel are used exhaust air during congested operations. The ventilation system comprises of 10 transverse ducts in total at the tunnel cover of each bore, each with 6 dampers modules. The total capacity of the ventilation system is 350 kcfm. The size of each damper module is 3'-4" x 8'-2". Only four of the six damper modules are opened in each transverse duct in order to ensure a reasonably high face velocity and improve exhaust efficiency.

3.2 Applicable Standards and Criteria

The permissible exposure limits for each bore shall be in accordance with Environmental Protection Agency and FHWA standards. Maximum limit levels for normal traffic operations are given in Table 4 below.

Table 4. Maximum Pollutant Levels

Pollutant	Maximum Limit
Carbon Monoxide, CO	120 ppm
Nitrogen Dioxide, NO_2	1 ppm
Nitric Oxide, NO	15 ppm
Particulate Matter, PM	0.007 m^{-1} extinction coefficient

3.3 Objective

The objective of the congested traffic scenario simulation is to evaluate the tenability in the tunnels during congested traffic operations for a prolonged length of time in the presence of a semi-transverse ventilation system. A total capacity of 350 kcfm is used for both tunnels during congested operations to extract the polluted air due to pollutants from traffic emissions. The ventilation capacity is based upon the fire analysis and minimum flow rate required for smoke control. The objective of the ventilation system is to keep the levels of the pollutants from emissions below the maximum limit values outlined in Table 4 above.

3.4 Traffic Emissions

In order to model the release of noxious gases and particulate matter into the tunnel environment and monitor the conditions in the tunnel, the source flow rates of the respective pollutants (i.e., NO_2, NO, CO and PM) released from the traffic exhaust pipe is required. This information is supplied to the FDS program that uses these source values to disperse the pollutants into the CFD domain accordingly. The traffic emissions data is available from the US EPA computer model - Motor Vehicles Emissions Simulator (MOVES 2010b model [5]). Based on the vehicle age distribution and source-type distribution of traffic provided by CDOT, ANA (Atkins North America) have estimated the amount of pollutants using their MOVES model. These quantities are listed in their Ventilation and Fire Life Safety report [5]. The MOVES model concentrates on emissions

levels during congested traffic as this will produce the worst case conditions for pollutant concentration levels. The emissions source values used in the current congested traffic scenario CFD model assumes that the traffic is stationary or not moving since that is a conservative estimate for the pollutant concentration levels as there is no fresh air induced into tunnels due to the motion of the traffic that would dilute the concentration levels of the pollutants. The current congested traffic scenario CFD model uses the pollutant emission source values available from ANA's MOVES model.

The traffic density in the tunnels is exactly the same as that used in Atkins' Ventilation and Fire Analysis Report [5]. Based on this, in the current CFD model, a model train consisting of 6 vehicles of total length of 50 m is repeated in each lane of the available 6 lanes making up the entire traffic in a single bore. The quantity for pollutant emissions for CO, NO, NO_2 and PM is also exactly the same as the values available from the EPA MOVES model for eastbound bore at zero vehicular speed. The same emission values were used for the westbound bore also in the current CFD simulation.

3.5 CFD Model and Methodology

The following points summarize the model and methodology

- The Fire Dynamics Simulator v 6.2 (FDS) [3] – CFD software developed by the National Institute of Standards and Technology (NIST) – is used to model the fire scenarios
- The model uses a structured Cartesian mesh with a varying resolution of 0.5 ft to 1.5 ft. The total number of grid cells is 1.4 M cells for the emissions model.
- A Large Eddy Simulation approach is used with the Deardorff eddy viscosity subgrid turbulence model

3.5.1 CFD Geometry

The tunnel geometry is built in CFD using the structural plan drawings. The tunnel has a gradient of 1.19% with the east portal at a higher elevation compared to the west portal. The north tunnel has a varying width with a width of 95.1 ft (29 m) at the west portal and 114.8 ft (35 m) at the east portal. Hence the north wall of north tunnel is converging towards the west portal. For the congested operations scenario, both the north and the south tunnels are modeled in CFD. The south tunnel is assumed to be of constant width of 91.9 ft (28 m). Although the dividing wall isolates the two tunnels, a common ventilation system of 350 kcfm capacity is used for both the tunnels during congested operations in order to extract smoke using the exhaust vents at the cover of both the tunnels.

The geometry of the tunnel for the congested traffic CFD model is shown in Figure 6, Figure 7 and Figure 8. Note than for vehicle emissions analysis, the cover structure with both traffic travel directions is modeled. During congested operations, a single ventilation system with a total capacity of 350 kcfm is used to extract smoke using the transverse ducts with dampers located at the cover using semi-transverse ventilation. Figure 6 shows an isometric view of the CFD model. Various elements of the geometry including the dividing wall, girders, the traffic and the dampers at the cover are shown in the figure. Figure 7 shows the end view of the tunnel looking west. Figure 8 shows the plan view of the tunnel indicating the exhaust dampers connected to the 10 transverse ducts (80 damper modules open in total) at the tunnel cover. The exhaust flow through each of the dampers is the same. The total ventilation capacity used to extract pollutants from emissions during congested operations is 350 kcfm.

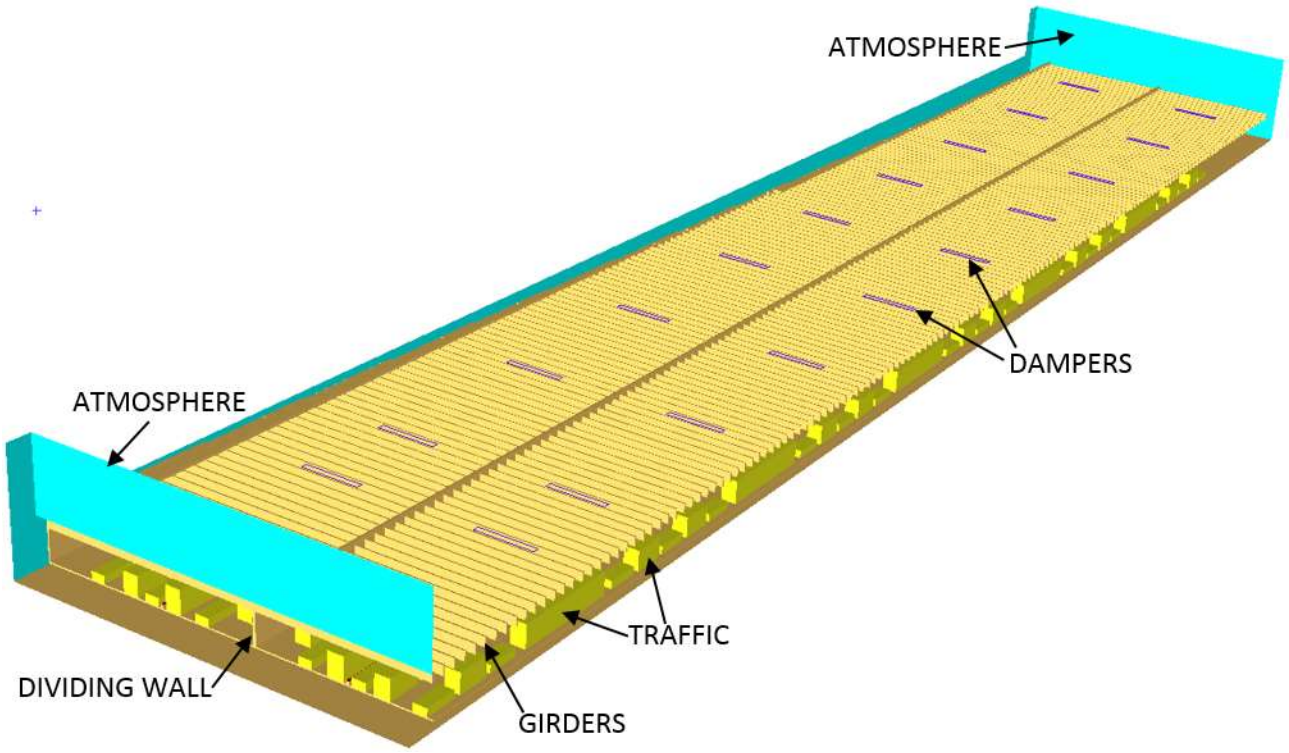


Figure 6. Isometric view of the CFD model showing the two tunnels with the dividing wall, congested traffic, girders and the dampers connected to the transverse ducts at the tunnel cover.

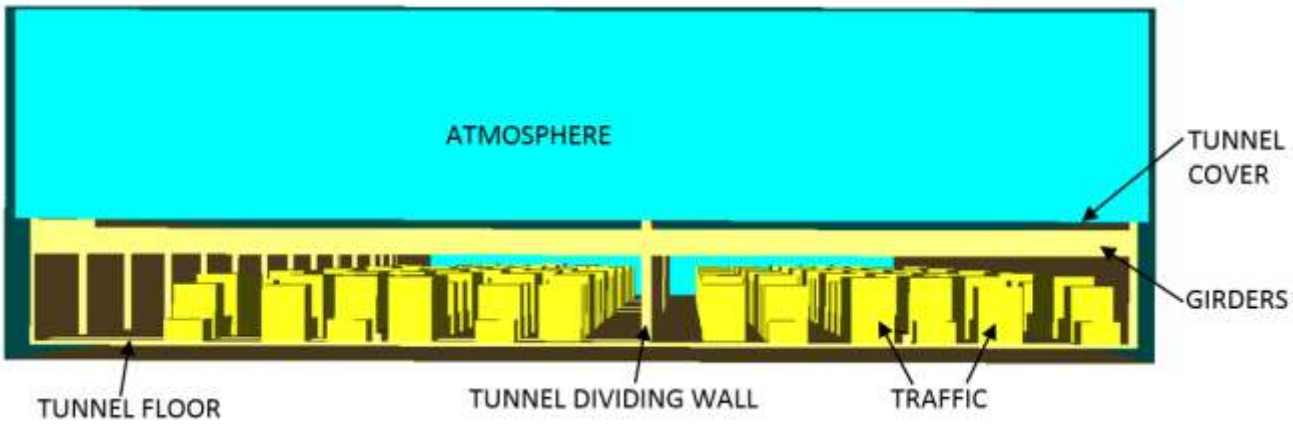


Figure 7. End view of the tunnel showing the congested traffic in both the tunnels

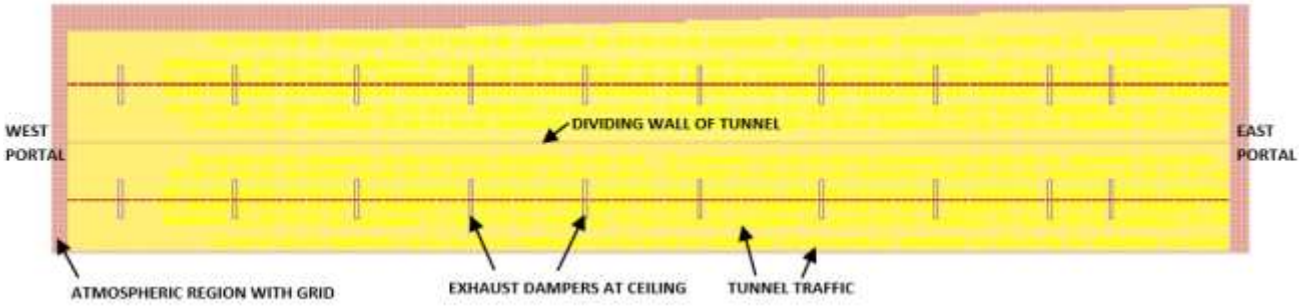


Figure 8. Plan view of the tunnel showing the congested traffic, dividing wall and exhaust dampers in the tunnel cover

3.6 Ventilation Scheme

When the traffic in the tunnel comes to a standstill due to congestion, the air quality in the confined environment of the tunnel will continue to deteriorate with time in the absence of any ventilation system as pollutants from the traffic emissions accumulate in tunnel air. When the traffic is moving, the piston effect due to the flow of traffic provides adequate influx of fresh air to ventilate the tunnel environment. However, when the traffic is standstill for an extended period, it is necessary to remove the pollutants released into tunnel air by use of mechanical ventilation. It is assumed in the current CFD simulations that after 2 minutes (120 seconds) of traffic congestion in the tunnel, the ventilation system is turned on. Although the tunnel environment is still tenable (as discussed in the simulation results later) after 2 minutes of traffic congestion, not operating the ventilation system will continue to deteriorate the air quality in the tunnel as the concentration of the pollutants (NO_2, NO, CO and PM) released by the vehicular traffic in the tunnel continues to rise. During a congested traffic scenario, the CFD simulations aims to remove the accumulated emissions from the vehicles through the operation of a semi-transverse ventilation system that will remove 'dirty' air from the tunnel and pull fresh air from the portals inwards. Because traffic conditions could include congestion in both traffic directions, all ten transverse ducts above the road way and their dampers are modelled are opened simultaneously in the model. This allows for extraction of emissions from the entire cover structure. Based on the total available exhaust capacity of 350 kcfm, the exhaust velocity through each transverse duct opening is 163 ft/min (0.83 m/s). The tabulated exhaust velocity value is shown in Table 5 below.

Table 5. Calculated values for exhaust velocity through the damper modules

Number of Open Transverse Ducts and Damper Modules	Transverse Duct Opening Size [ft]	Individual Transverse Duct Opening Area [ft^2]	Volume Flow Rate through each Transverse Duct Opening [kcfm]	Exhaust Velocity [fpm]
10 Transverse Ducts (80 damper modules open in total)	3'-3" x 32.8' (1 m x 10 m)	107.6 ft^2 (10 m^2)	17.5 kcfm (8.26 m^3/s)	163 ft/min (0.83 m/s)

3.7 Boundary Conditions

In the case of the congested traffic scenario CFD model, no wind is applied at the portal boundary. This is a conservative approach compared to the case where wind is applied as a boundary condition at the portal boundary. This is because imposing a portal wind boundary condition at the portal boundary will cause fresh air from the atmosphere to enter the tunnel through the portal. The fresh air entering the tunnel will dilute the tunnel environment consisting of polluted air. The dilution of the pollutants will result in the decrease in the concentration of the pollutants in the tunnel air. Thus, it is conservative to not apply wind as a boundary condition at the tunnel portal in order to estimate the worst conditions prevalent in the tunnel in terms of the concentration of pollutants from vehicle emissions present in tunnel air. Hence, both the tunnel boundaries are open to atmosphere with zero static pressure applied at the boundaries.

3.8 Results

For the congested operations simulations, there is no fire in the tunnel. The emissions from the traffic disperse pollutants such as Nitrogen Dioxide (NO2), Nitric Oxide (NO), Carbon Monoxide (CO) and Particulate Matter (PM, consisting of PM2.5 and PM10) into the tunnel space that accumulates over time. Particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. PM10 are inhalable particles with diameters generally 10 micrometers or less and PM2.5 are fine inhalable particles that are generally 2.5 micrometers or less. These noxious gases and the microscopic particles are considered harmful to public health and environment [6]. In the CFD simulation, the tunnel traffic is assumed to be stagnant. The effect of the moving traffic would be to dilute the tunnel environment by entraining fresh air due to the piston effect of traffic reducing the ppm concentrations of the pollutants. Hence assuming the traffic to be stagnant or not moving is a conservative assumption. The simulation set up and results are summarized in Table 6 and Table 7 below.

The congested traffic scenario setup is described in Table 6 below. The 350 kcfm semi-transverse ventilation is used in conjunction with all transverse duct openings exhausting air from the cover structure.

Table 6: Summary of Congested Operations Setup

Number of Transverse Ducts and Damper Modules Open	Ventilation Begin Time	Total Ventilation Capacity	Wind boundary condition	Results Appendix Location
10 Transverse Ducts (80 Damper Modules open) in Two Tunnels	Operational after 120 s after congestion begins	350 kcfm	No Wind assumed at tunnel portals	Appendix B – ppm concentrations of NO_2, NO, CO and Extinction Coefficient of PM.

Table *7* below summarizes the ppm concentration and particulate matter extinction coefficient results based on the results presented in Appendix B. The simulation is run for a total of 30 min. Running the simulations for 30 minutes allows monitoring the conditions in the tunnel for a sufficient length of time in order to confirm that a safe environment can be maintained. After 30 minutes, the ppm concentrations of NO2, NO and CO are maintained below the prescribed limits of 1 ppm, 15 ppm and 120 ppm respectively.

In addition, after 30 minutes, the extinction coefficient of particulate matter in the tunnel is below the corresponding extinction coefficient limit of 0.007 m^{-1}.

Thus the tunnel environment can be considered tenable and safe as all the required criteria needed to maintain tenability in the tunnel are satisfied for the duration of simulation. This shows that the ventilation system is successfully able to remove excess pollutants in the tunnel environment and continuously maintain a tenable environment for a prolonged length of time.

Table 7: Summary of Congested Operations Setup

Case	Pollutant	PPM Concentration/Extinction Coefficient Result
Ventilation starts after 120 s from start of fire	NO_2	PASS, NO_2 ppm < 1 ppm limit
	NO	PASS, NO ppm < 15 ppm limit
	CO	PASS, CO ppm < 120 ppm limit
	PM	PASS, PM Extinction Coefficient < 0.007 m^{-1} limit

3.9 Conclusions

In the case of congested traffic scenario, the simulations were run for a total time of 30 minutes. When the 350 kcfm semi-transverse ventilation system is used in conjunction with all the 10 transverse ventilation ducts (80 damper modules open), the ppm concentrations of NO_2, NO and CO are below the prescribed limits in the tunnels. In addition, the extinction coefficient of particulate matter is also below the prescribed limit. Hence, the ventilation system is able to maintain a tenable environment in both the tunnels for a prolonged amount of time during congested operation. Based upon the above grade discharge location currently being considered, dispersion analysis has been undertaken to assess the impact on sensitive receptors such as the Scholl in order to ensure there is no adverse impact of removal of air containing PM2.5, PM10 and noxious gases. The analysis shows that there is no adverse impact on air quality. In addition no air quality permits for discharge are required as the amount of pollutants will not reach annual threshold values. The design of the system has been checked against the I-70 East Final EIS and the proposed solution is compliant with section 5.10. Since the compliance with air quality requirements is met, no Electrostatic Precipitators are required.

4 References

[1] Central 70 Project: Project Agreement, Schedule 10, Section 12, Addendum No. 3, June, 2016.
[2] NFPA 502, Standard for Road Tunnels, Bridges and Other Limited Access Highways, National Fire Protection Association, 2014.

[3] Fire Dynamics Simulator, National Institute of Standards and Technology (NIST) https://www.nist.gov/services-resources/software/fds-and-smokeview

[4] Wind Rose for Denver International Airport, National Climatic Data Center

http://www.ncdc.noaa.gov/data-access/land-based-stationdata/land-based-datasets

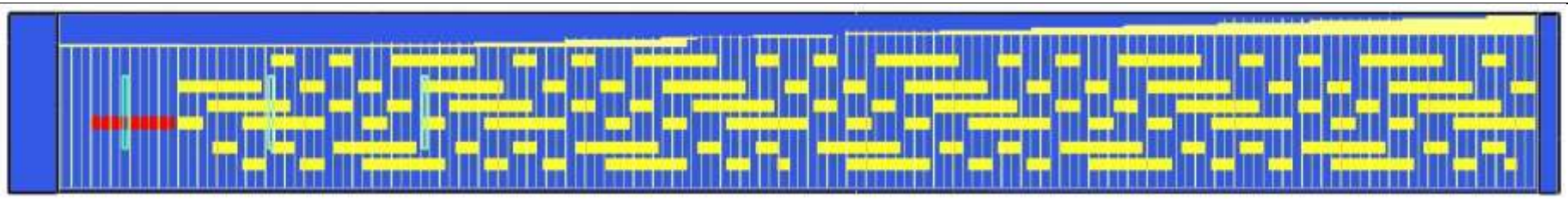
[5] I-70 East Project, Denver, CO Partial Covered Lowered Alternative, Ventilation and Fire Life Safety Report, V4, Sep 17 2015, 5115267.

[6] Particulate Matter (PM) Basics. https://www.epa.gov/pm-pollution/particulate-matter-pm-basics#PM

Appendix A1 - Figures
30 MW Fire – 3 Transverse Ducts

The results for the case with 30 MW fire located at the west portal are presented in Appendix A1 and Appendix A2 on a plane 8.2 ft above tunnel floor. In particular, in Appendix A1 the results corresponding to the case where only 3 transverse ducts are used in the semi-transverse ventilation system are shown. Figure A-1 shows the visibility images in the tunnel for a period of ten (10) minutes after the start of fire. Figure A-2 shows the temperature images in the tunnel for a period of ten (10) minutes after the start of fire.

Smoke Visibility:



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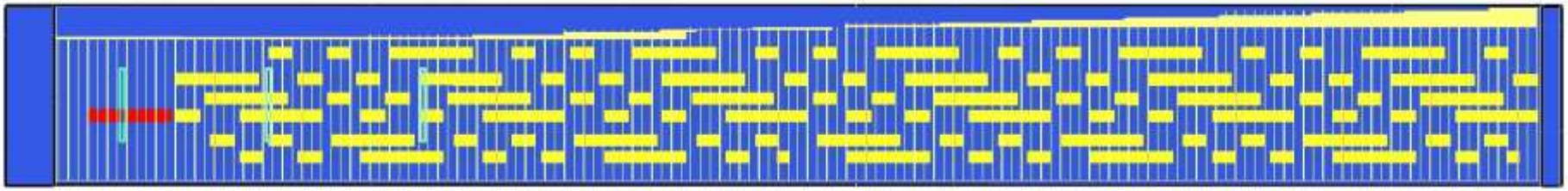

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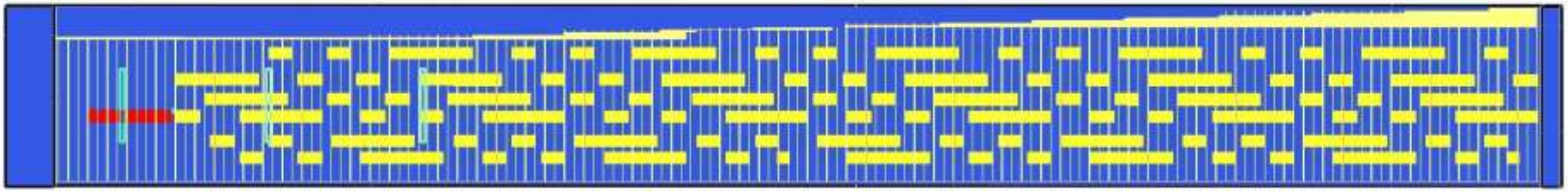

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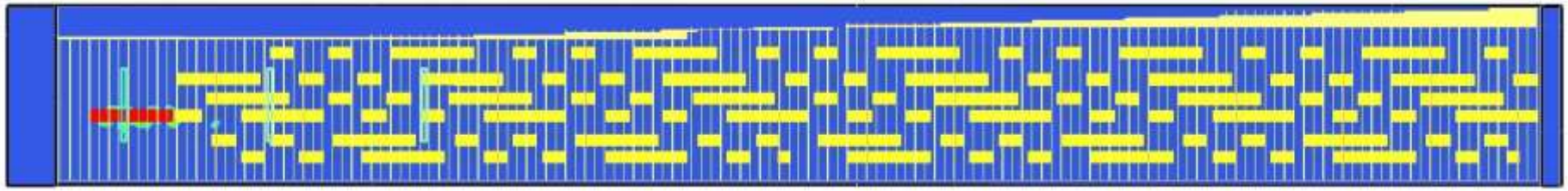

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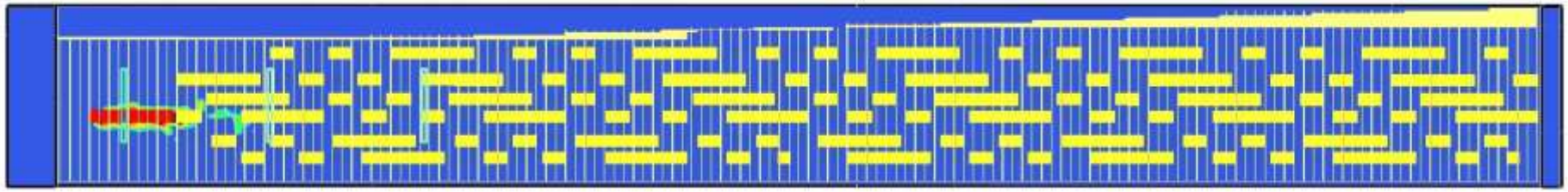

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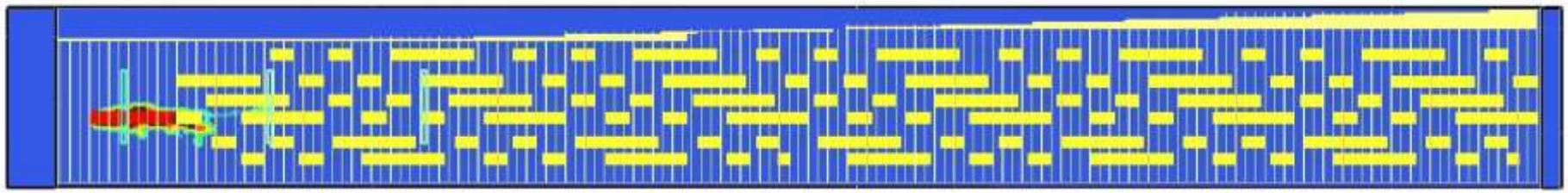

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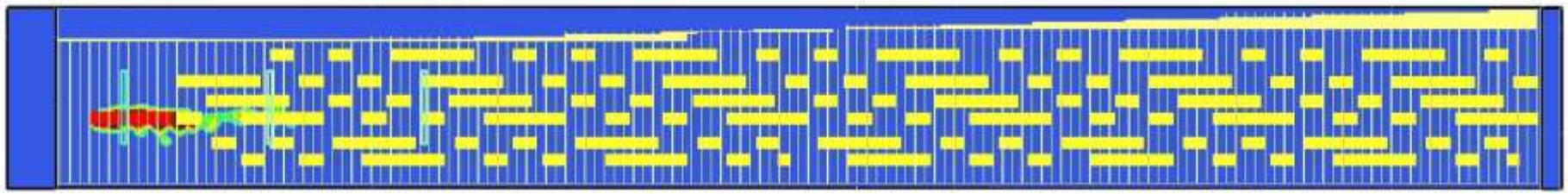

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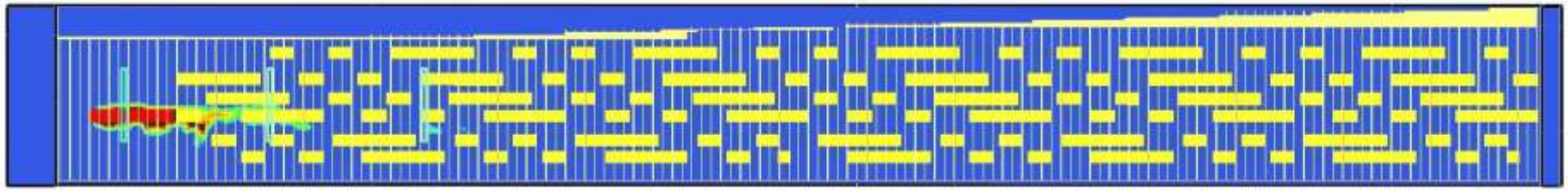

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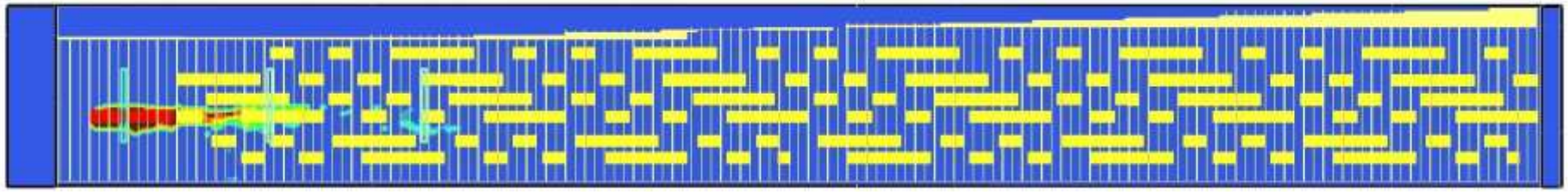
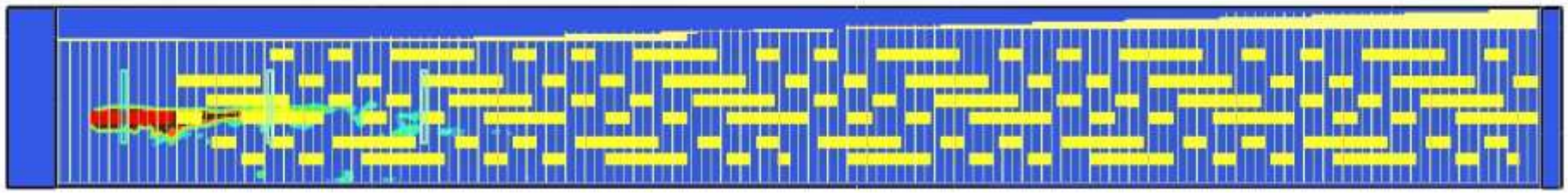
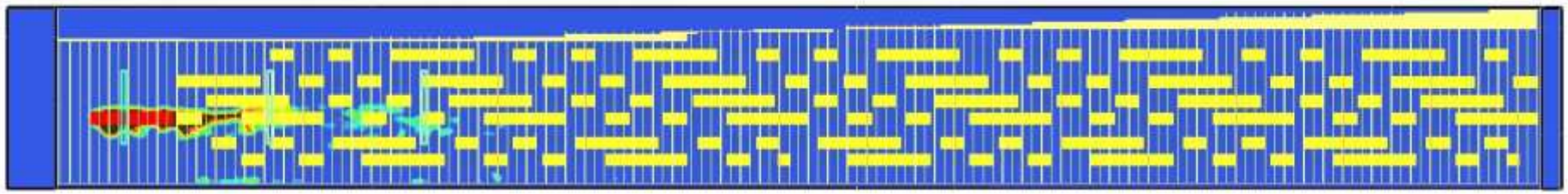


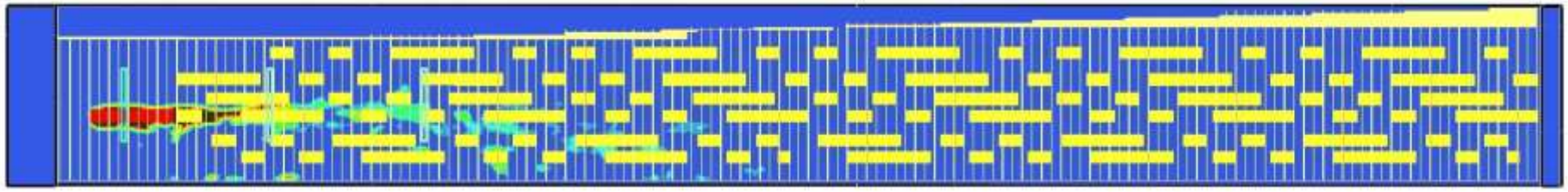
t=240s



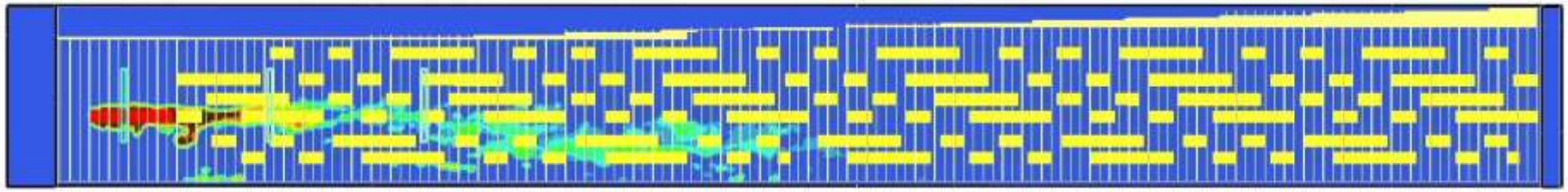
t=270s



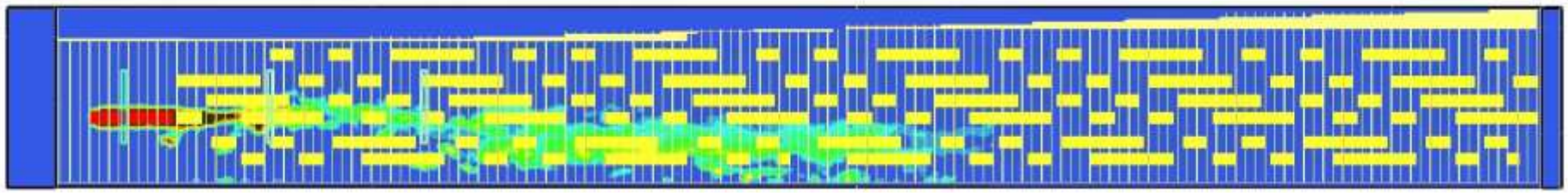
t=300s



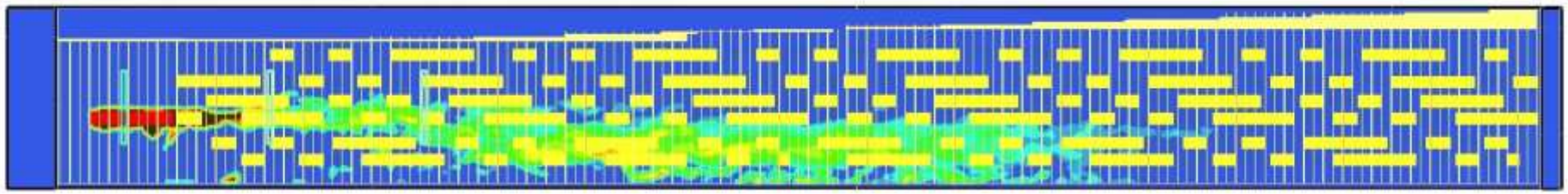
t=330s



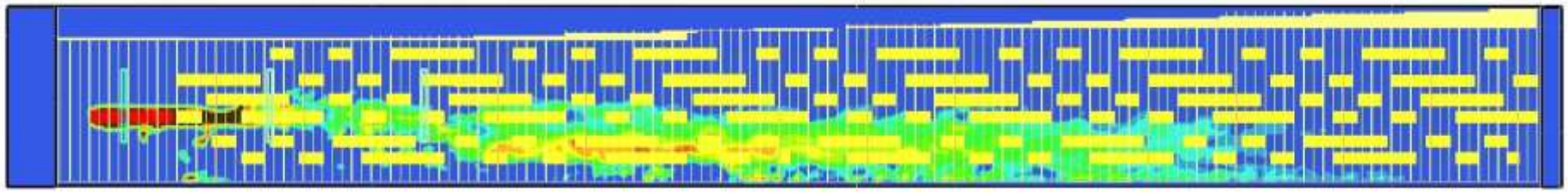
t=360s



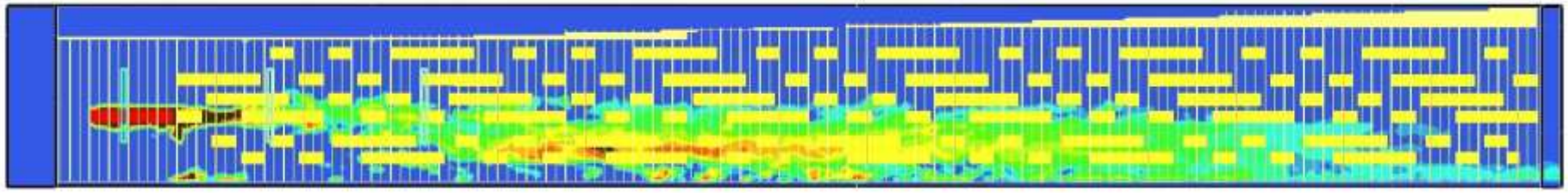
t=390s



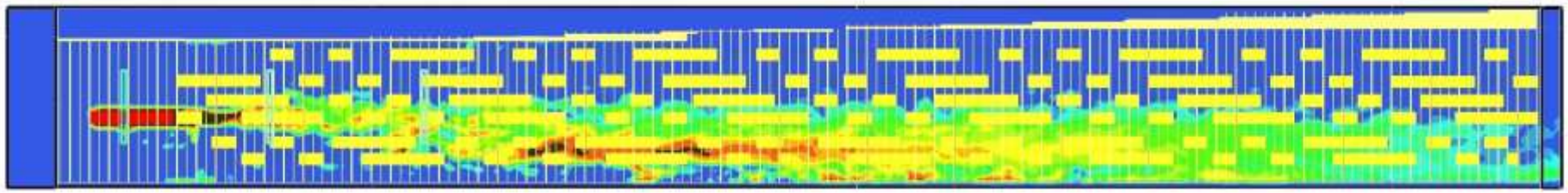
t=420s



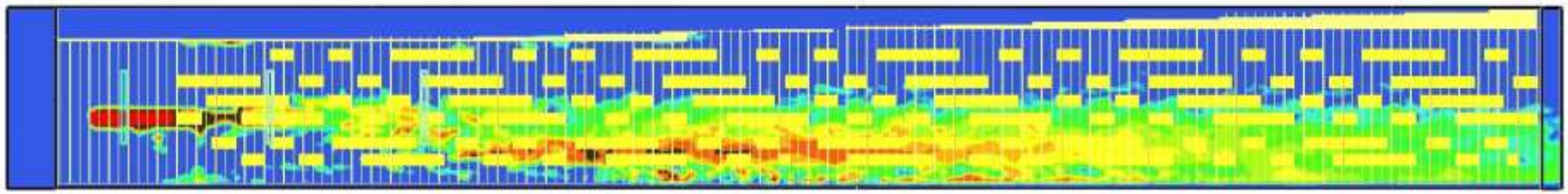
t=450s



t=480s



t=510s



t=540s

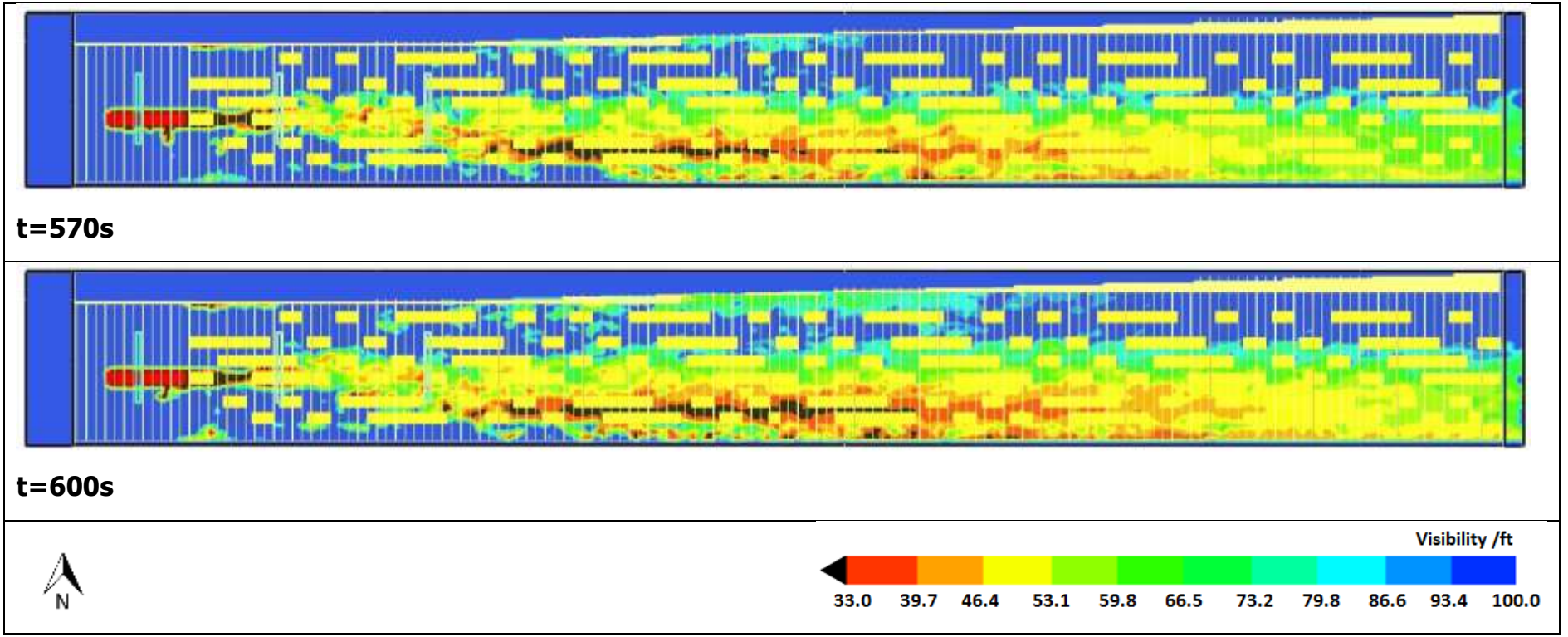
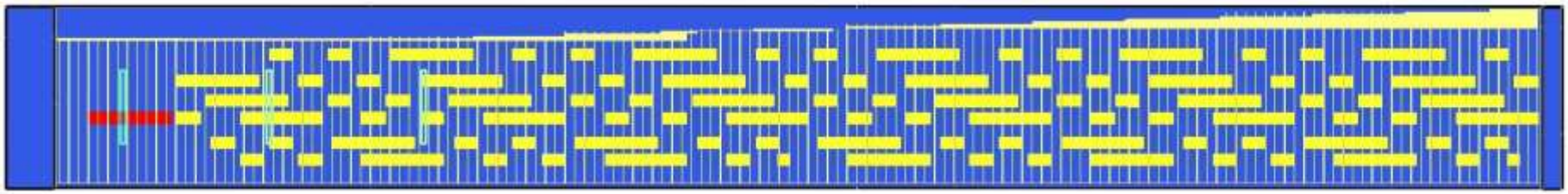
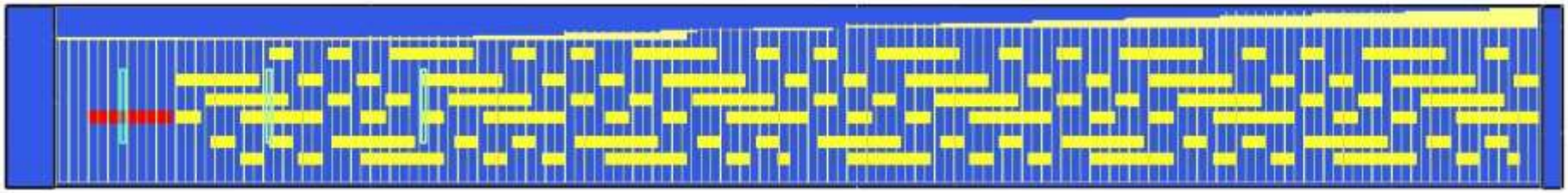


Figure A-1. Visibility on a plane 8.2 ft above Tunnel floor (3 Transverse Ducts)

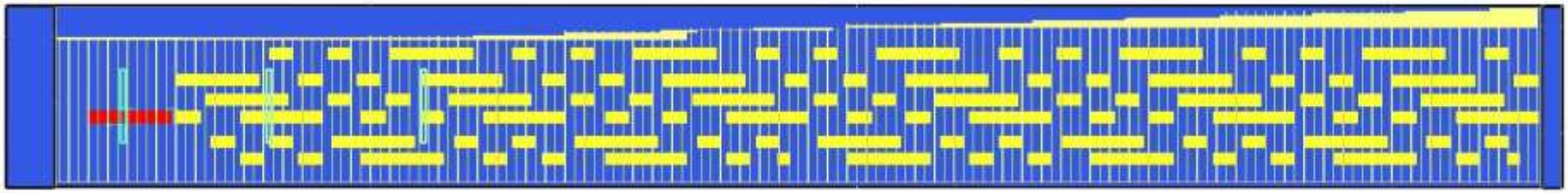
Temperature:



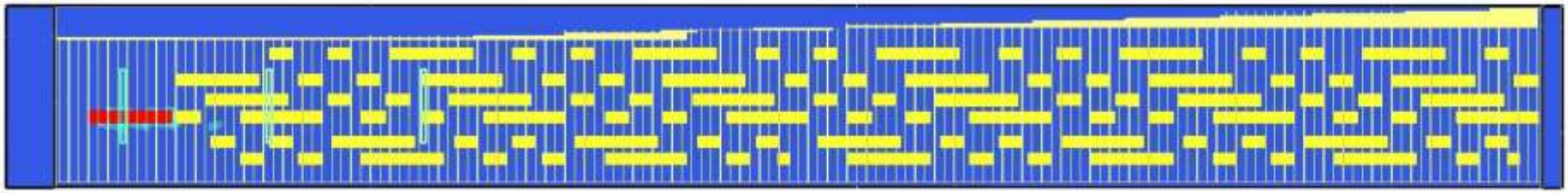
t=0s



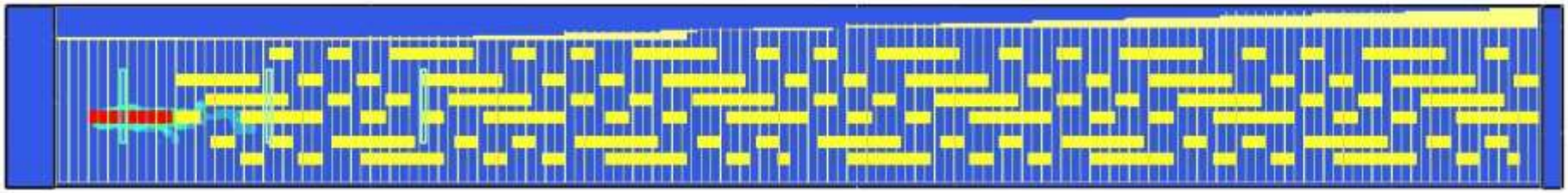
t=30s



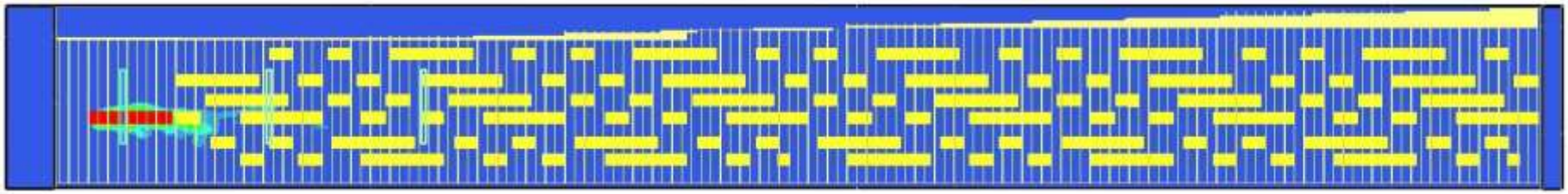
t=60s



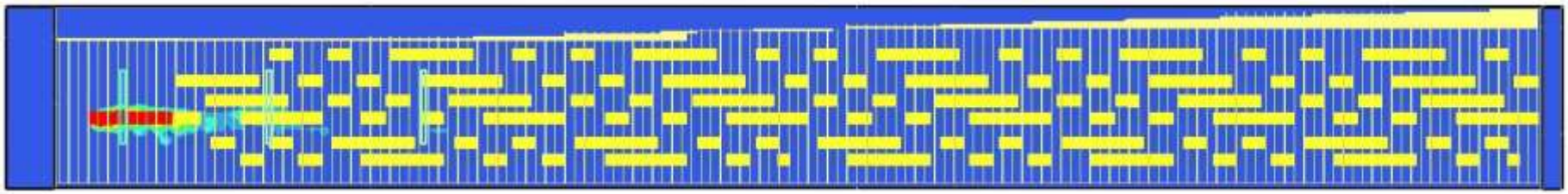
t=90s



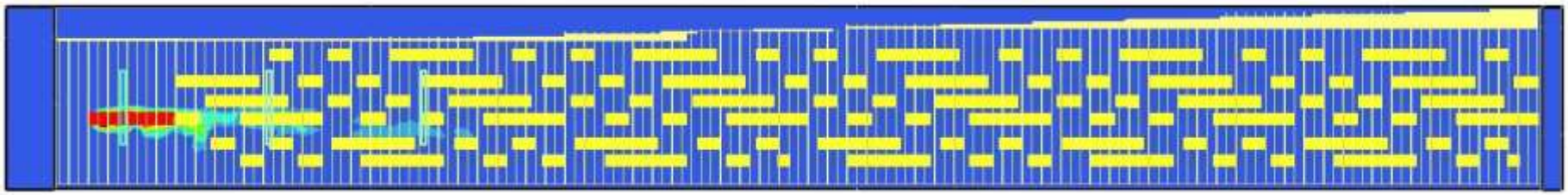
t=120s



t=150s



t=180s



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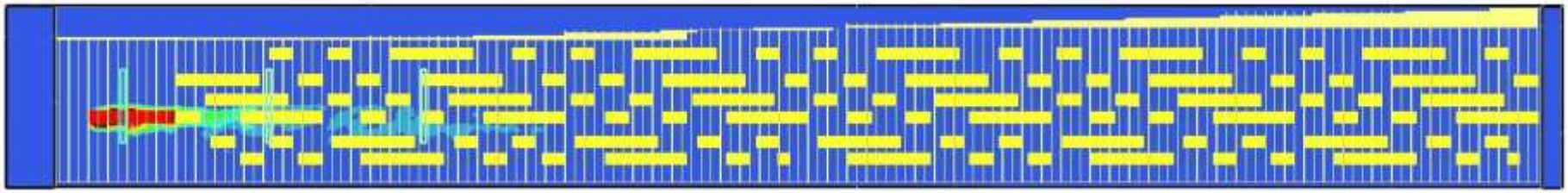
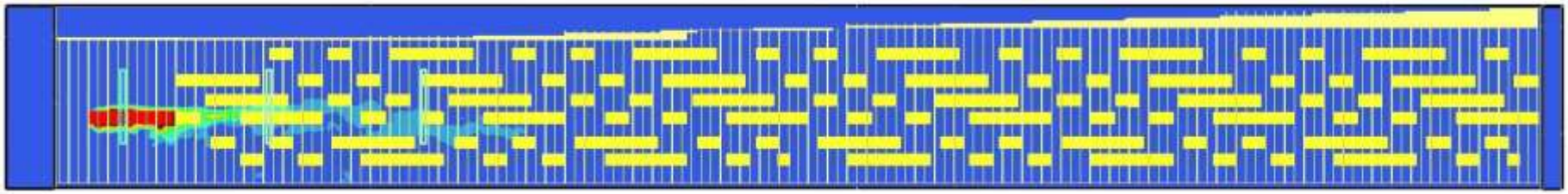
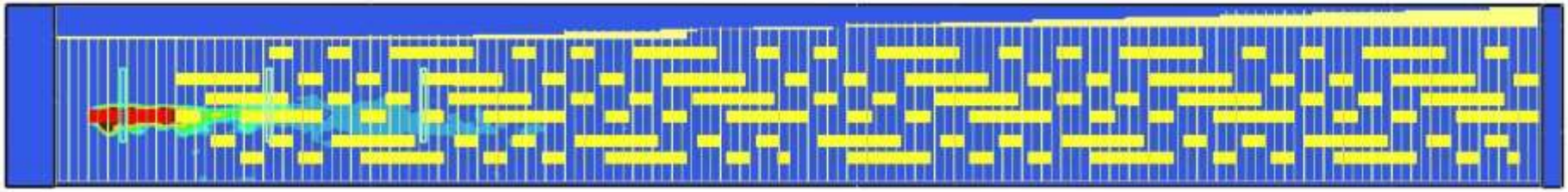


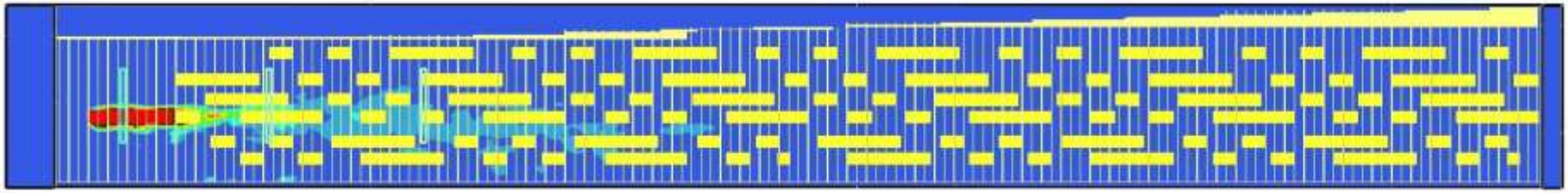
t=240s



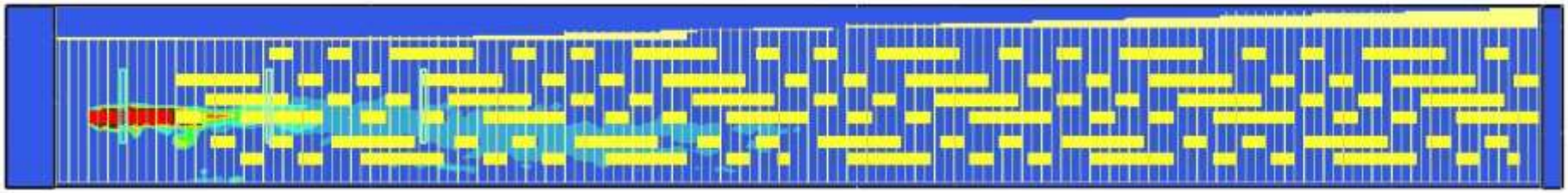
t=270s



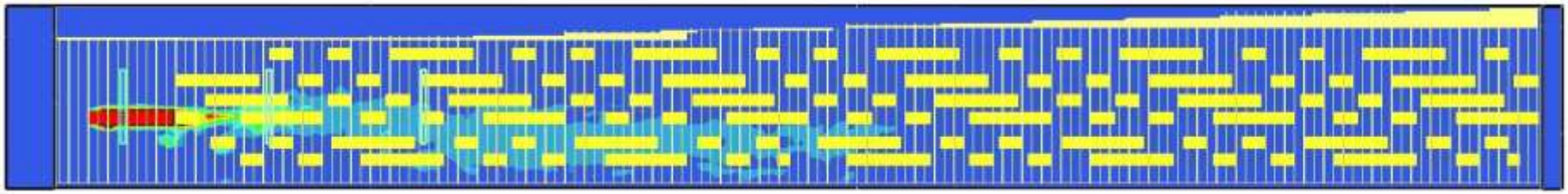
t=300s



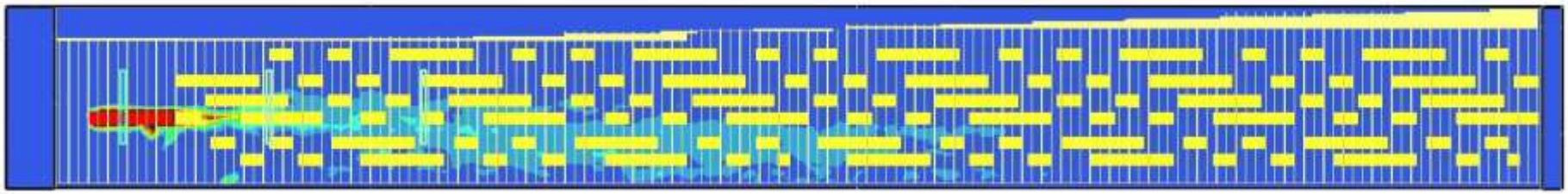
t=330s



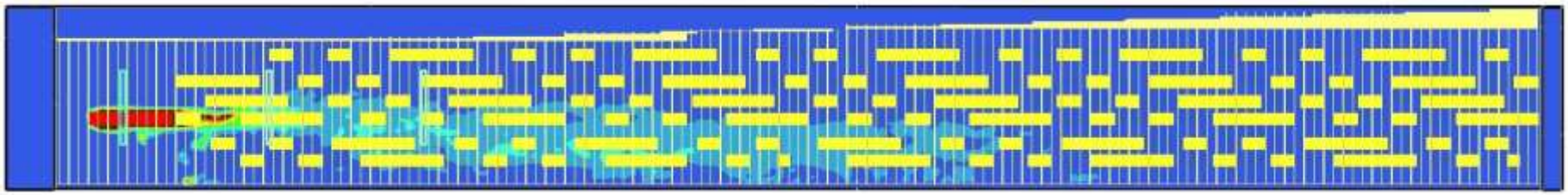
t=360s



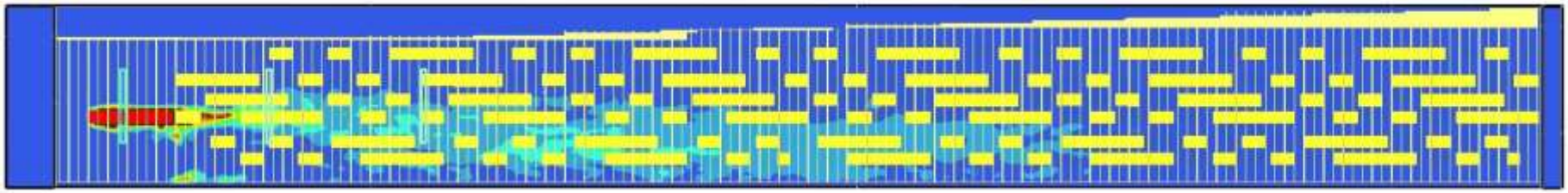
t=390s



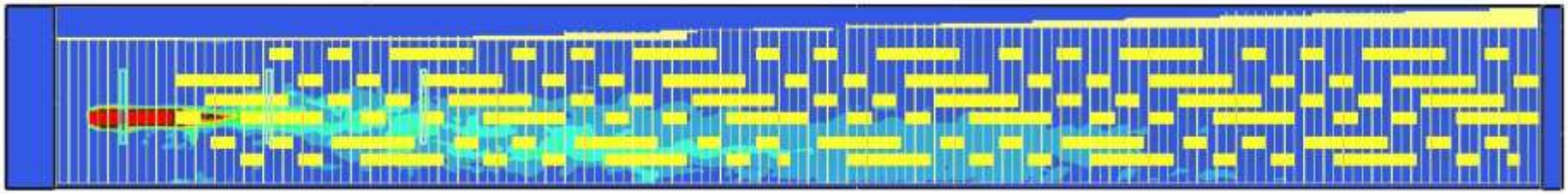
t=420s



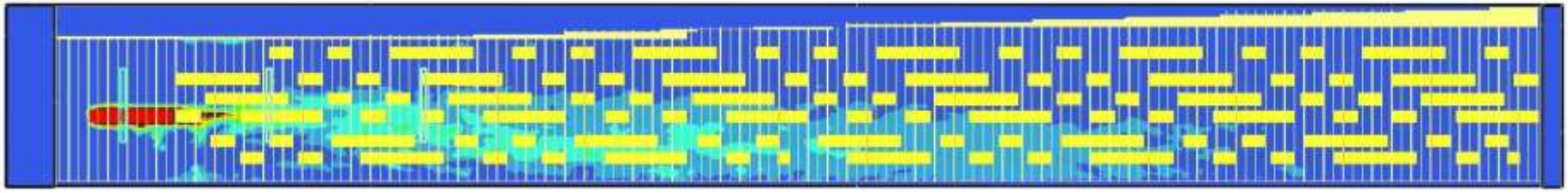
t=450s



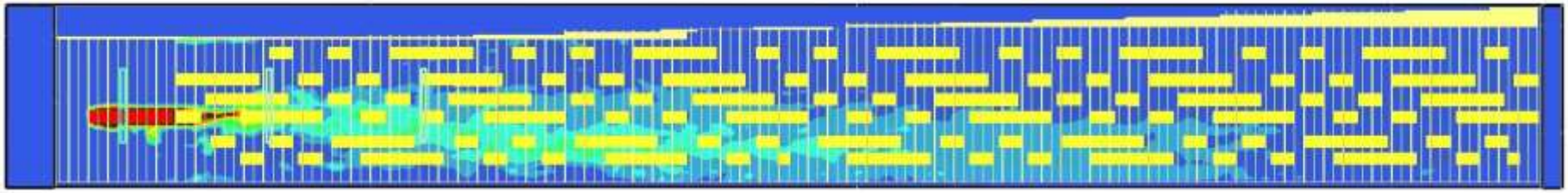
t=480s



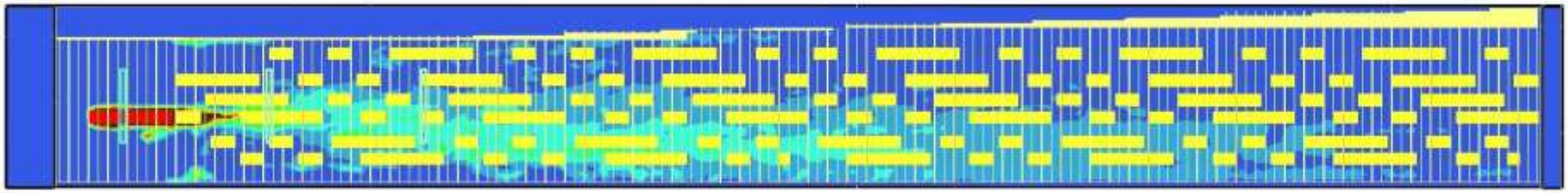
t=510s



t=540s



t=570s



t=600s

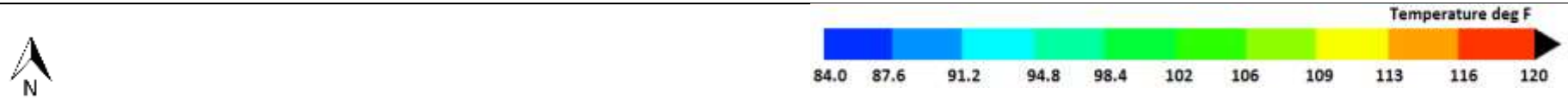
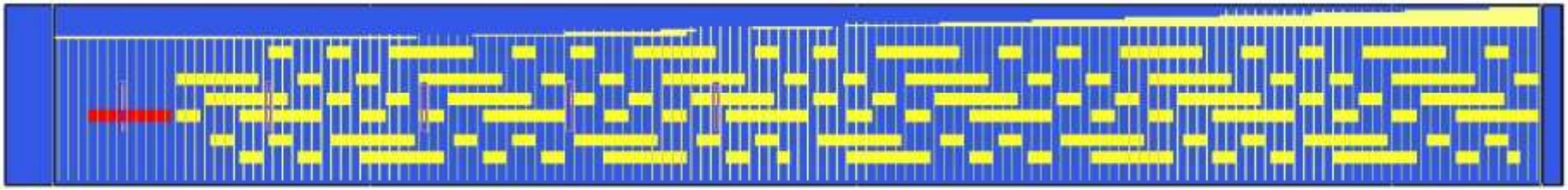


Figure A-2. Temperature on a plane 8.2 ft above Tunnel floor (3 Transverse Ducts)

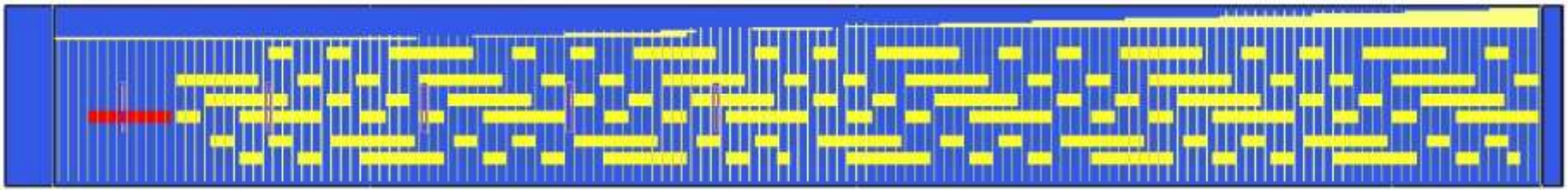
Appendix A2 - Figures
30 MW Fire – 5 Transverse Ducts

The results for the case with 30 MW fire located at the west portal are presented in Appendix A1 and Appendix A2 on a plane 8.2 ft above the tunnel floor. In particular, in Appendix A2 the results corresponding to the case where 5 transverse ducts are used in the semi-transverse ventilation system are shown. Figure A-3 shows the visibility images in the tunnel for a period of ten (10) minutes after the start of fire. Figure A-4 shows the temperature images in the tunnel for a period of ten (10) minutes after the start of fire .

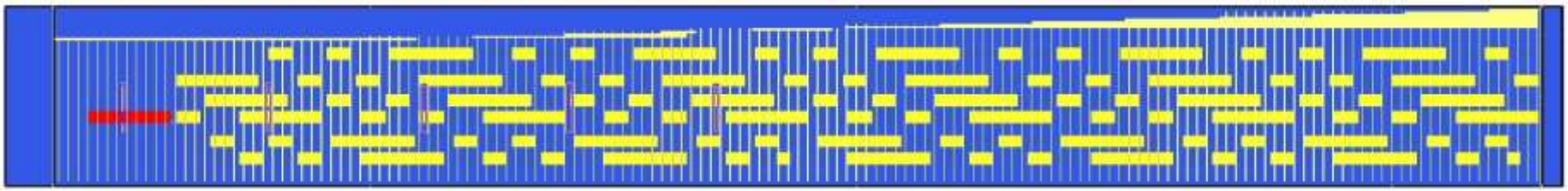
Smoke Visibility:



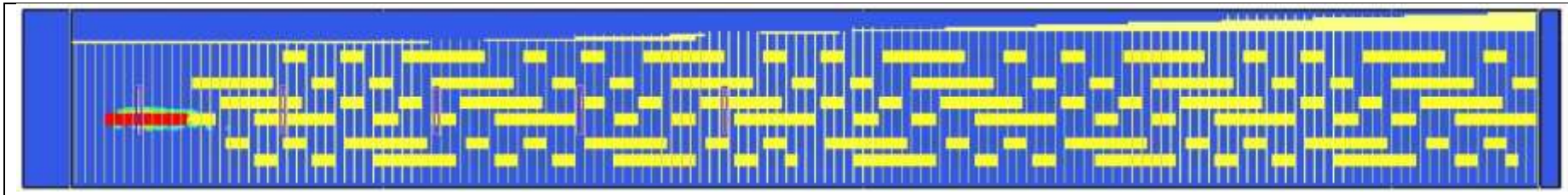
t=0s



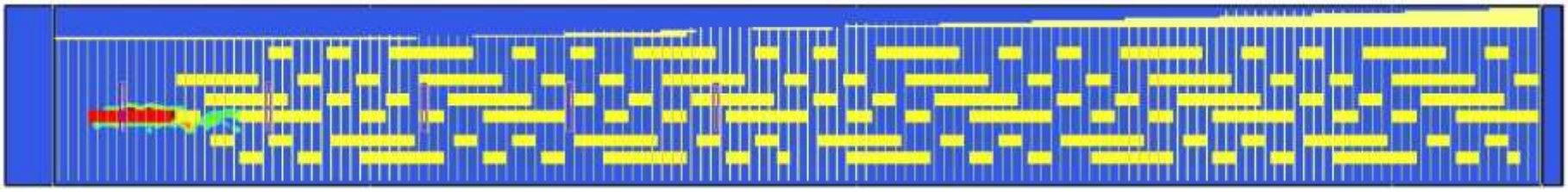
t=30s



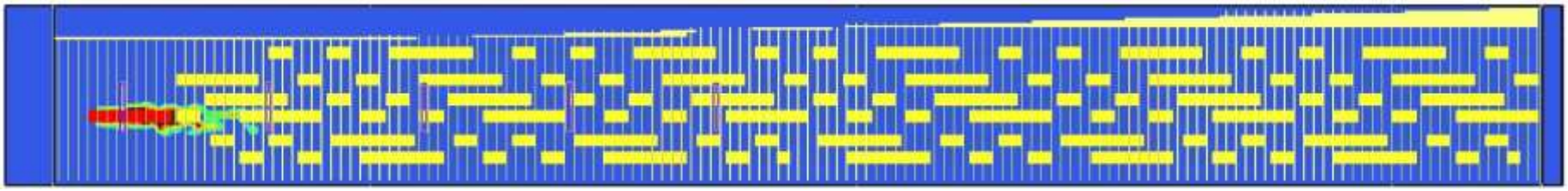
t=60s



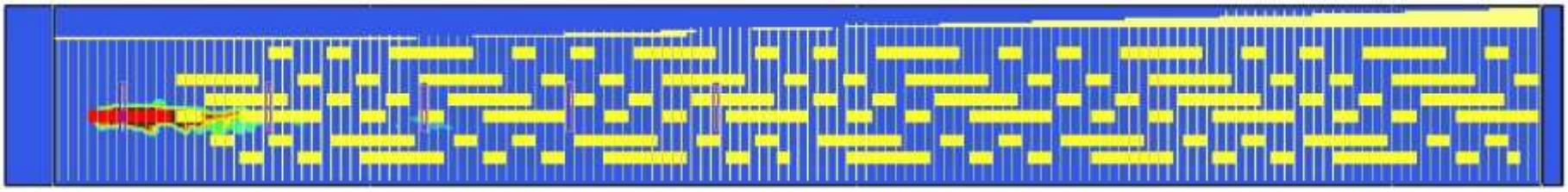
t=90s



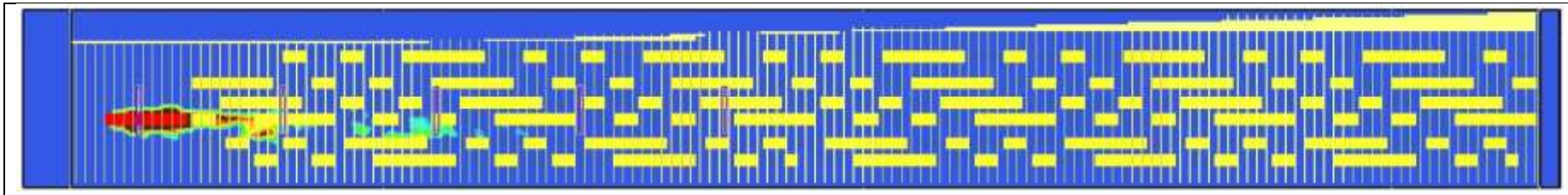
t=120s



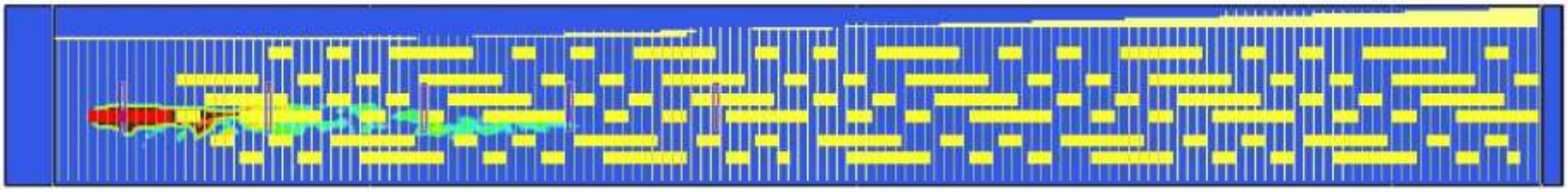
t=150s



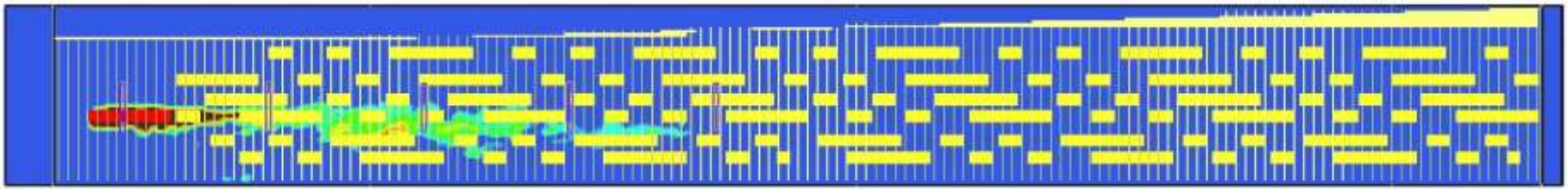
t=180s



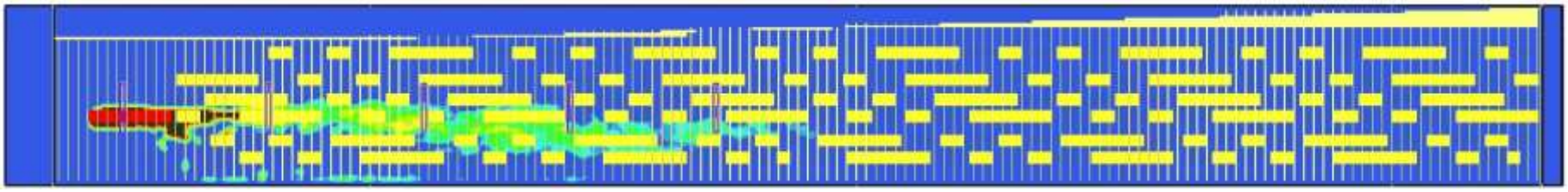
t=210s



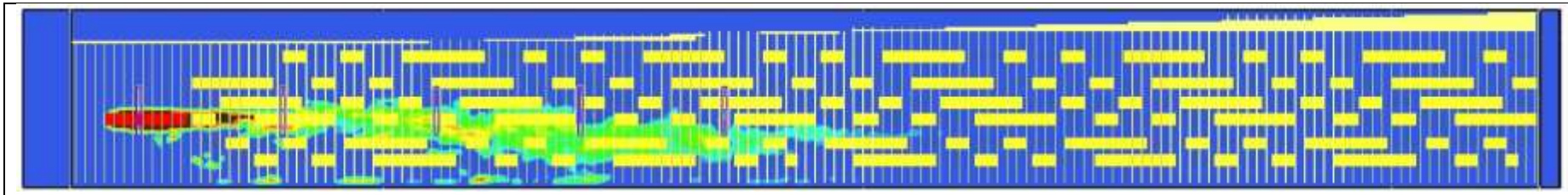
t=240s



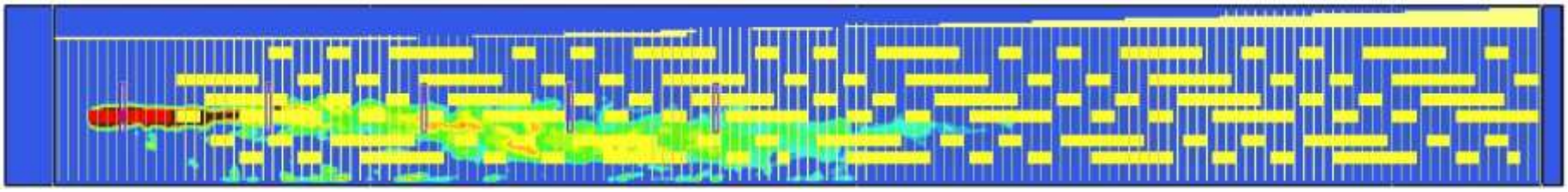
t=270s



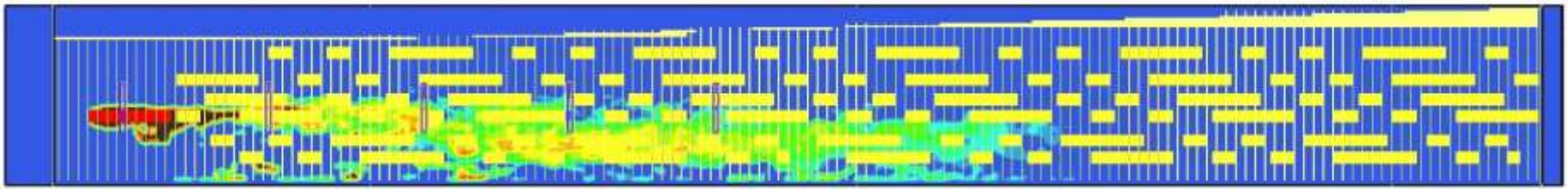
t=300s



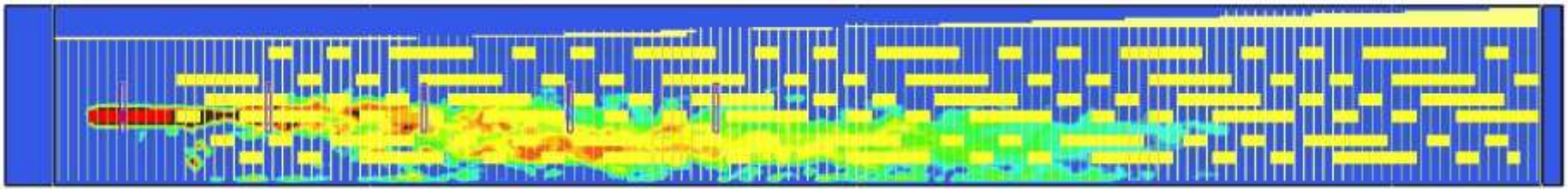
t=330s



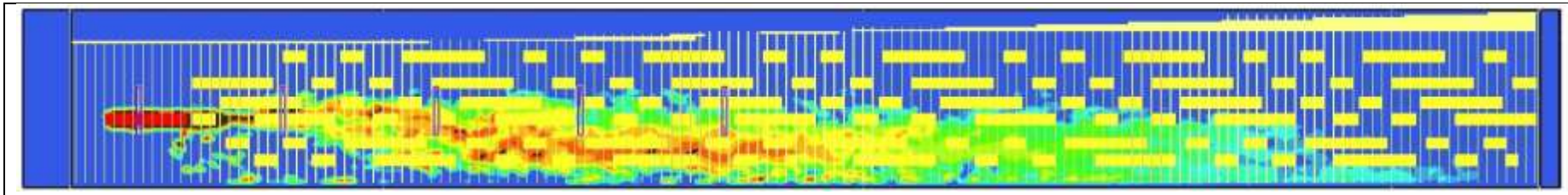
t=360s



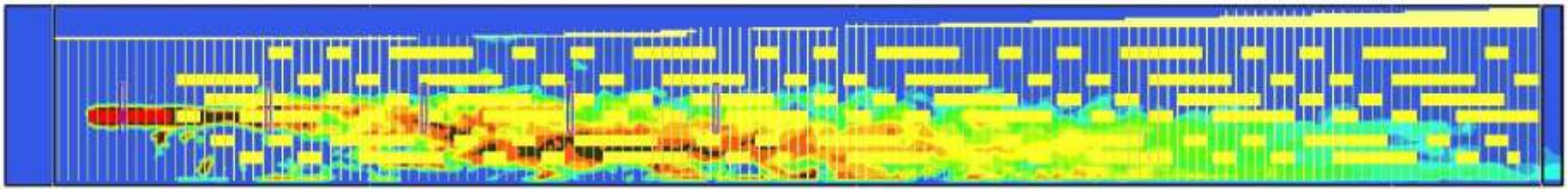
t=390s



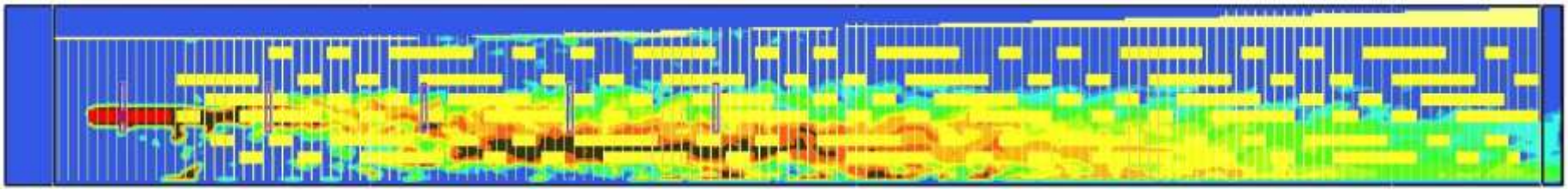
t=420s



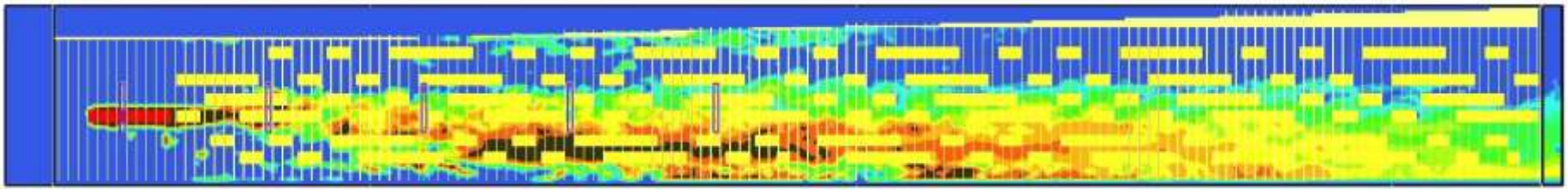
t=450s



t=480s



t=510s



t=540s

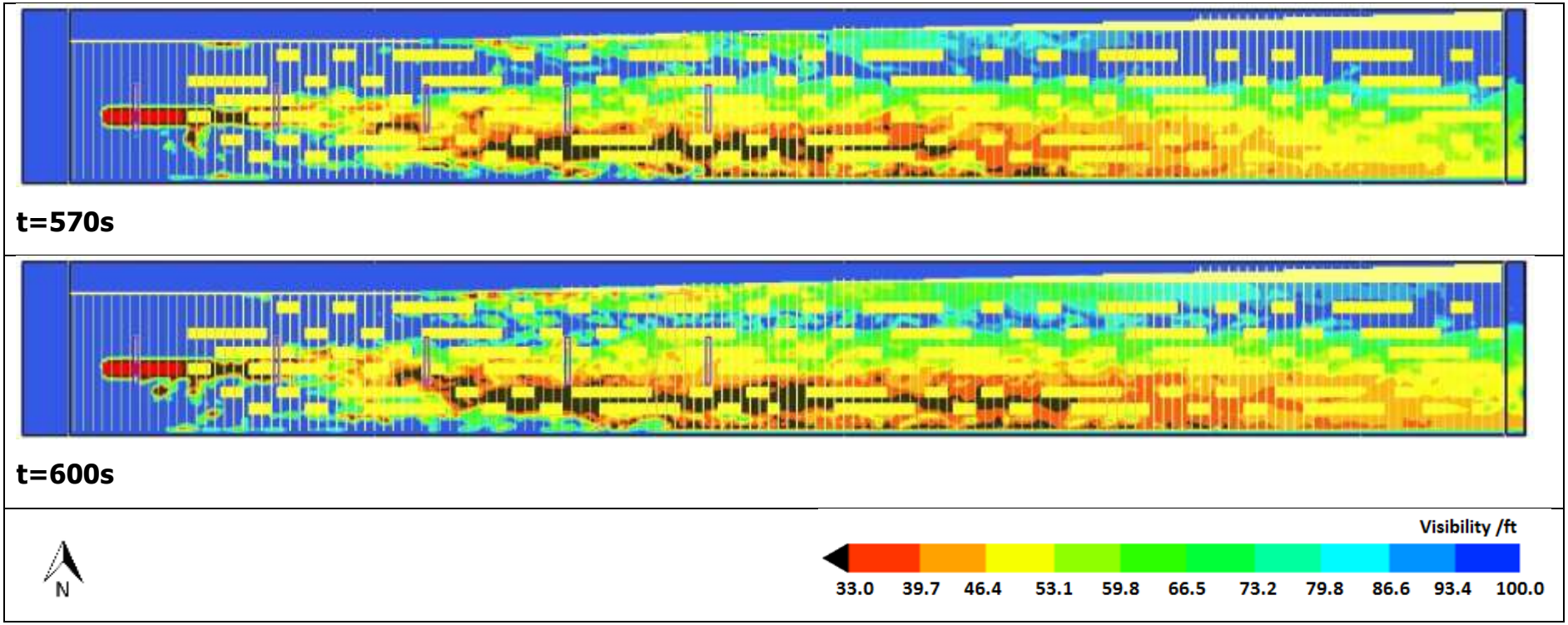
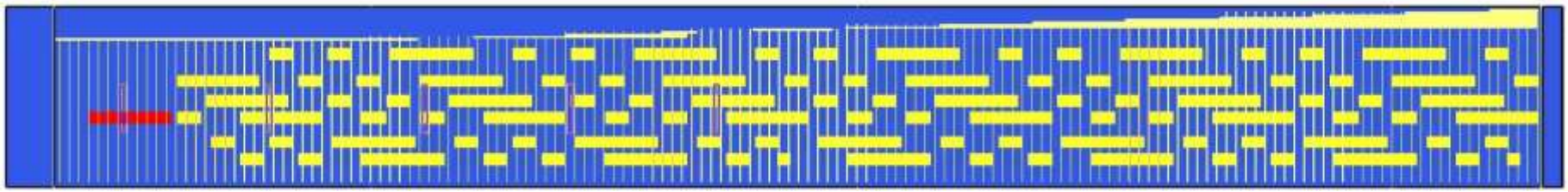
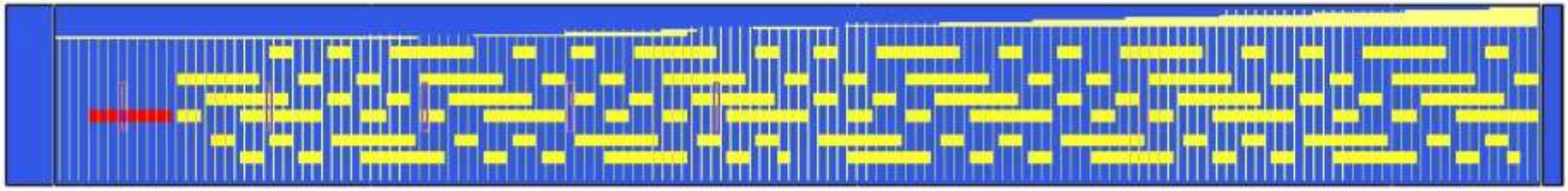


Figure A-3. Visibility on a plane 8.2 ft above Tunnel floor (5 Transverse Ducts)

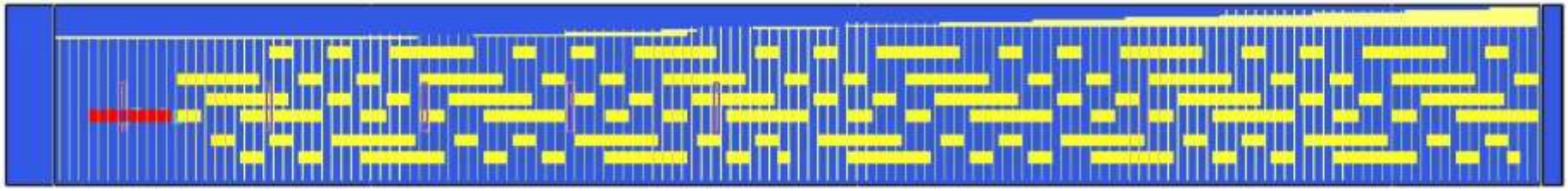
Temperature:



t=0s



t=30s



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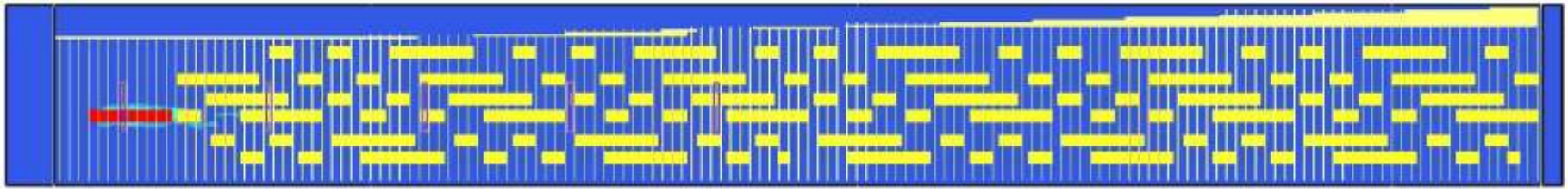

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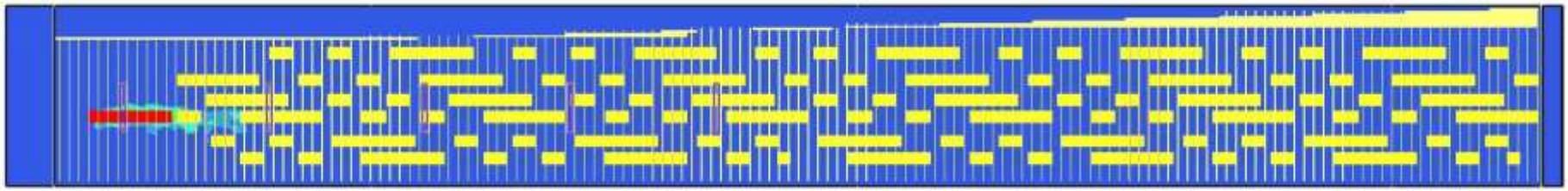

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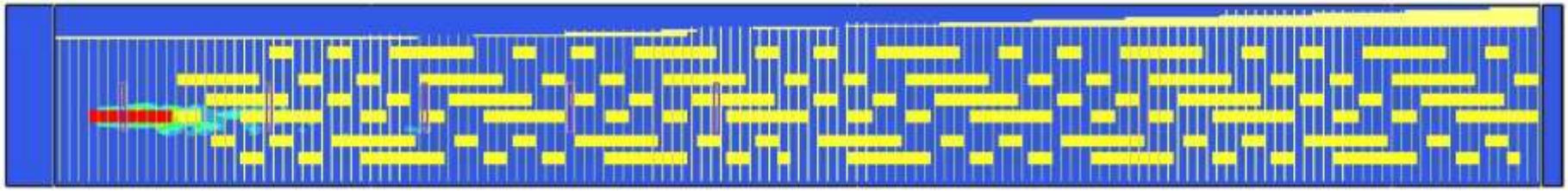

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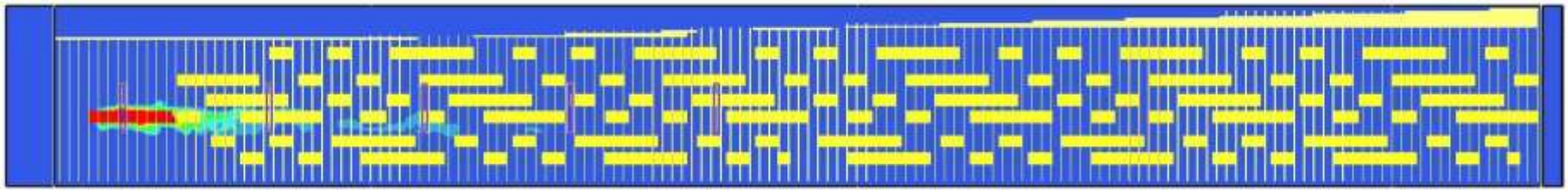

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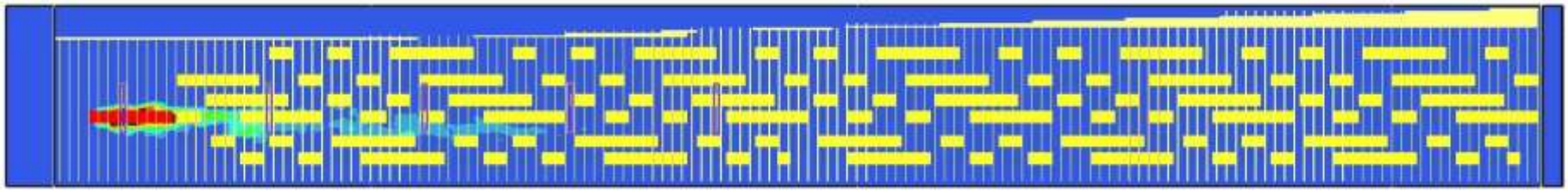

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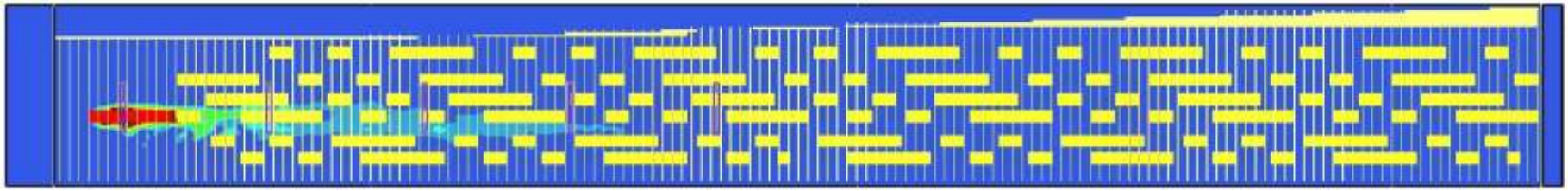

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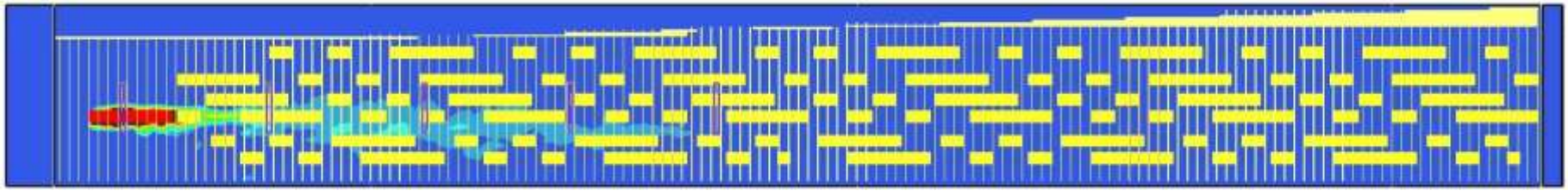

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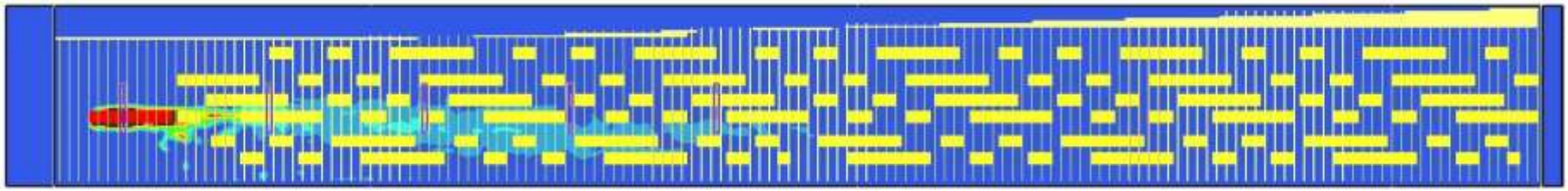

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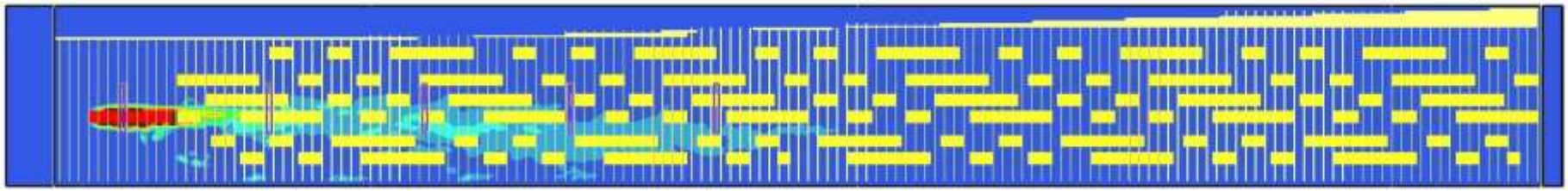

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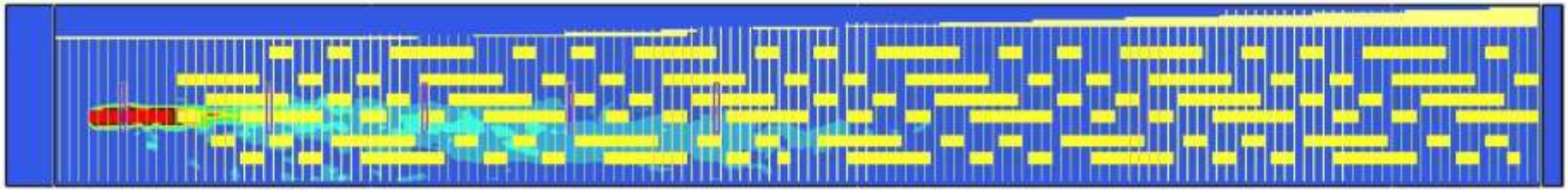

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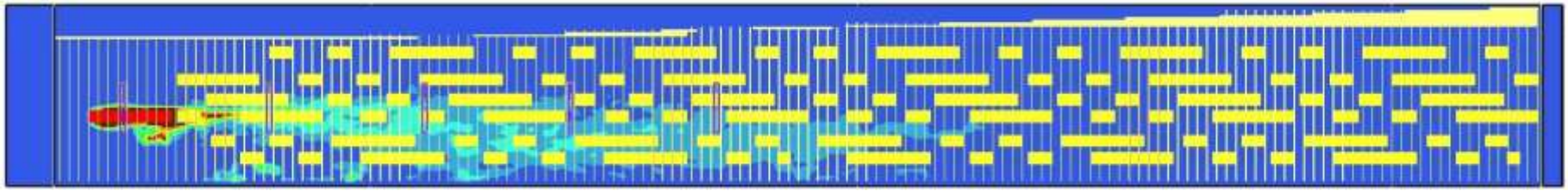

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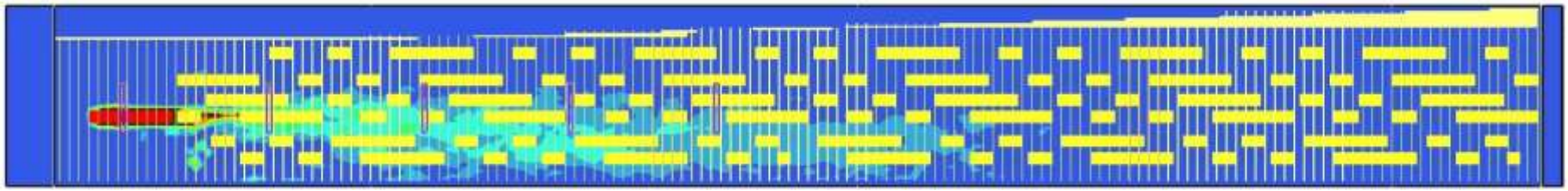

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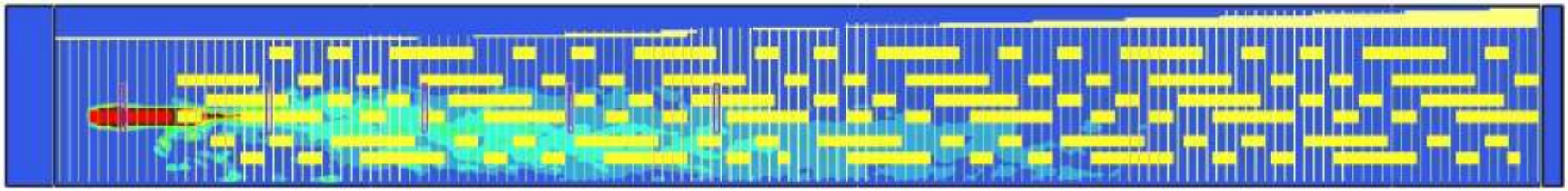

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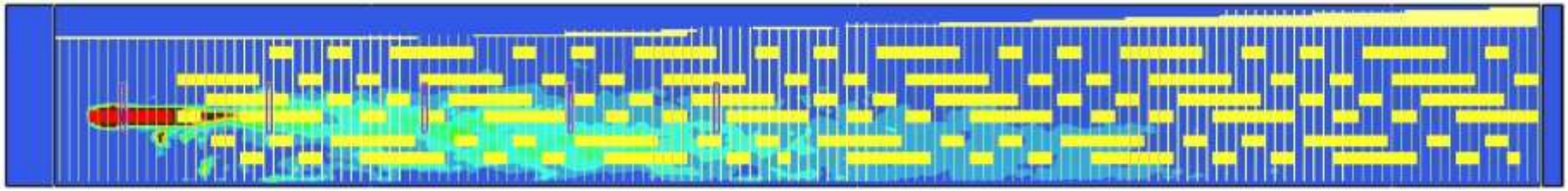

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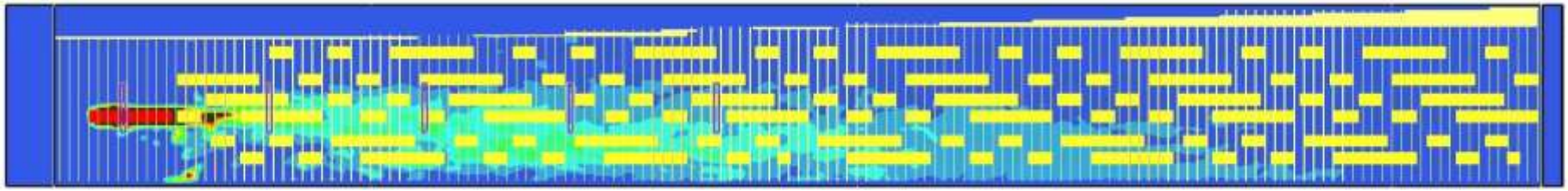

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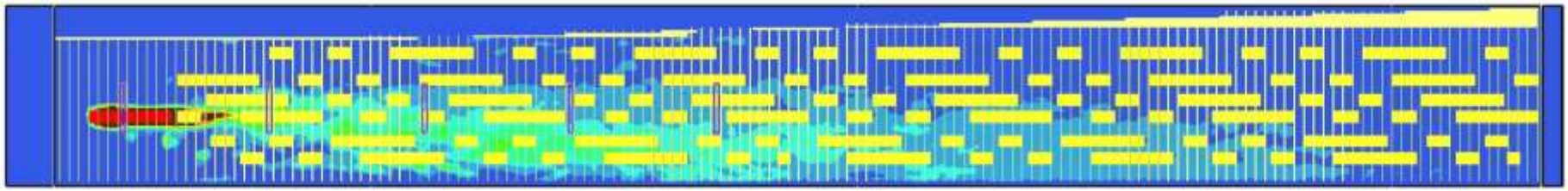

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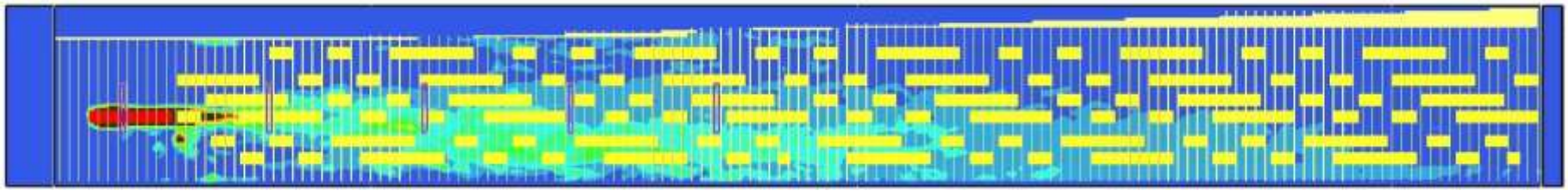

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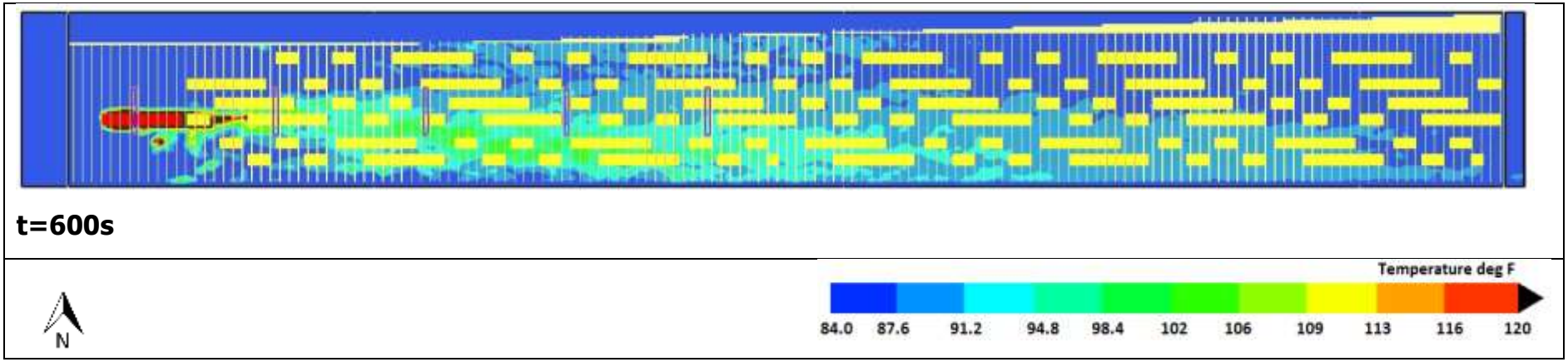
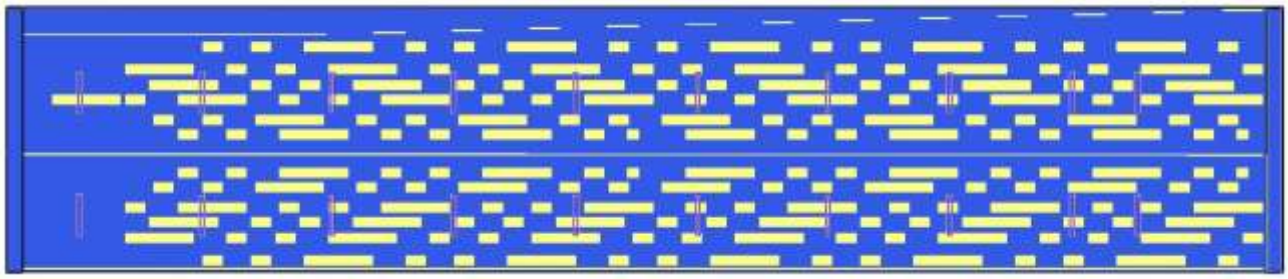


Figure A-4. Temperature on a plane 8.2 ft above Tunnel floor (5 Transverse Ducts)

Appendix B - Figures
Congested Traffic – 350 kcfm Exhaust after 2 min from start of fire

The results for the case with congested traffic are presented in Appendix B. Figure B-1 shows the ppm concentration of NO_2, Figure B-2 shows the ppm concentrations of NO, Figure B-3 shows the ppm concentrations of CO and Figure B-4 shows the extinction coefficient for particulate matter in the tunnels. The results are presented for a period of 30 minutes after congestion begins on a plane 8.2 ft above the floor of the tunnels.

NO_2 PPM:



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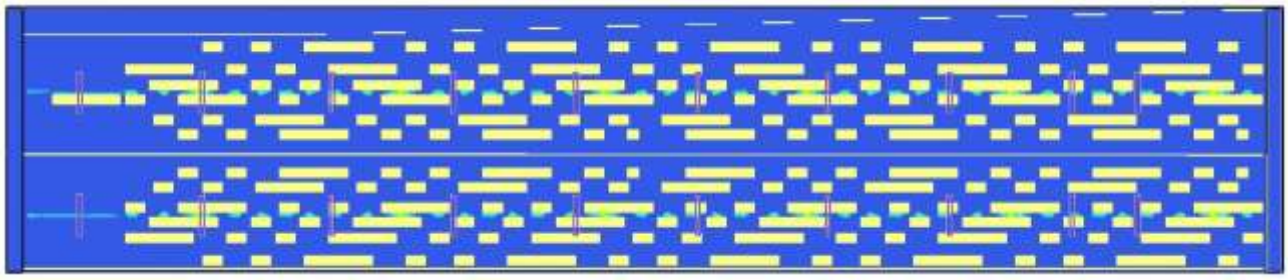

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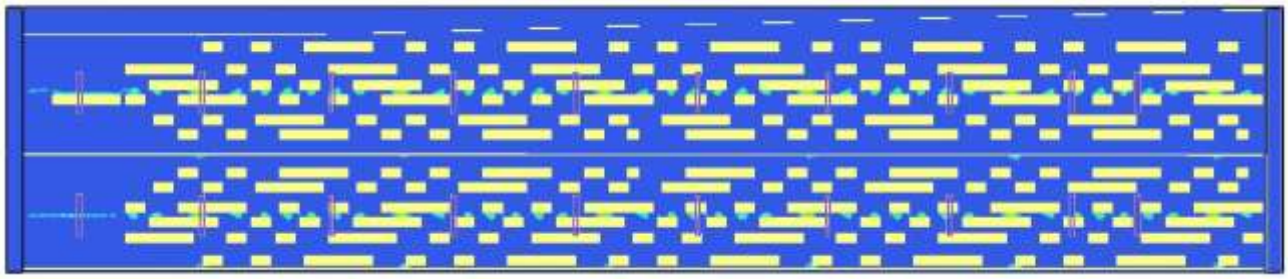

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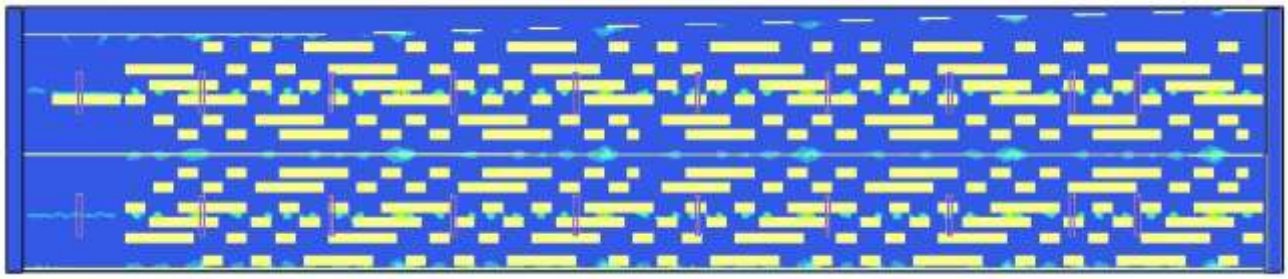

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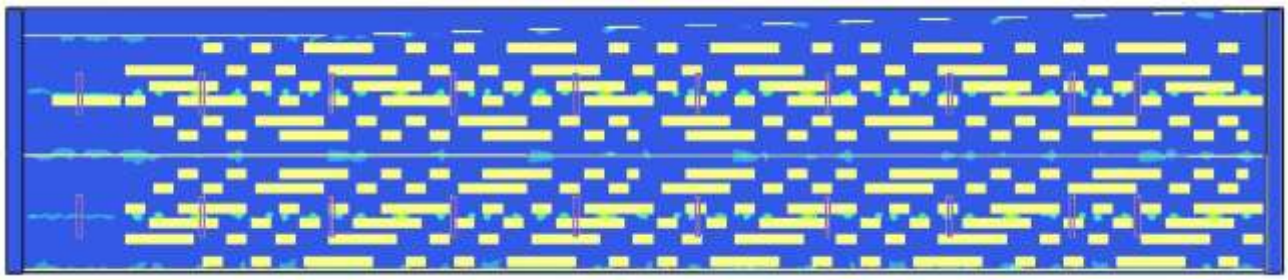

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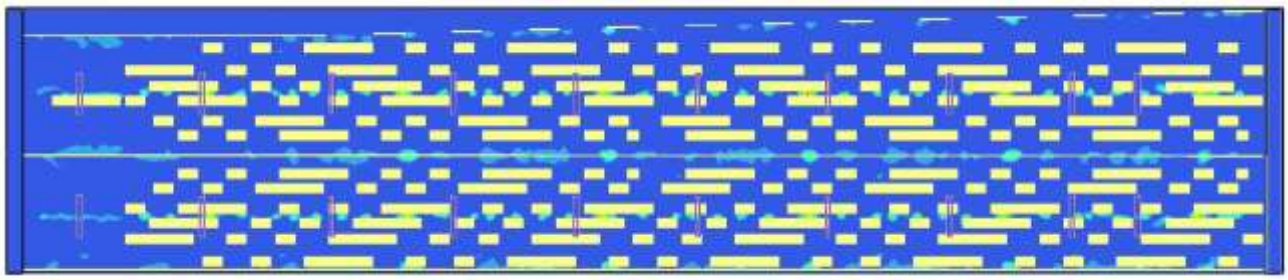

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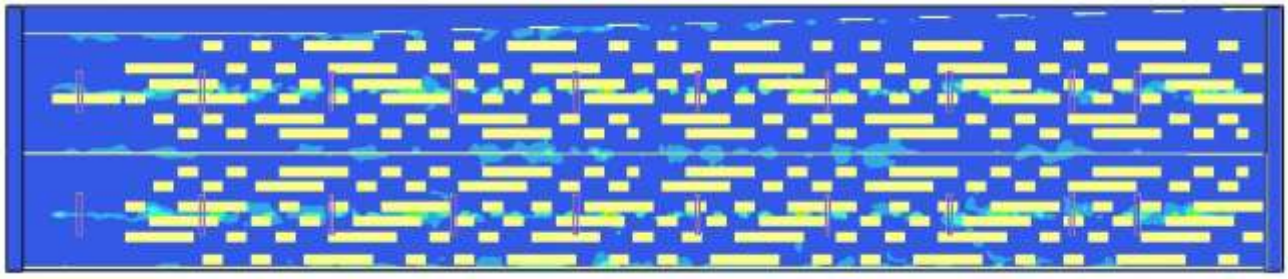

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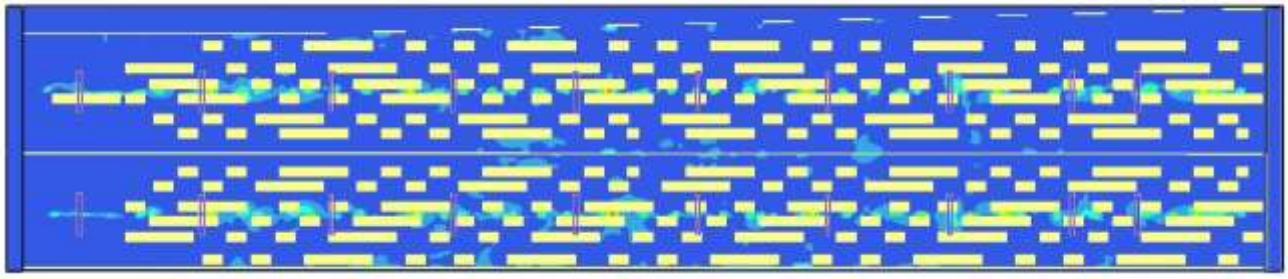

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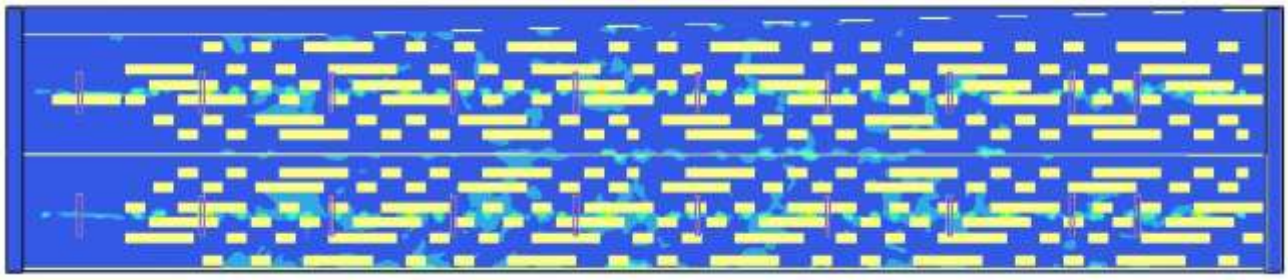

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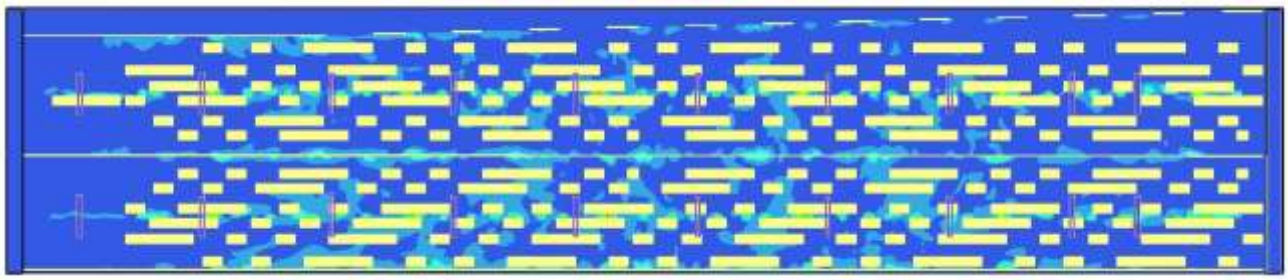

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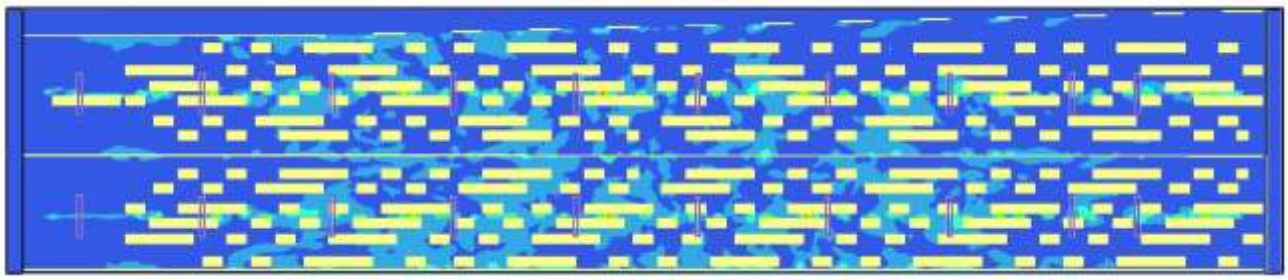

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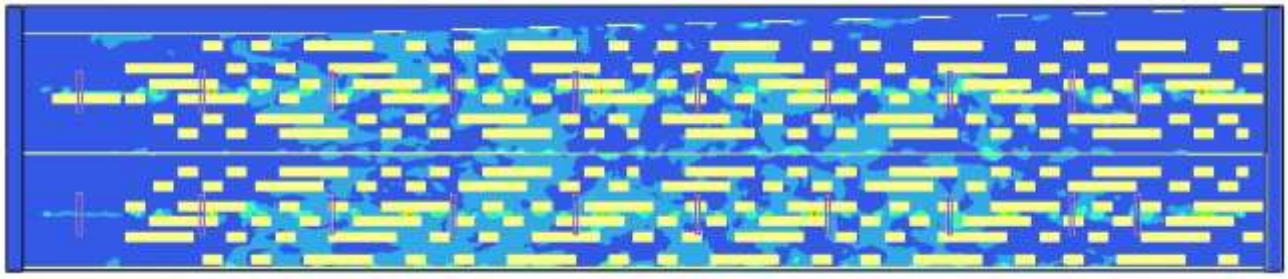

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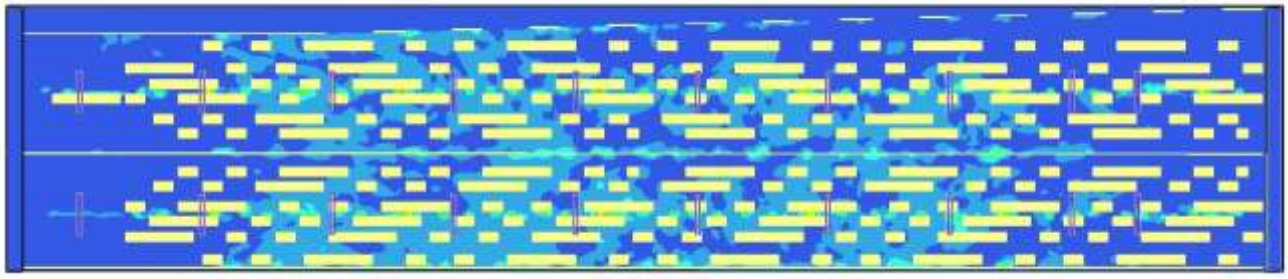

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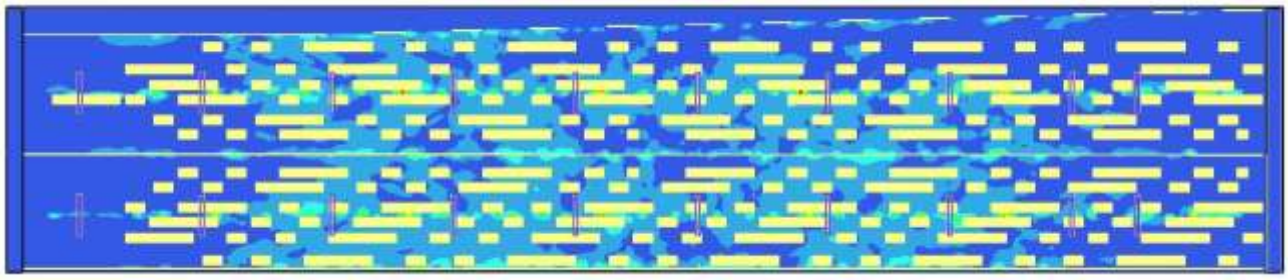

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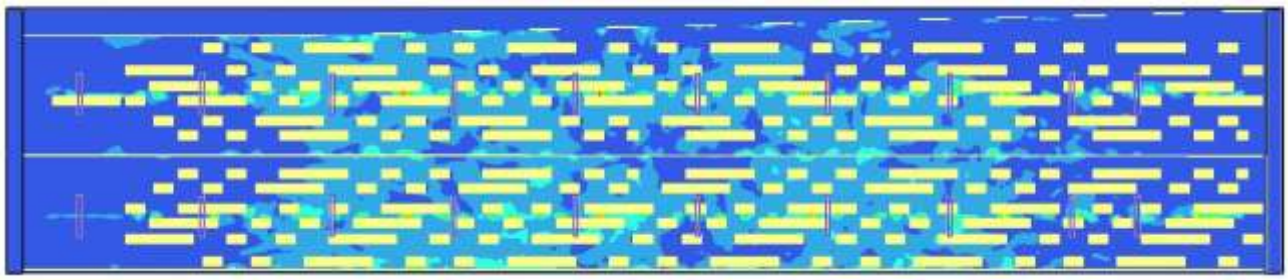

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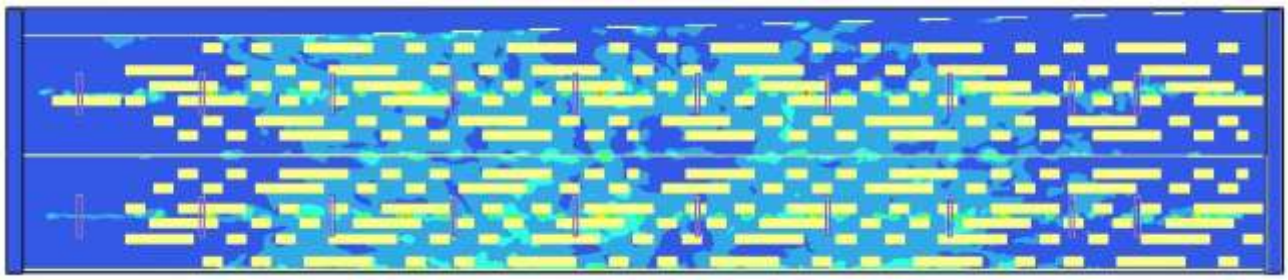

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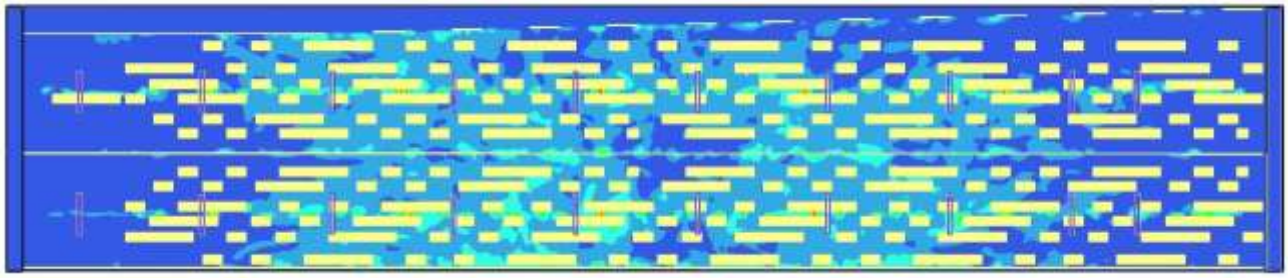

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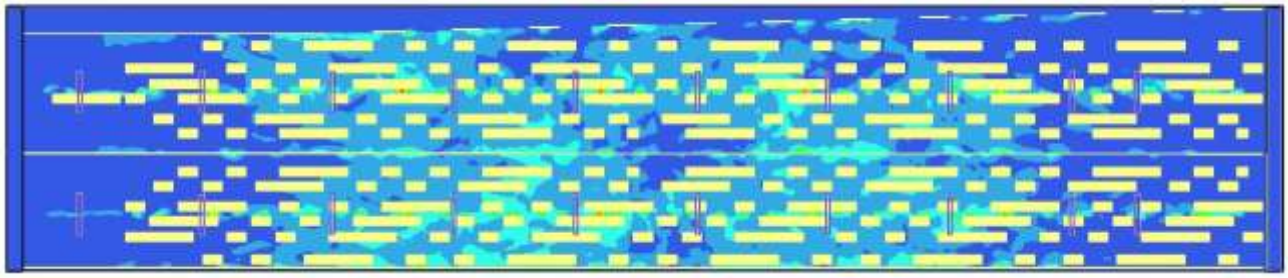

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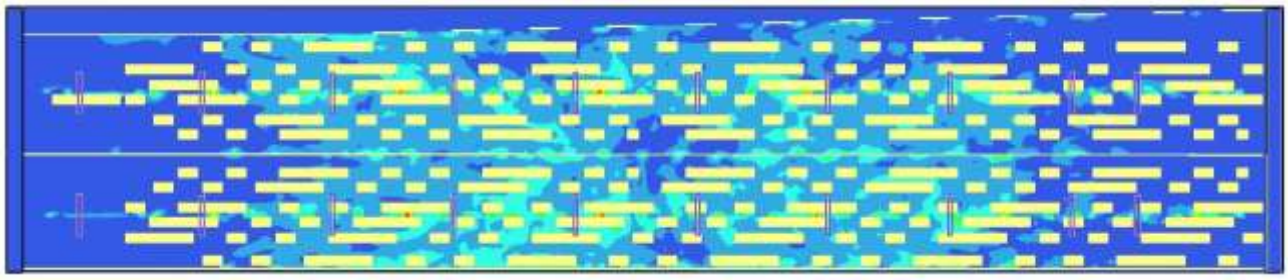

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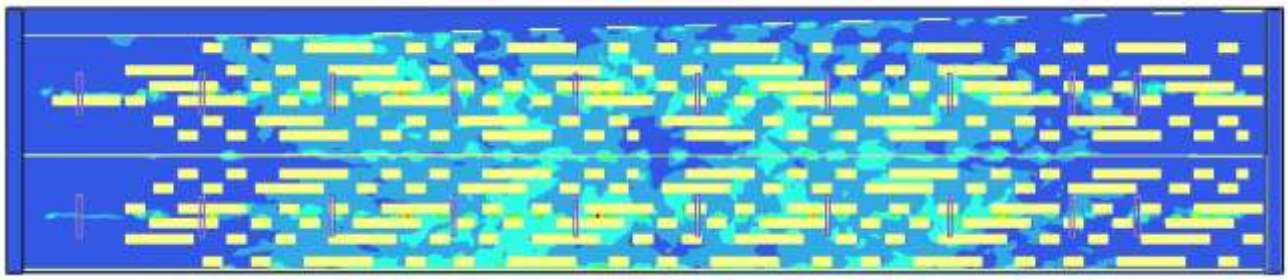

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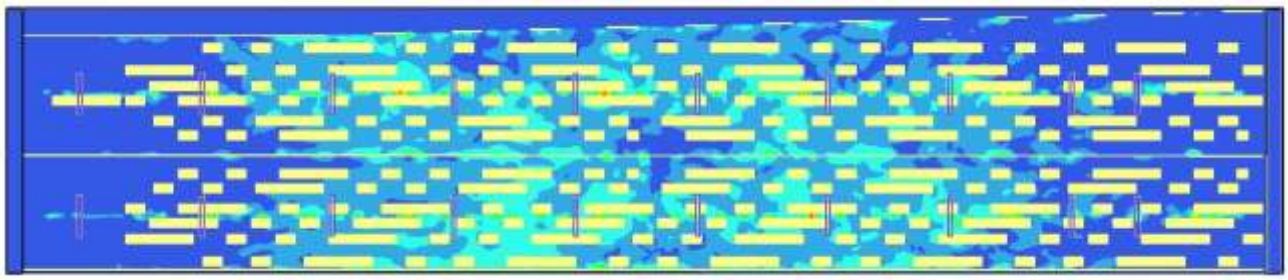

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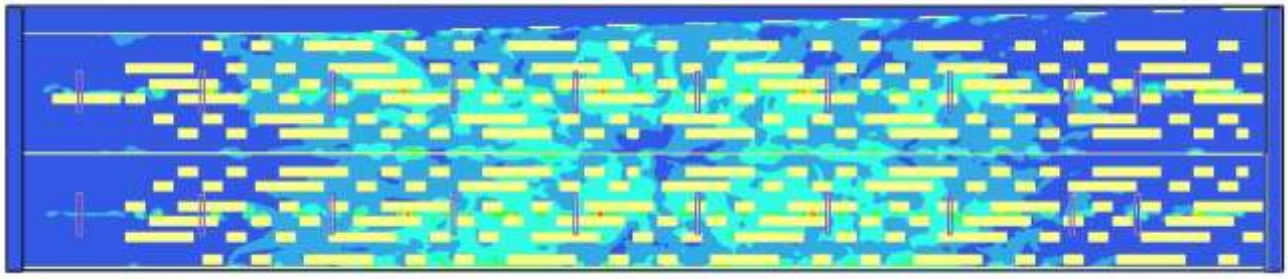

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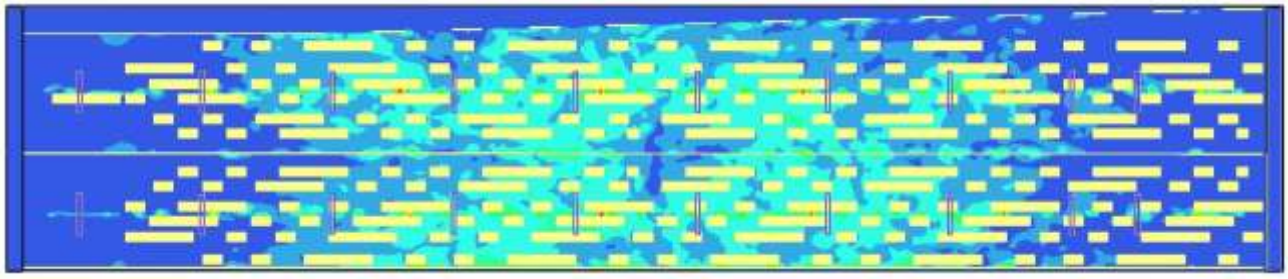

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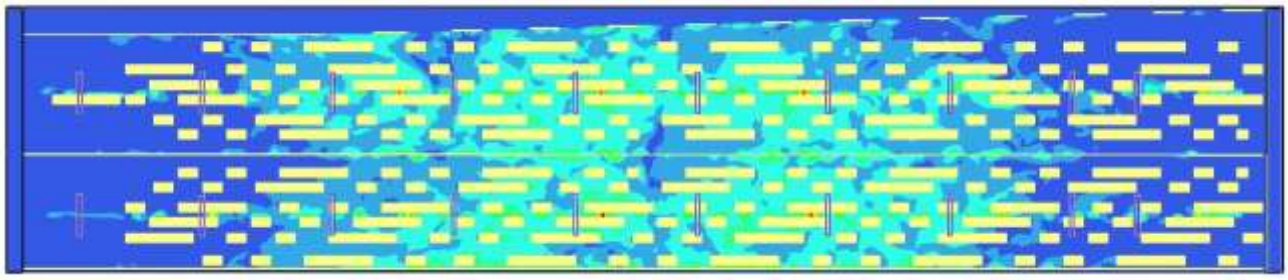

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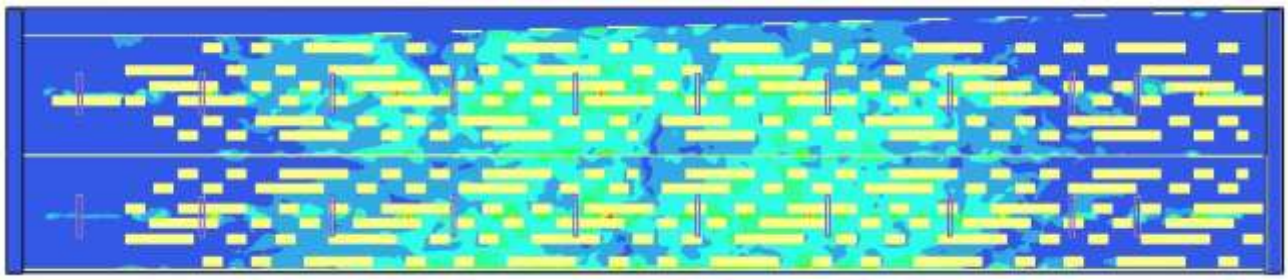

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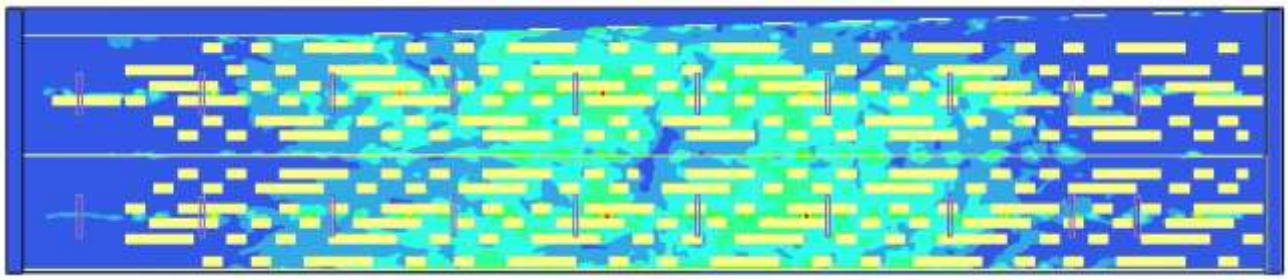

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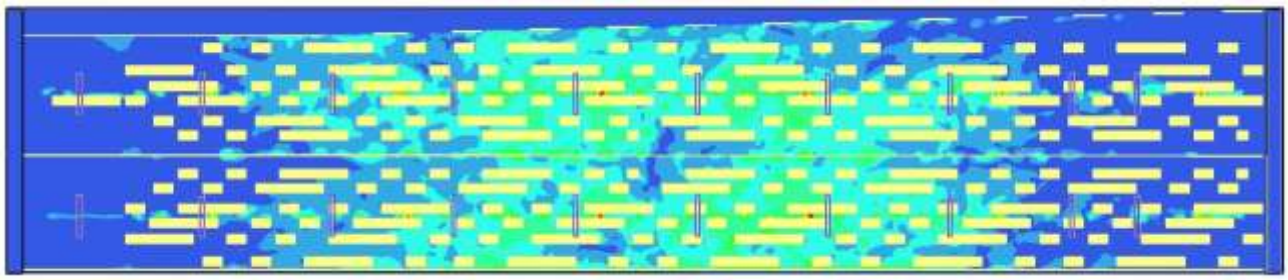

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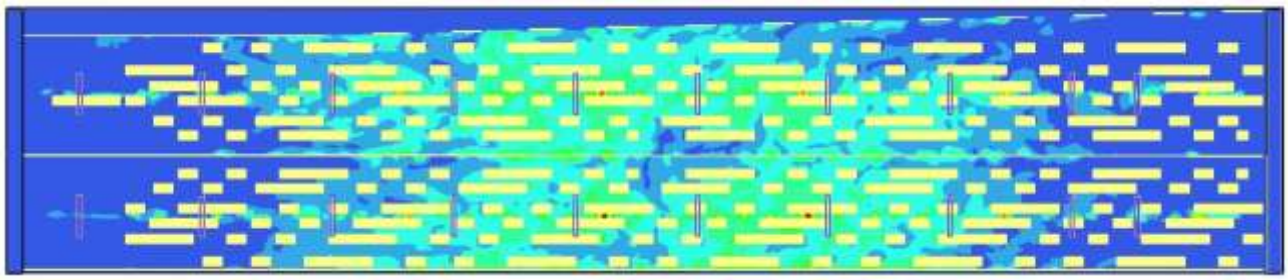

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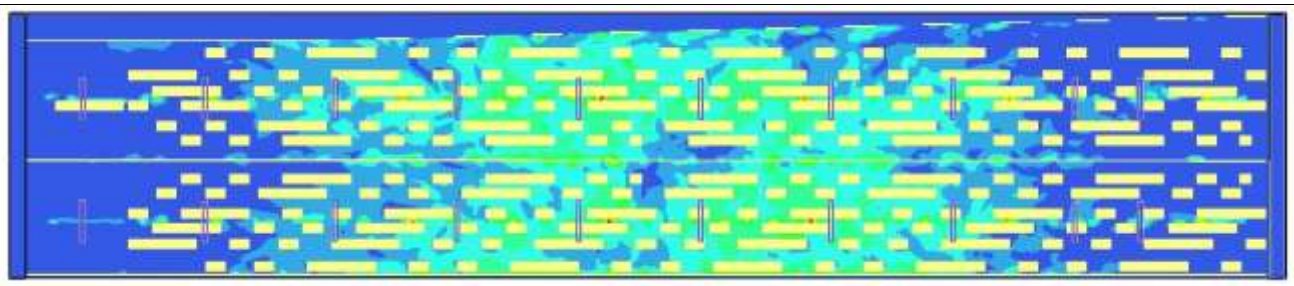

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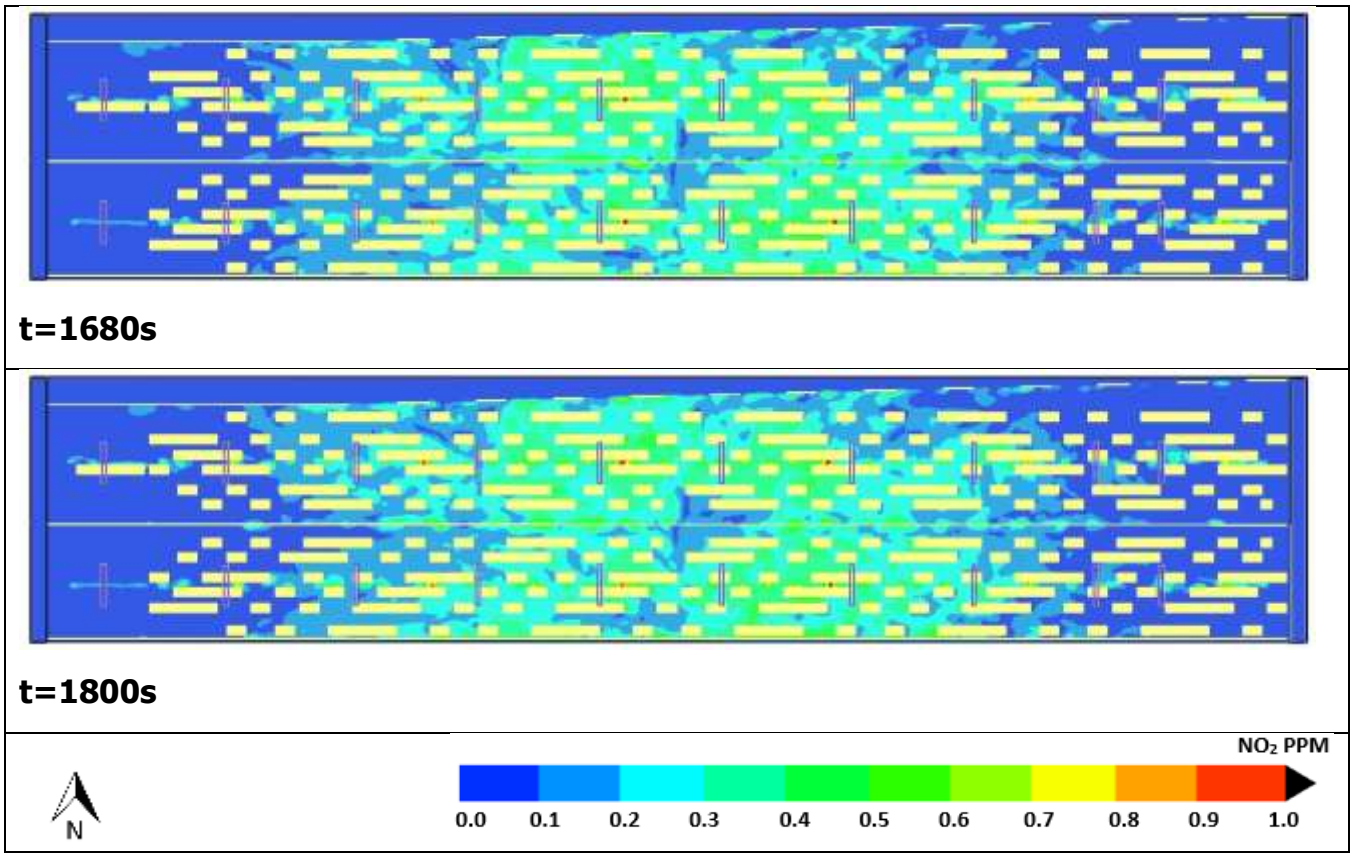
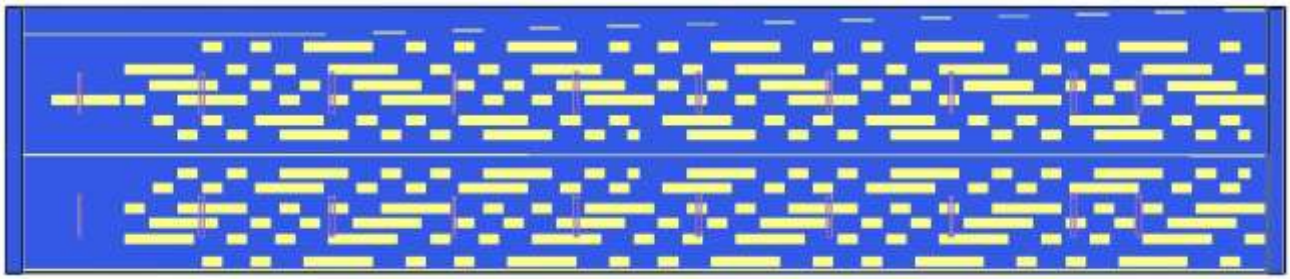
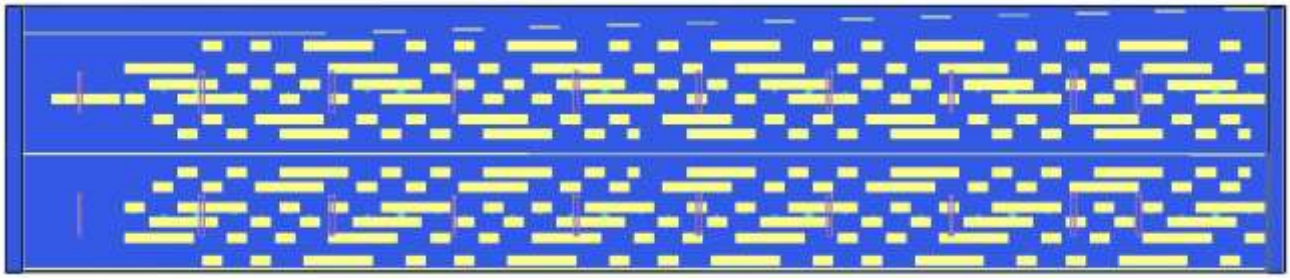


Figure B-1. NO_2 ppm concentration on a plane 8.2 ft above Tunnel floor (350 kcfm exhaust 120 s after start of fire)

NO PPM:



t=0s



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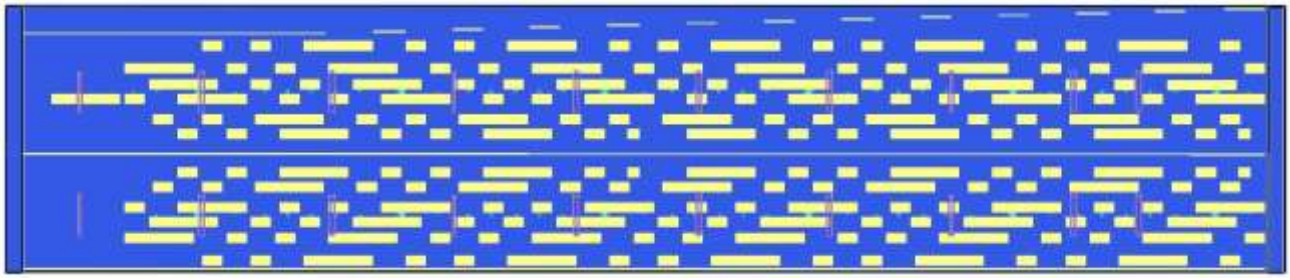
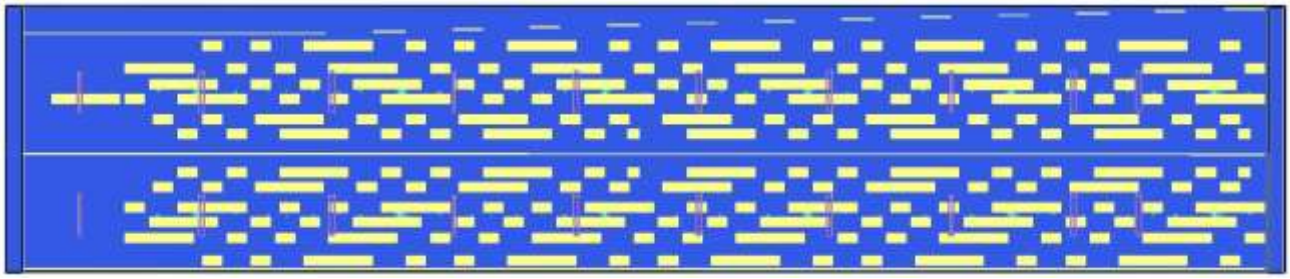


t=60s



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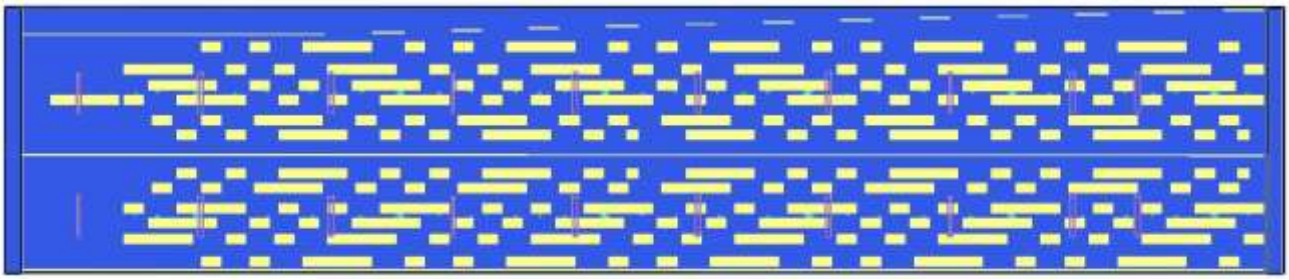
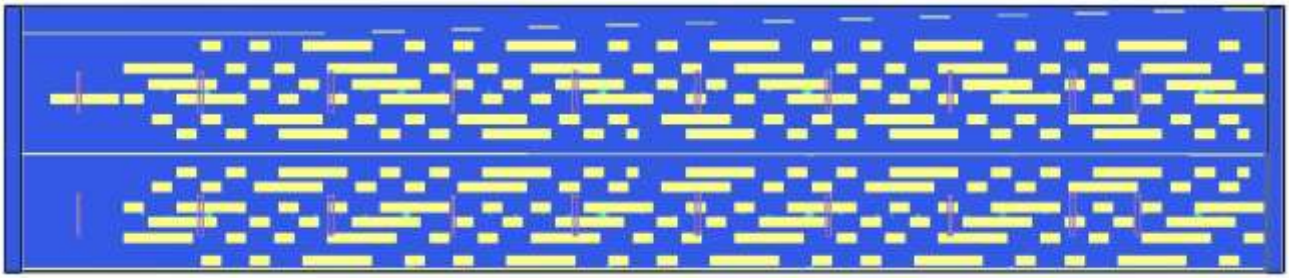


t=120s



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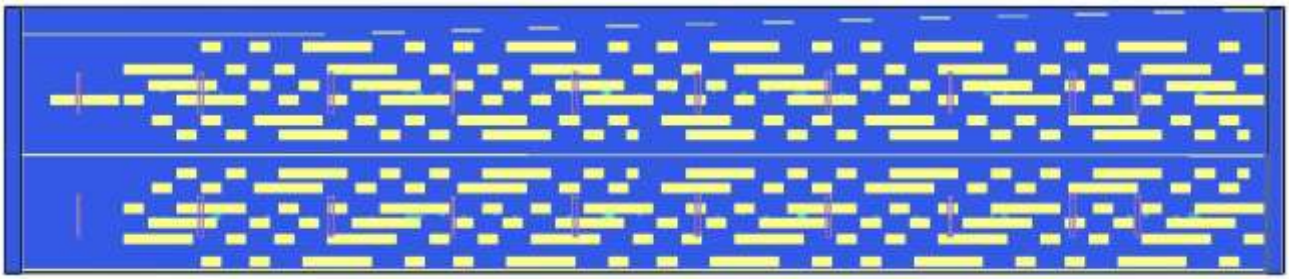
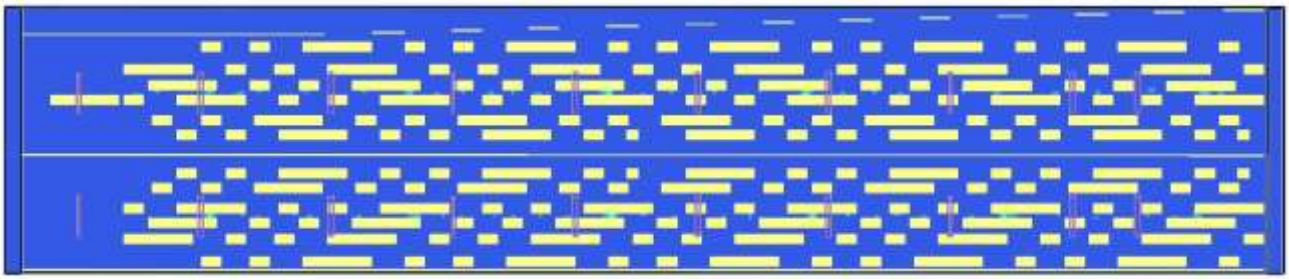
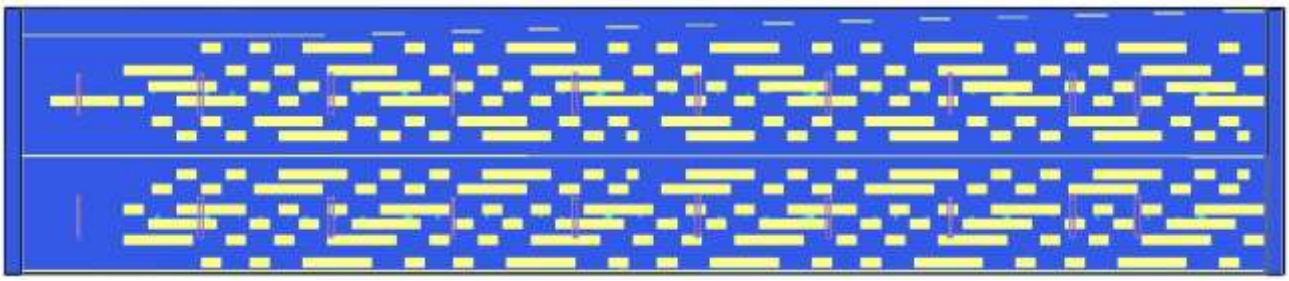


t=180s



t=210s



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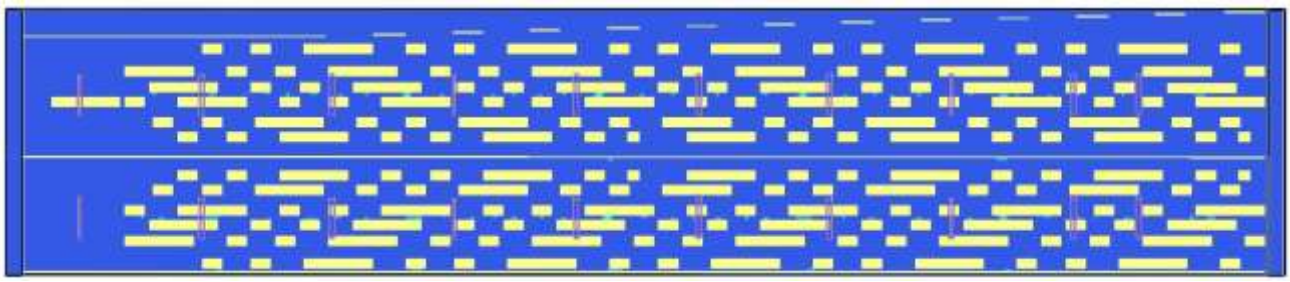
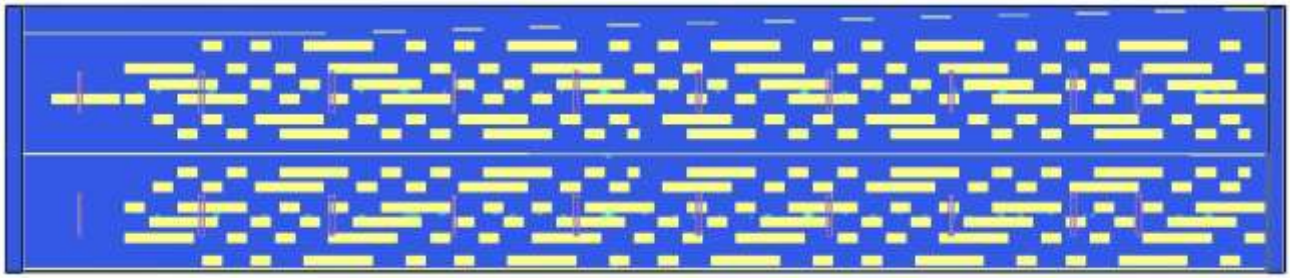


t=270s



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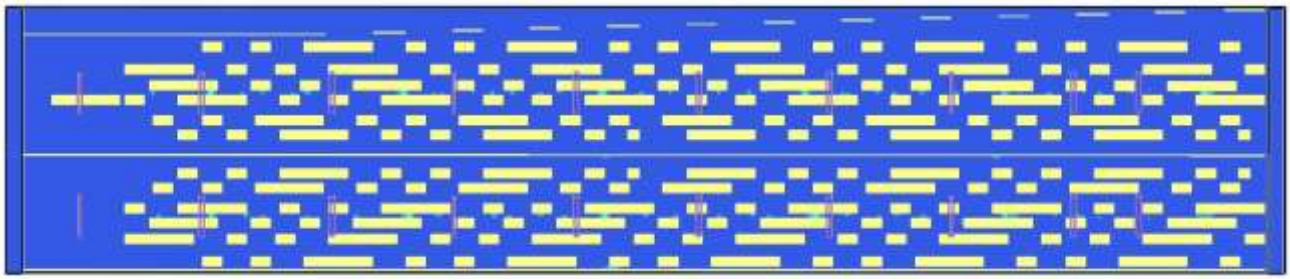

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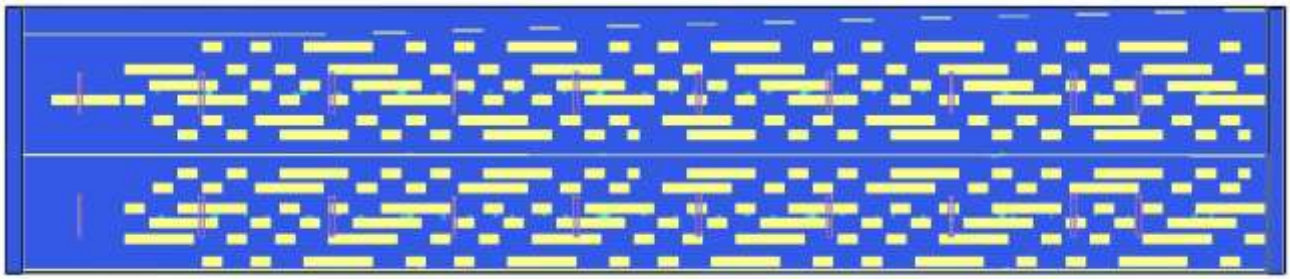

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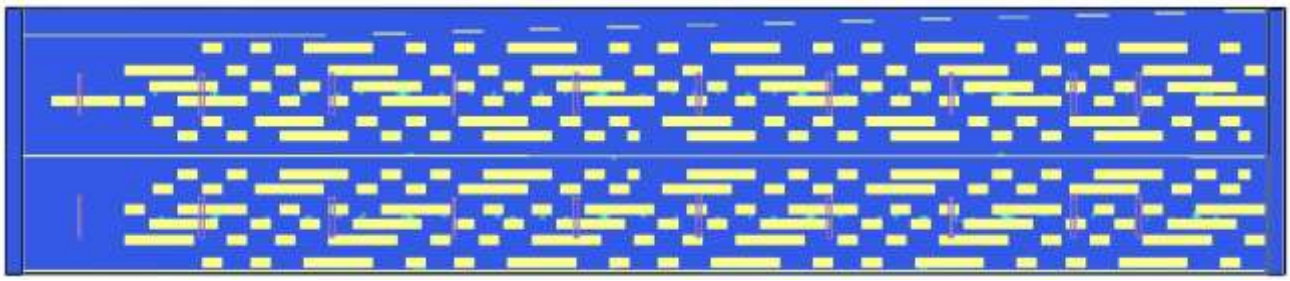

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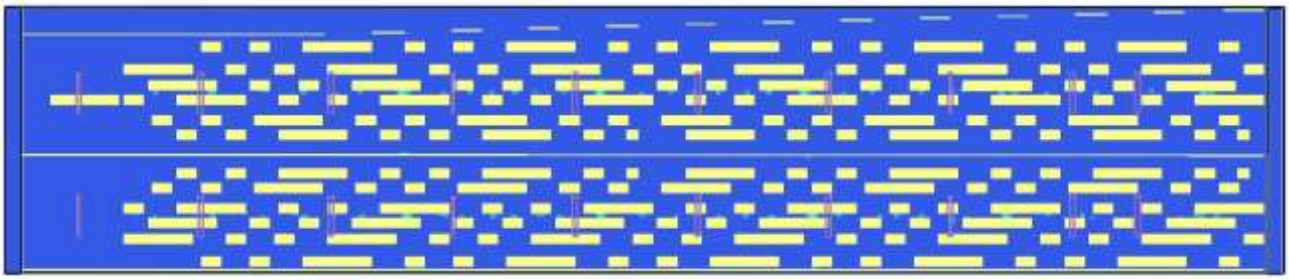

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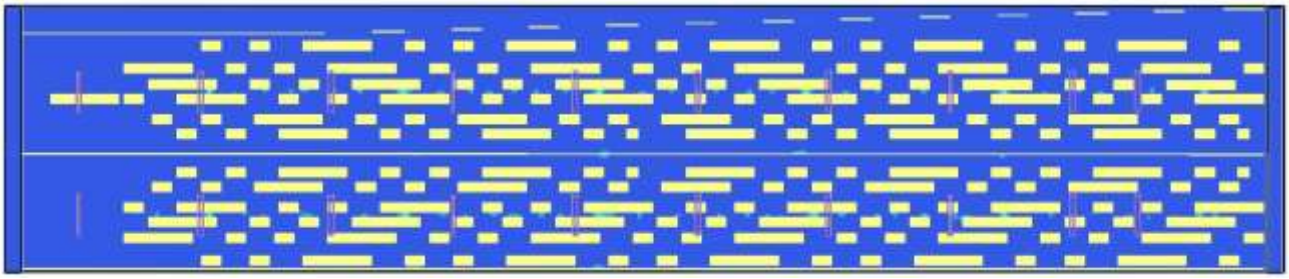

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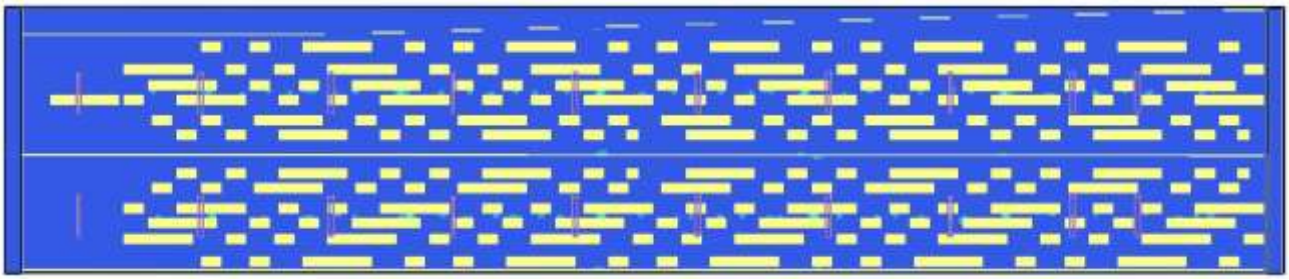

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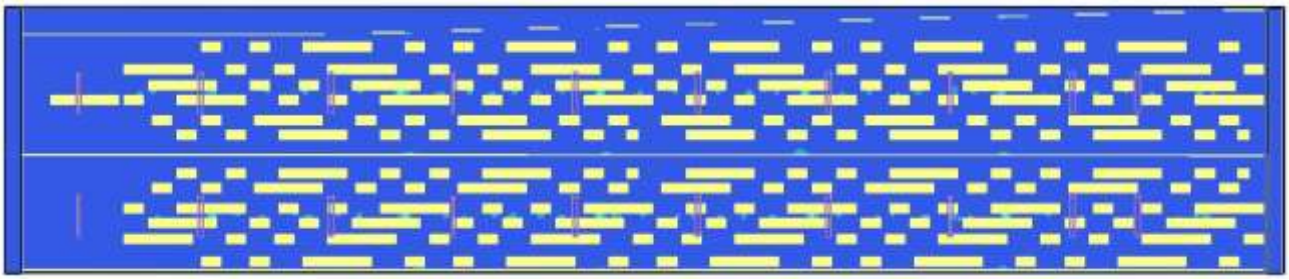

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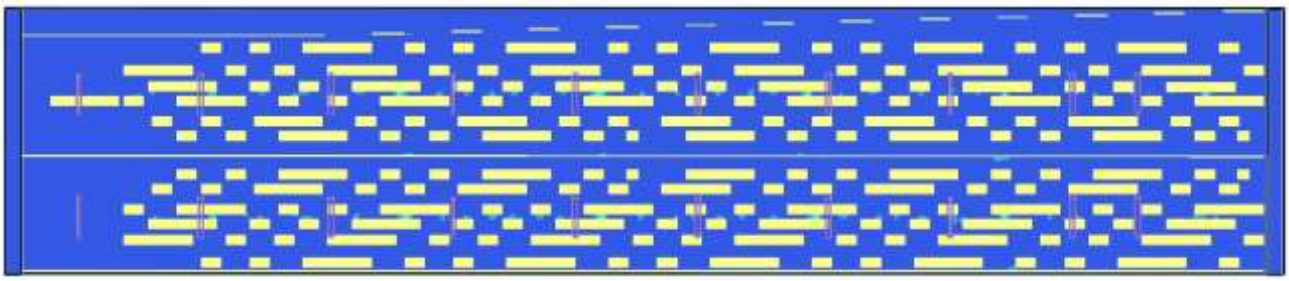

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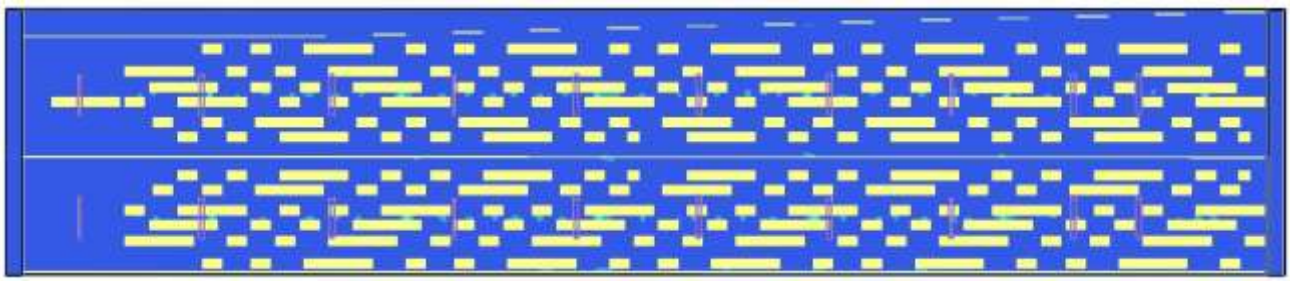

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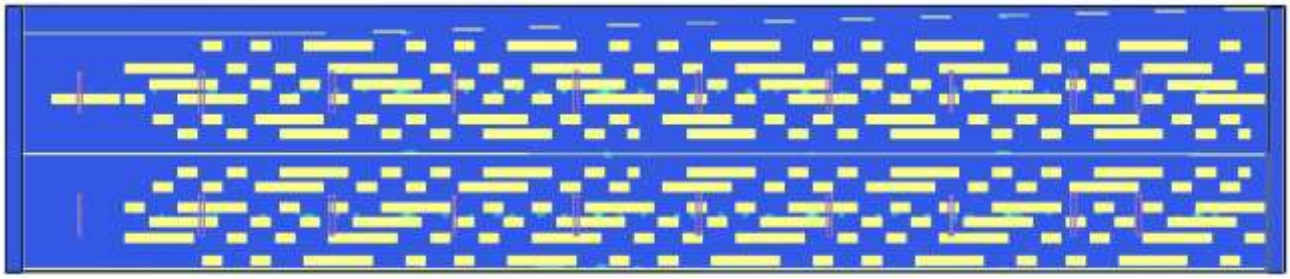

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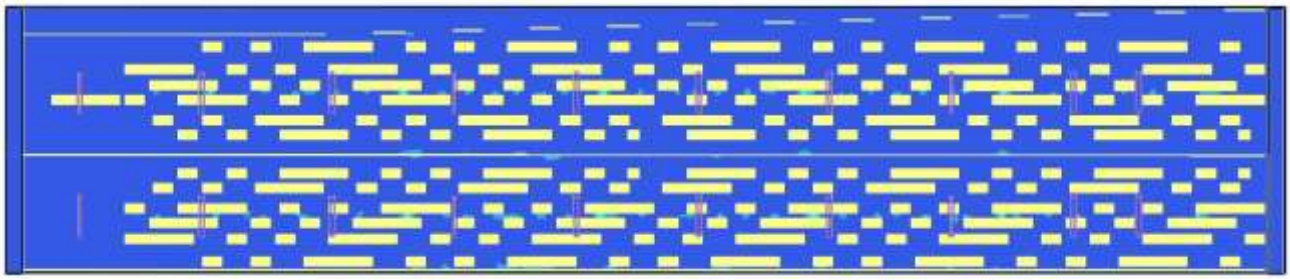

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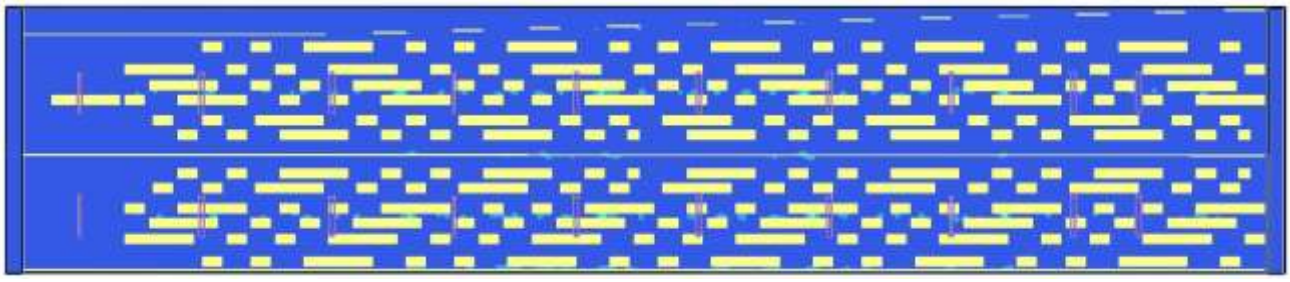

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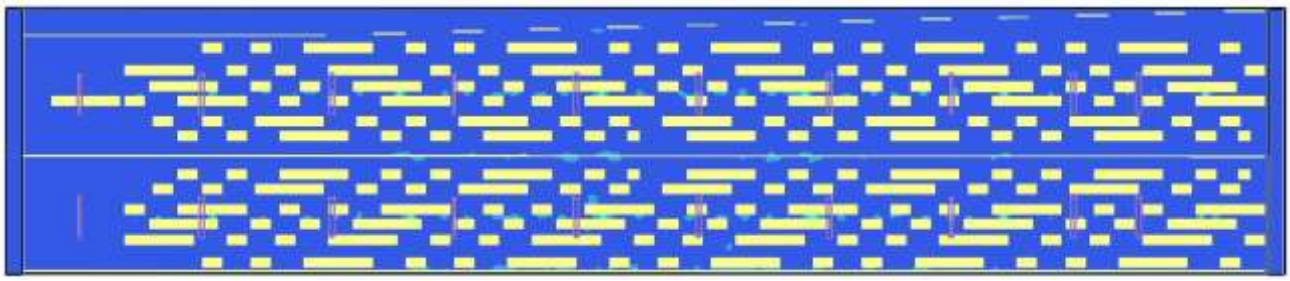

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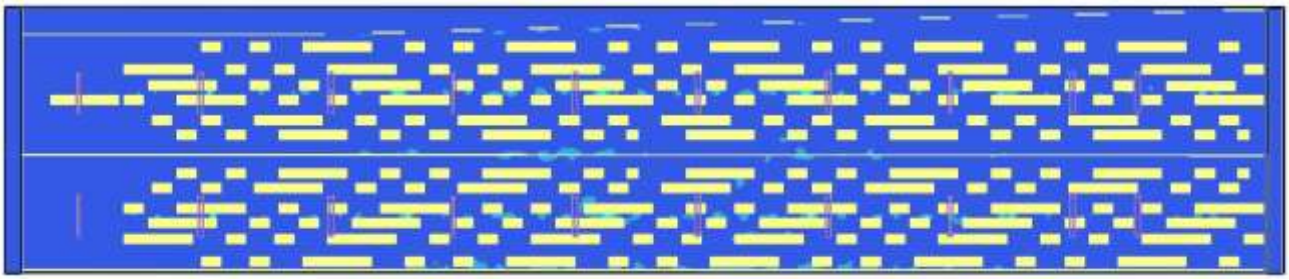

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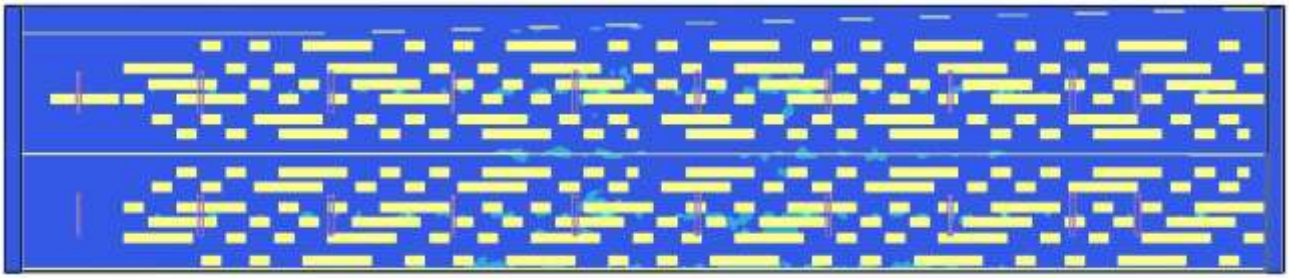

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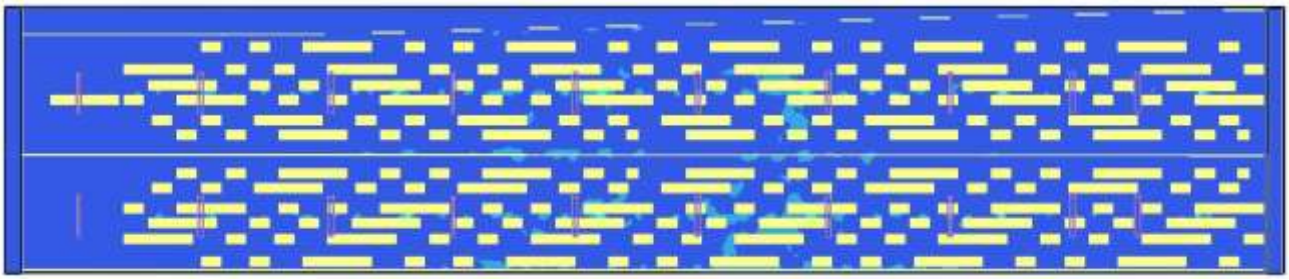

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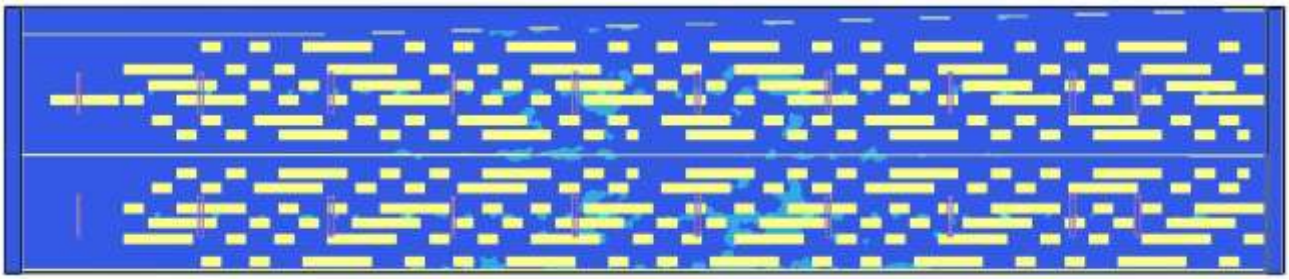

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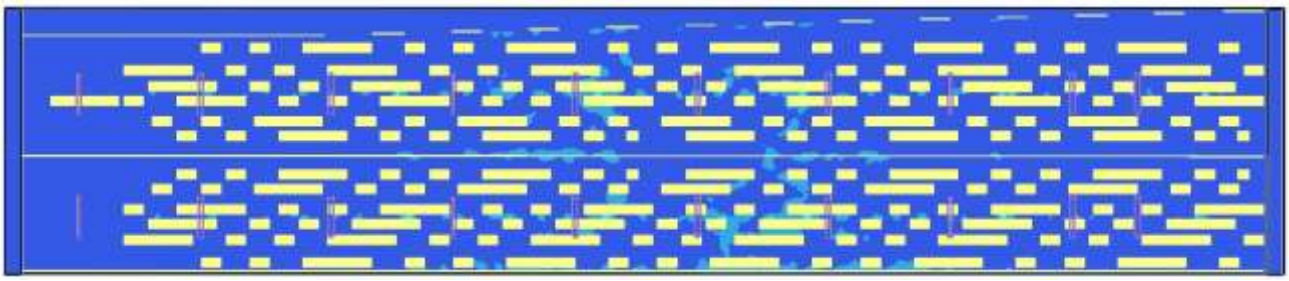

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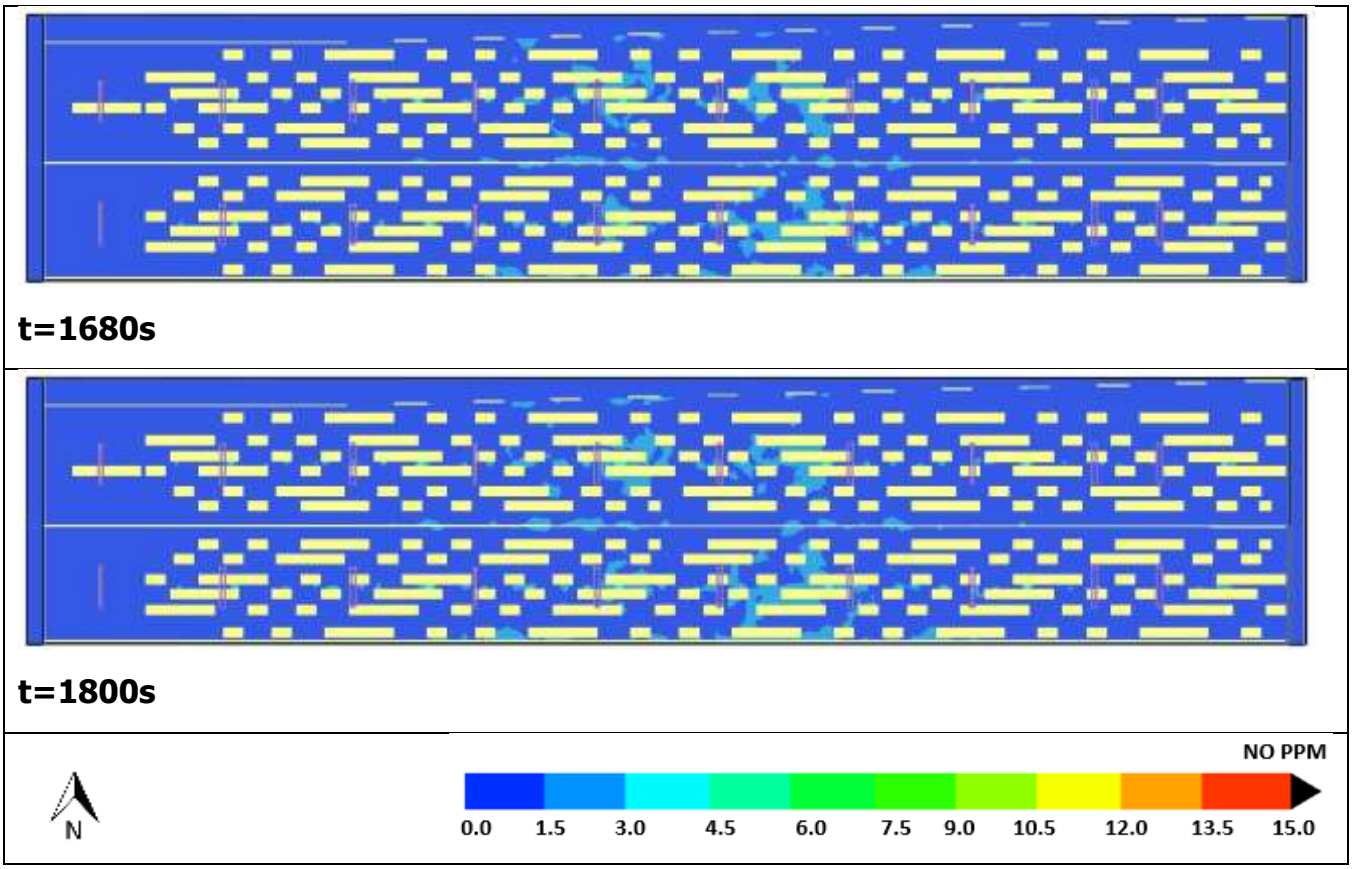
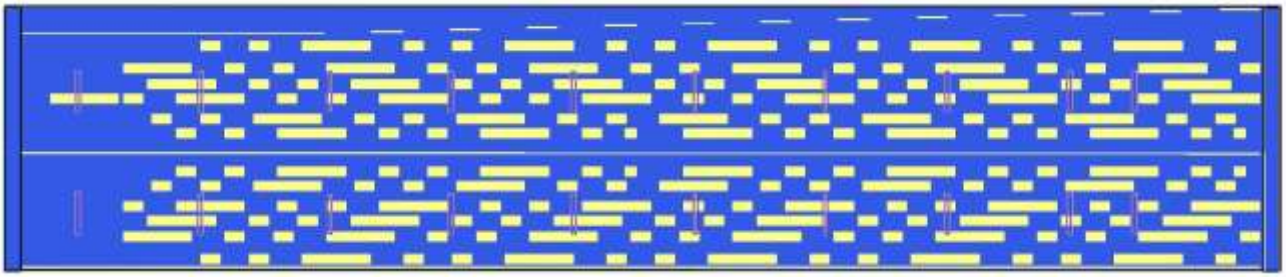


Figure B-2. NO ppm concentration on a plane 8.2 ft above Tunnel floor (350 kcfm exhaust after 120s from start of fire)

CO PPM:



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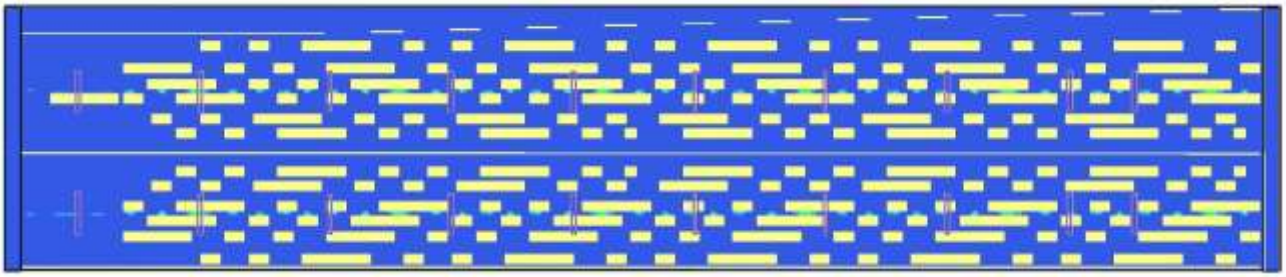

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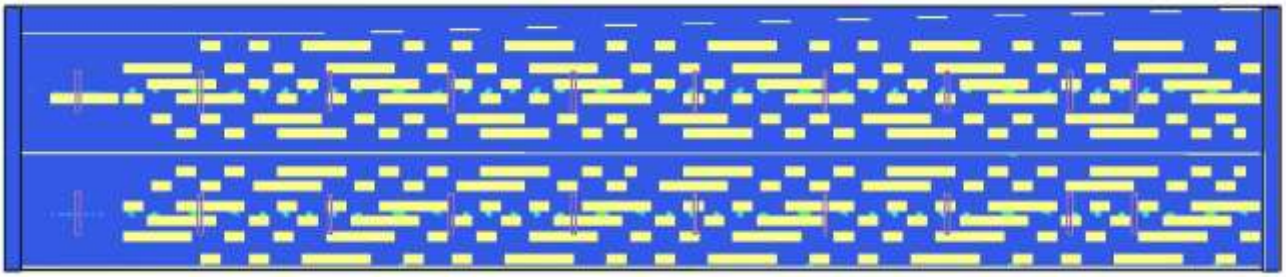

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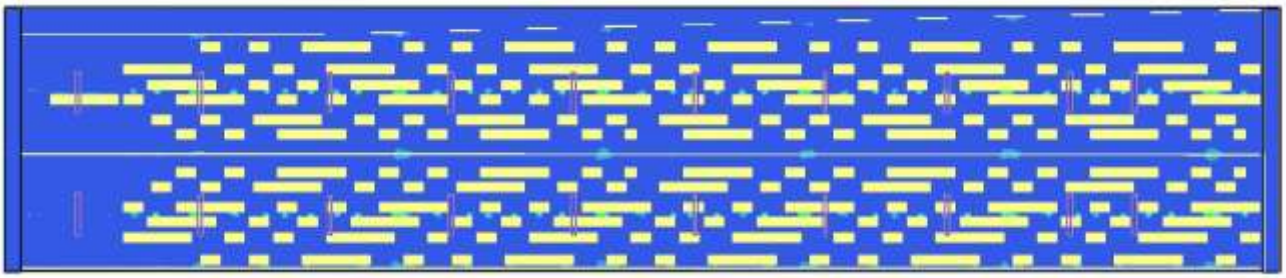

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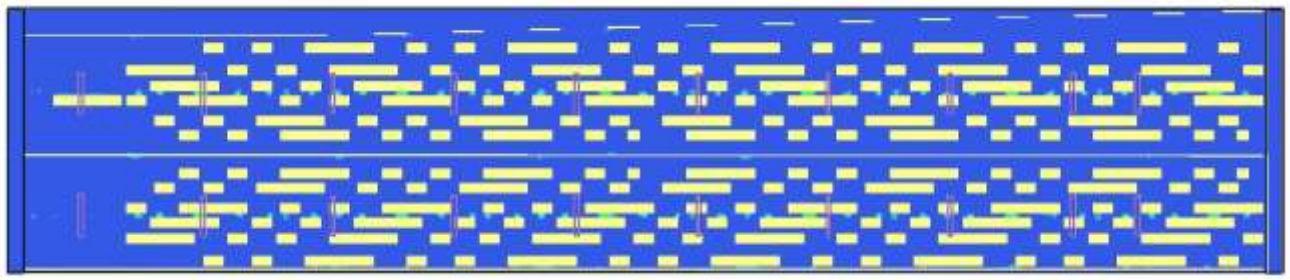
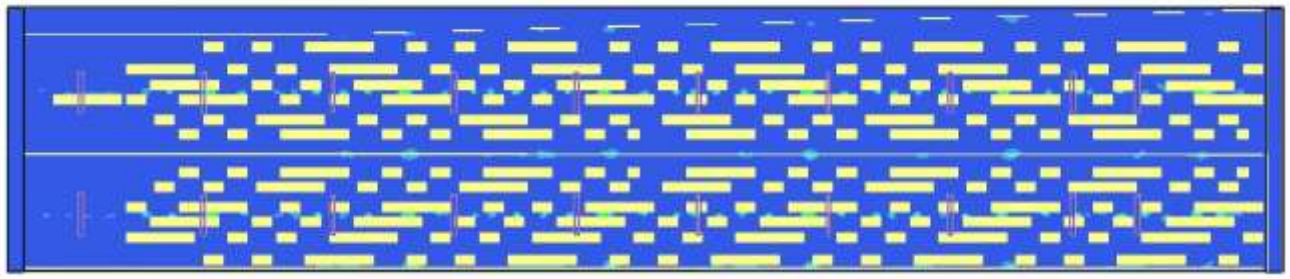
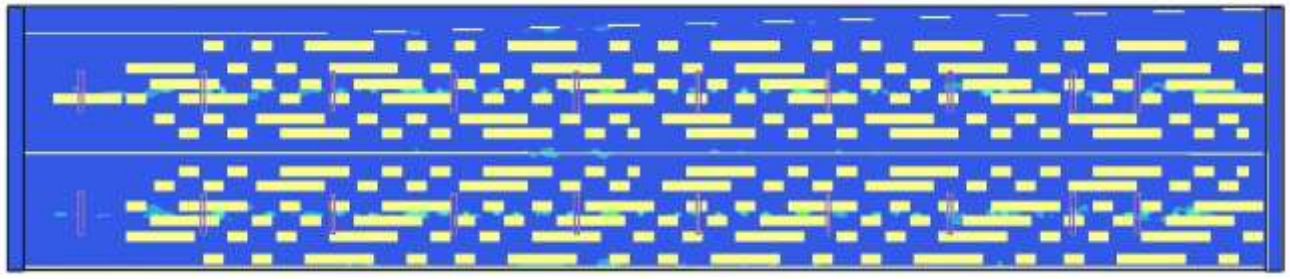


t=120s



t=150s



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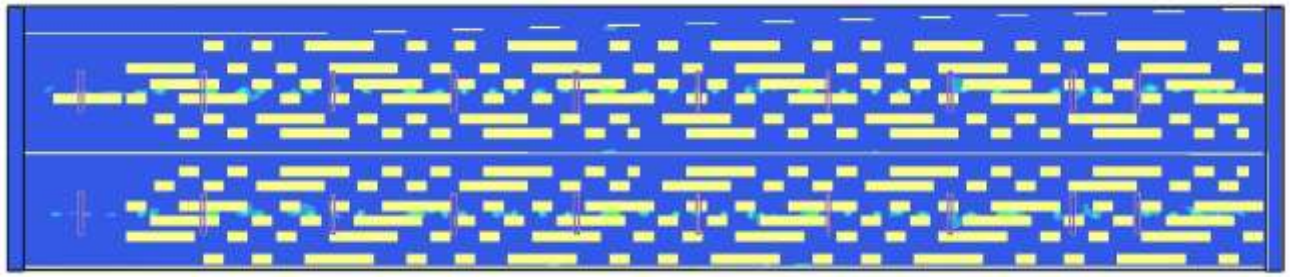

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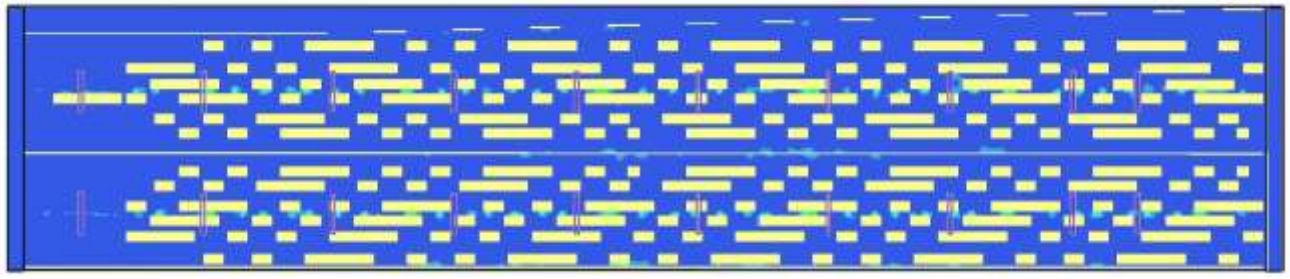

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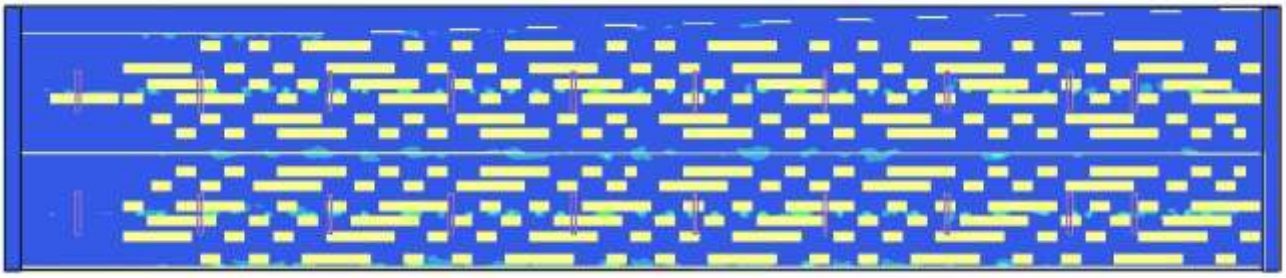

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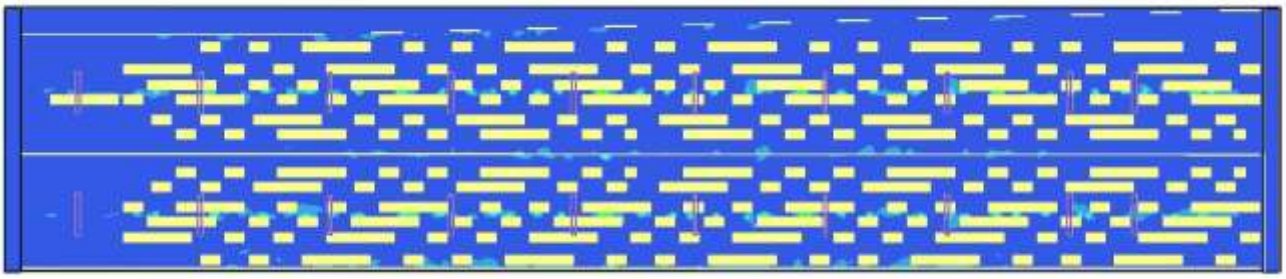

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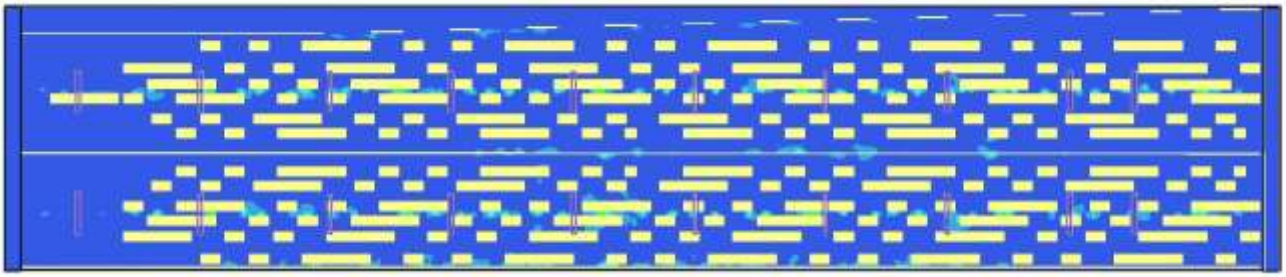

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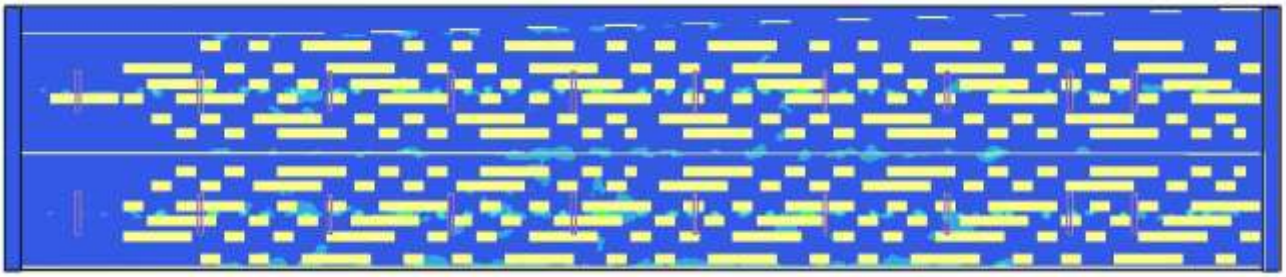

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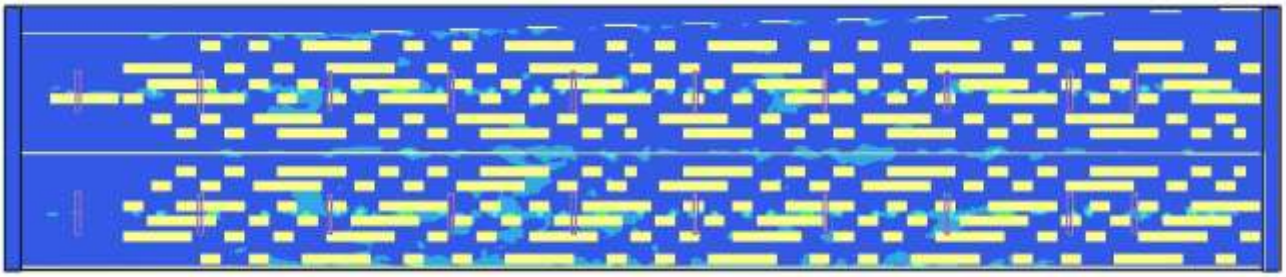

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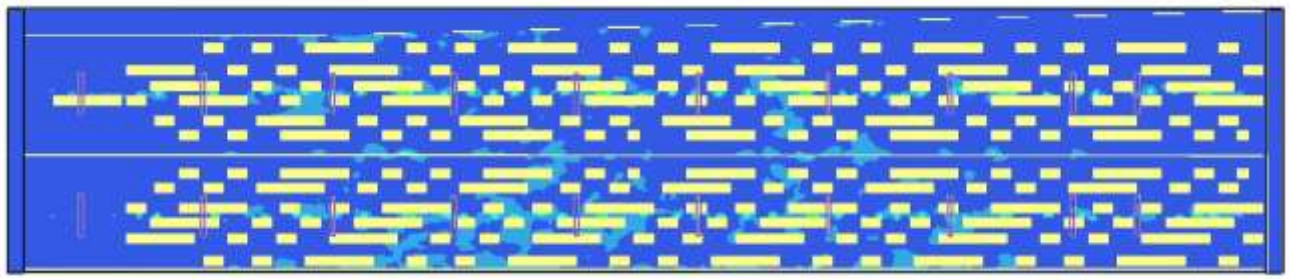

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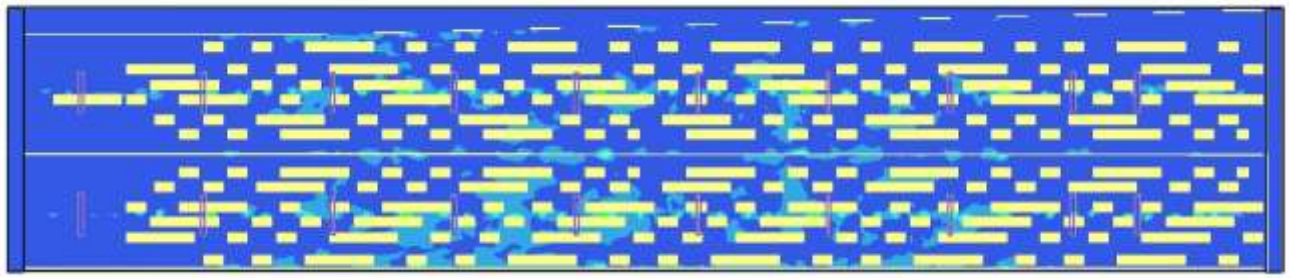
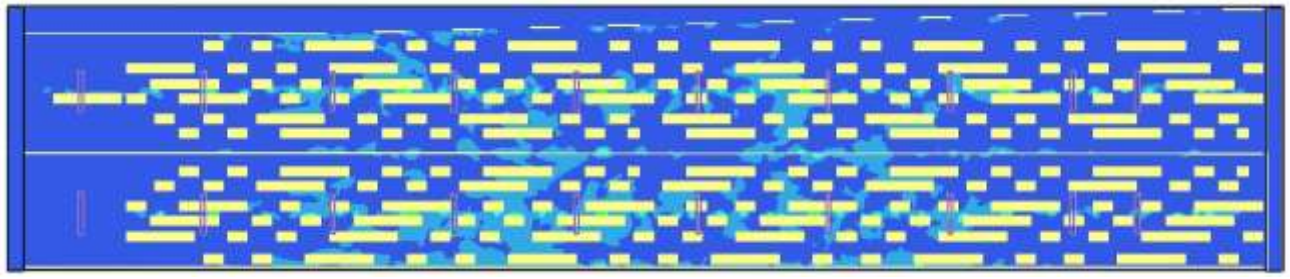


t=450s



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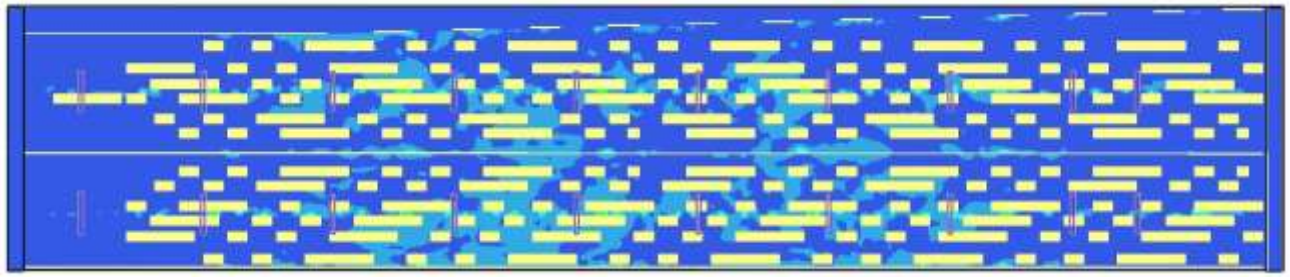

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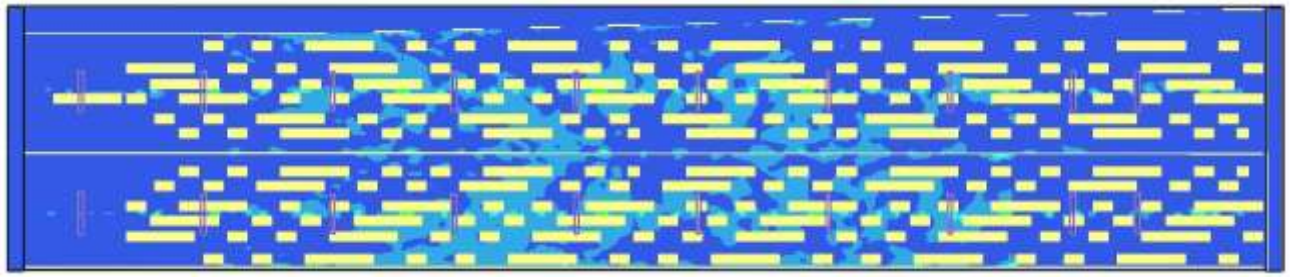

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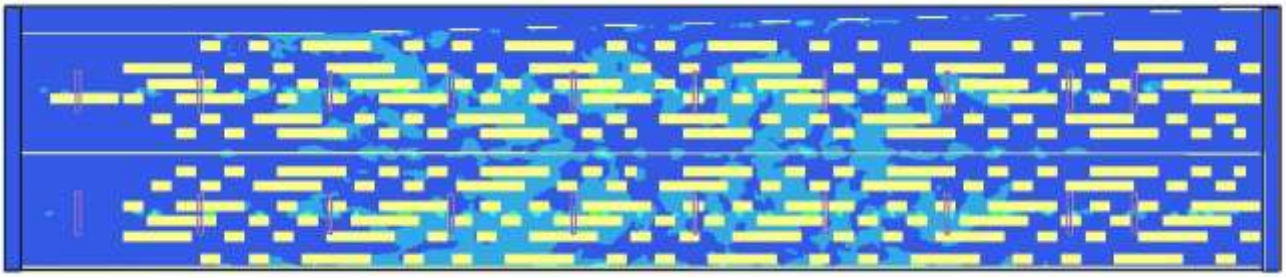

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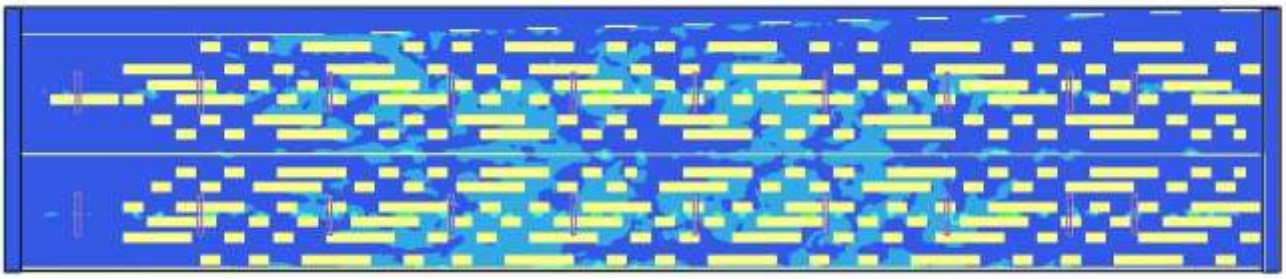

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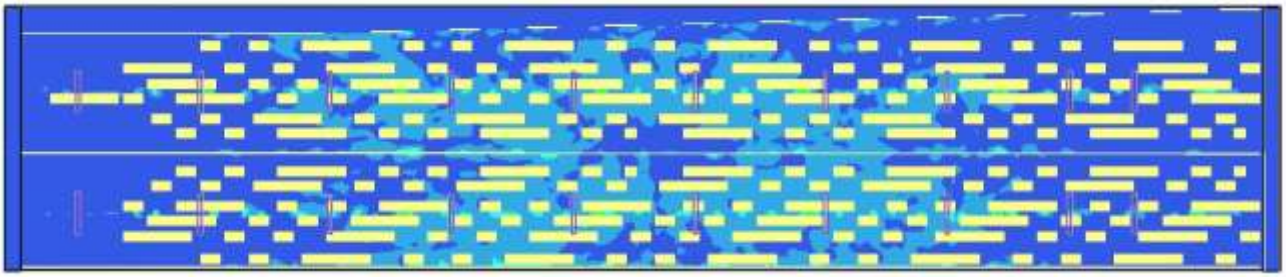

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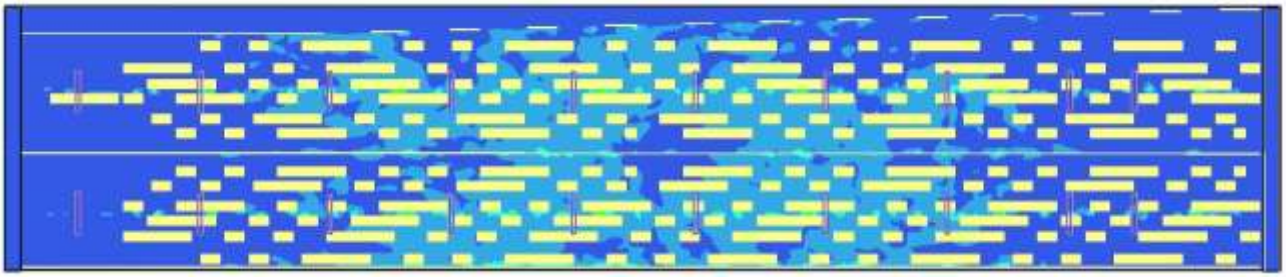

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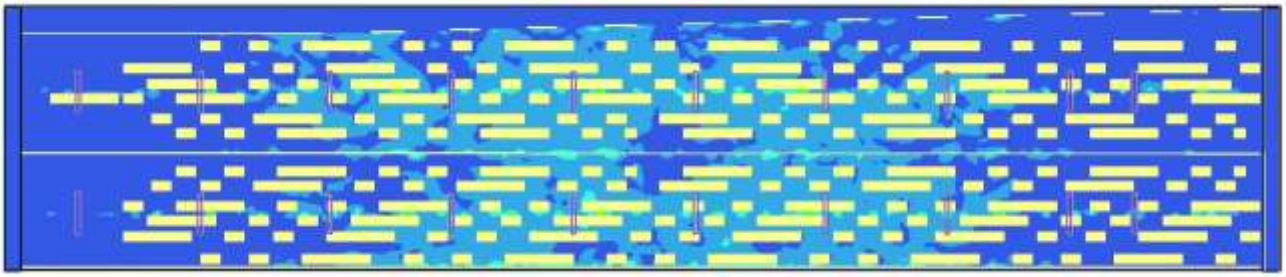

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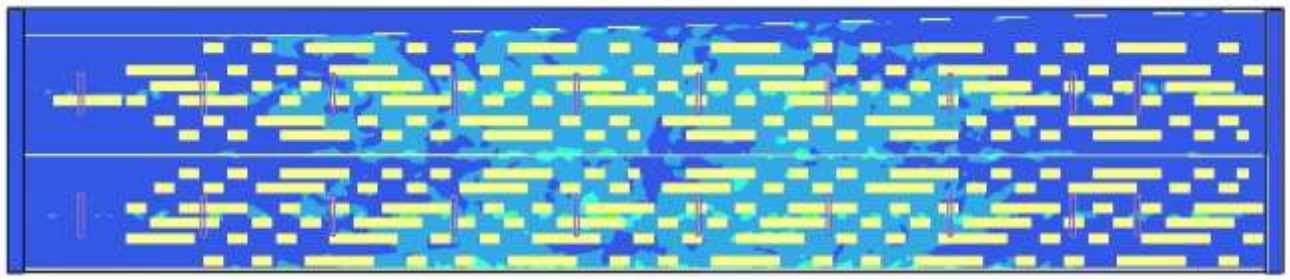

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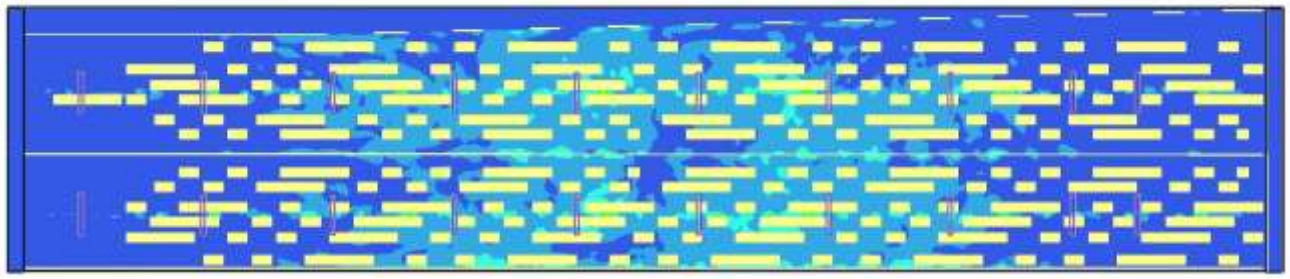

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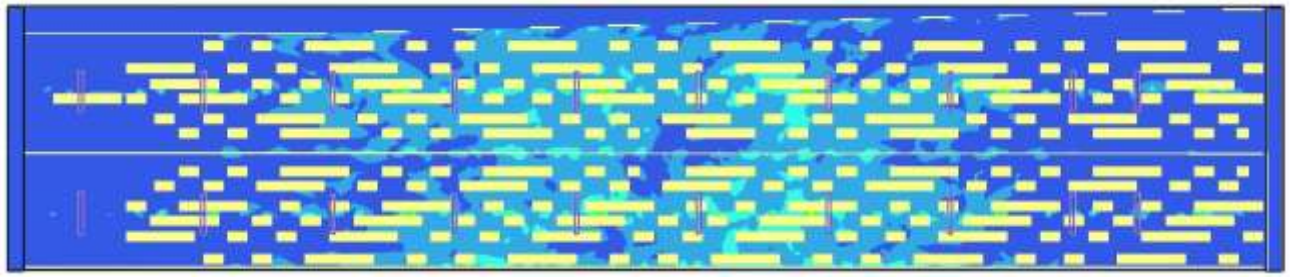

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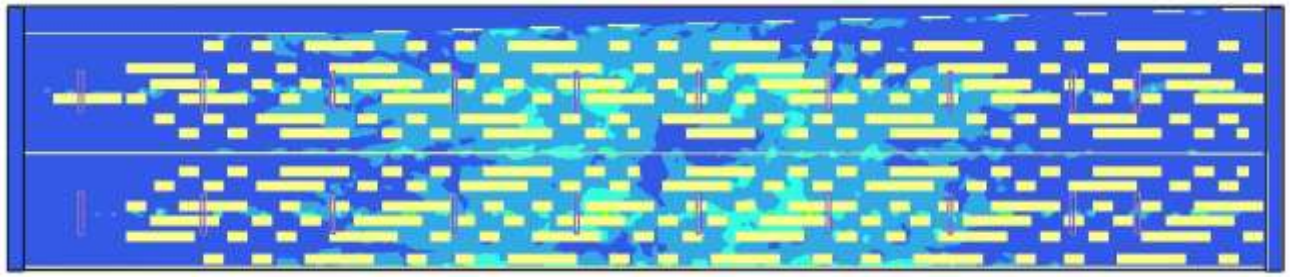

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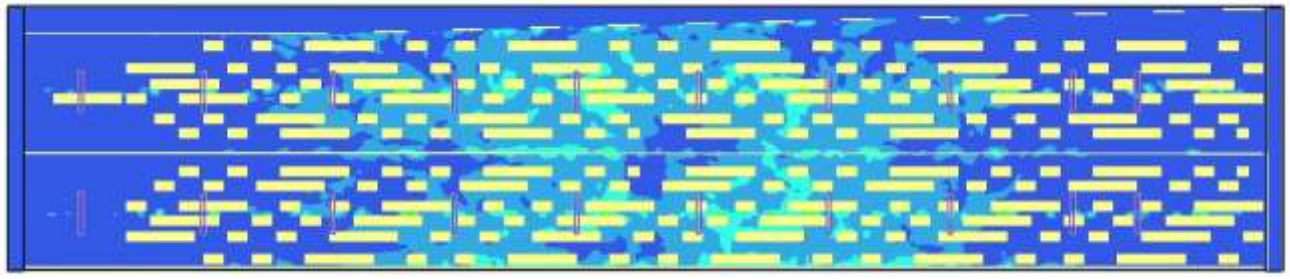

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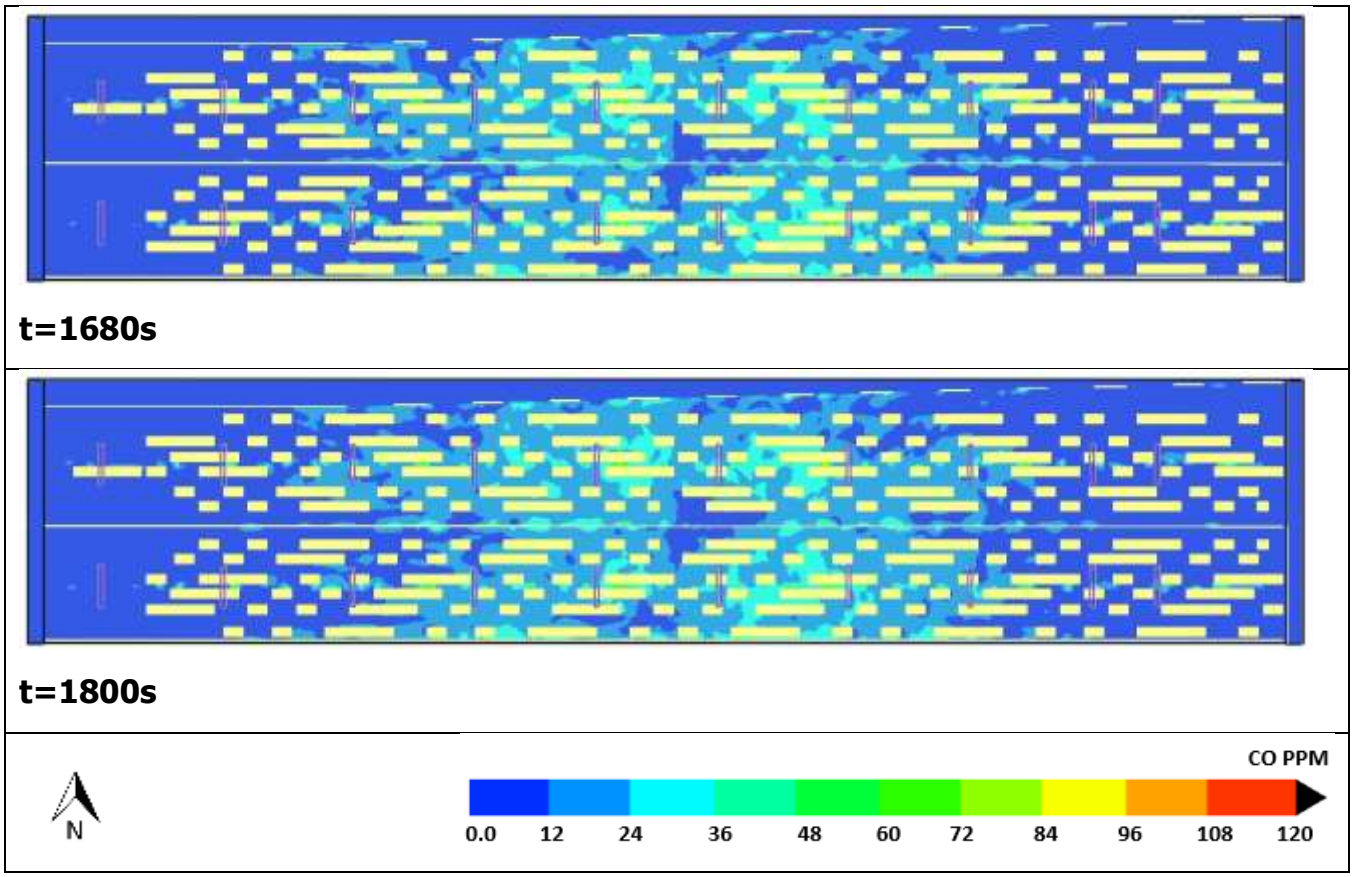
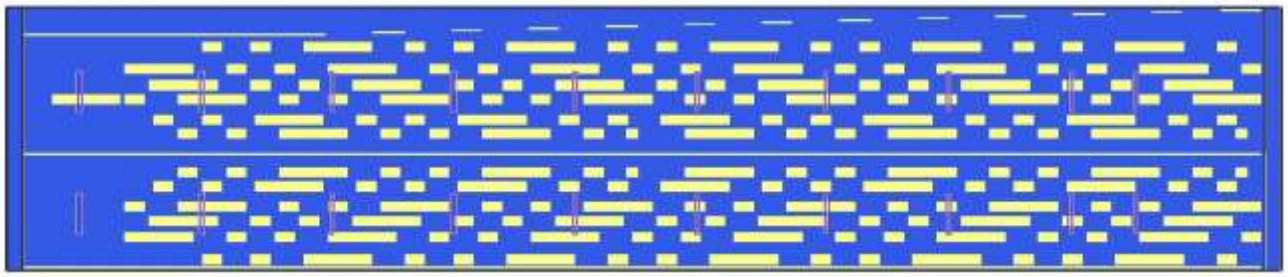


Figure B-3. CO ppm concentration on a plane 8.2 ft above Tunnel floor (350 kcfm exhaust after 120s from start of fire)

PM Extinction Coefficient:



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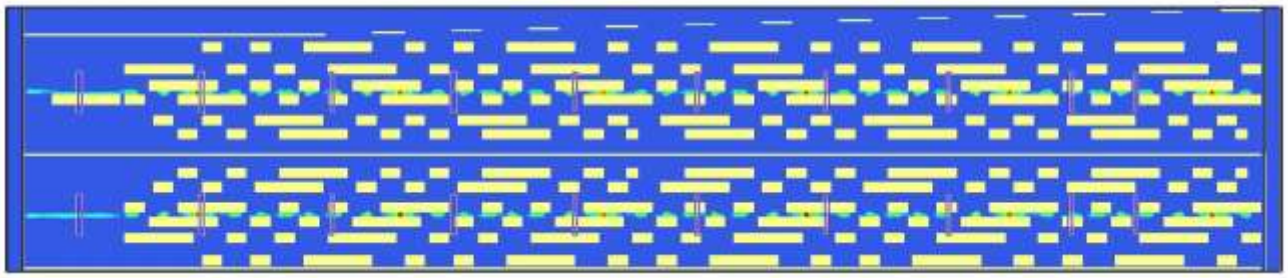
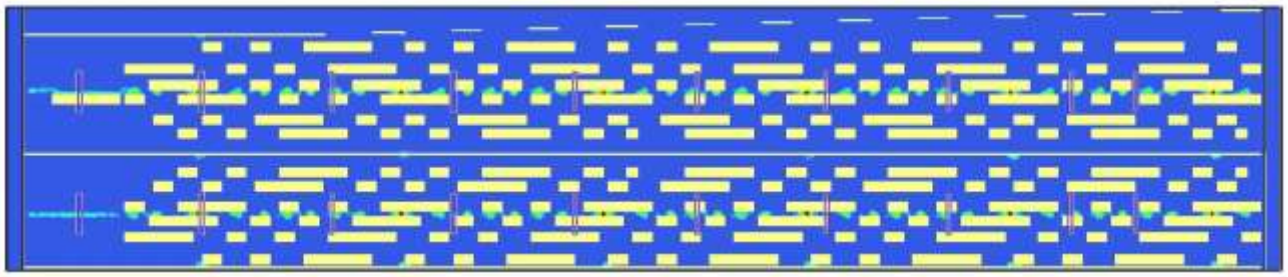
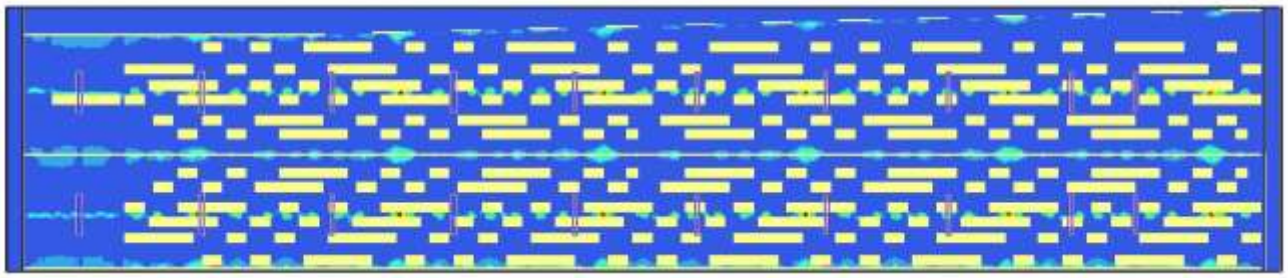


t=30s



t=60s



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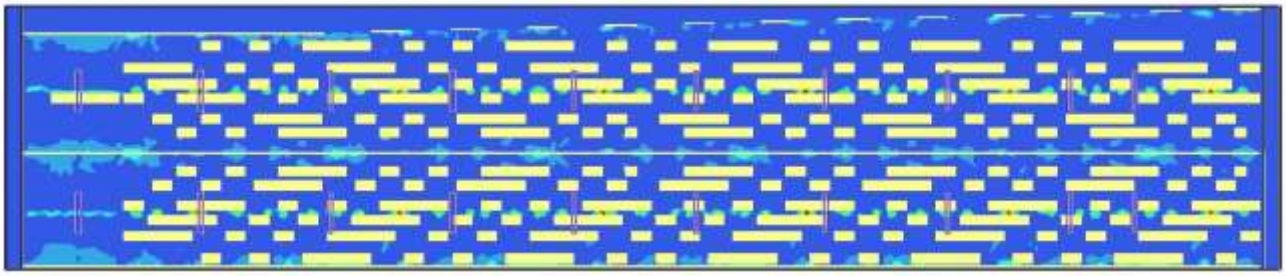

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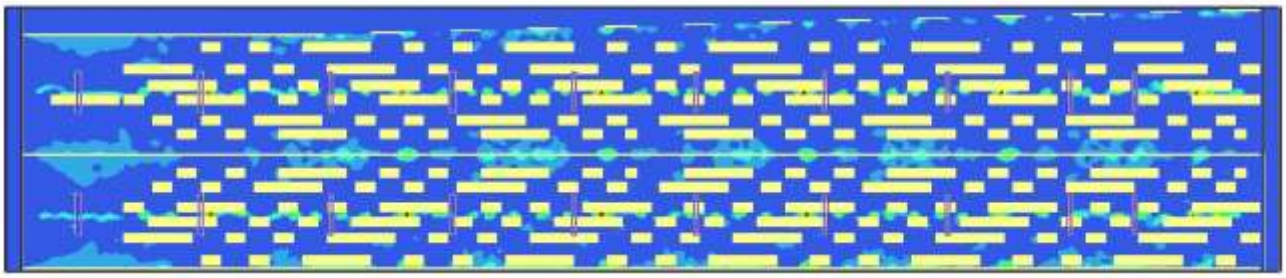

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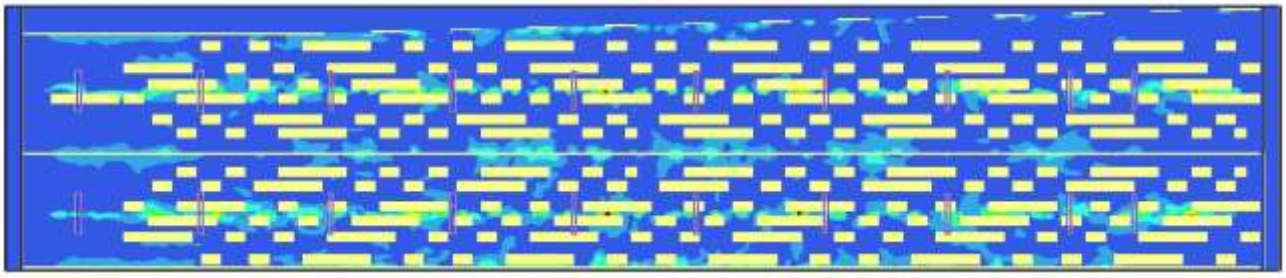

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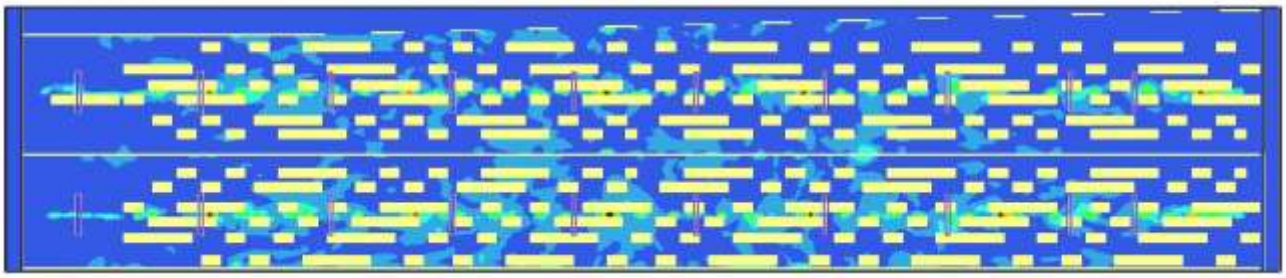

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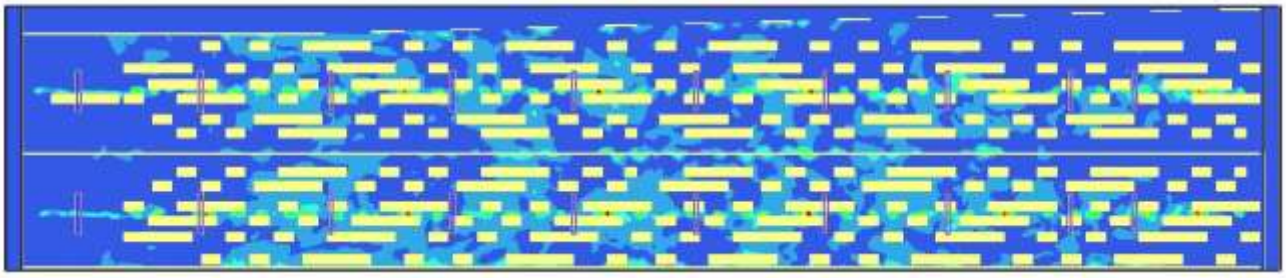

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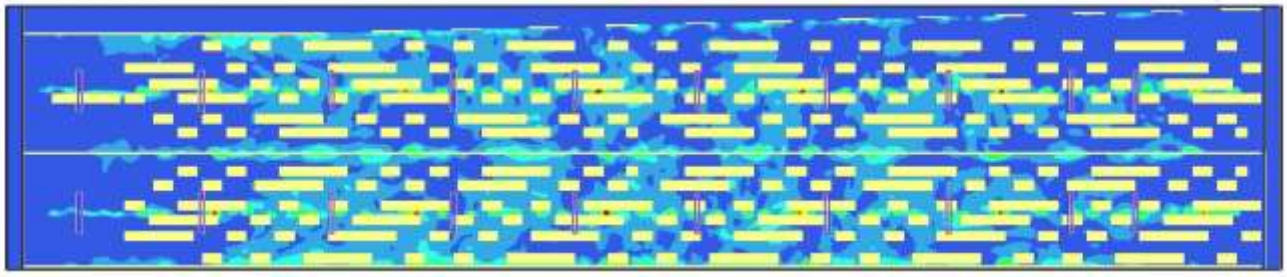

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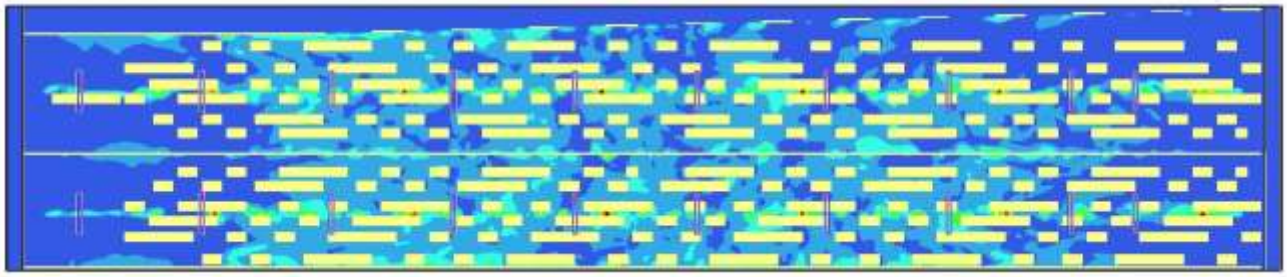

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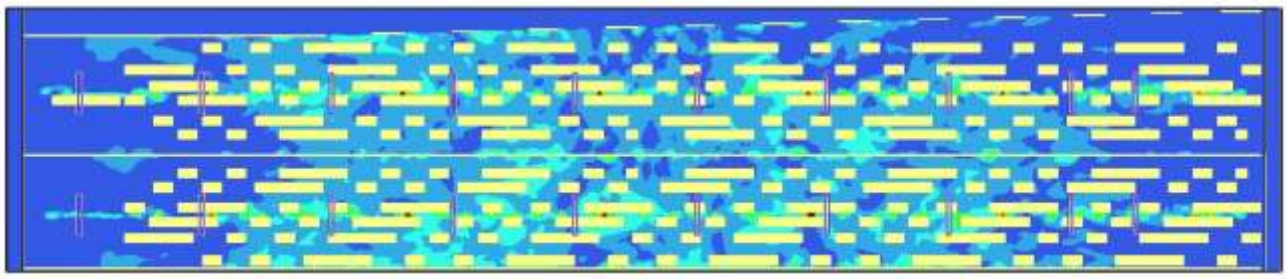

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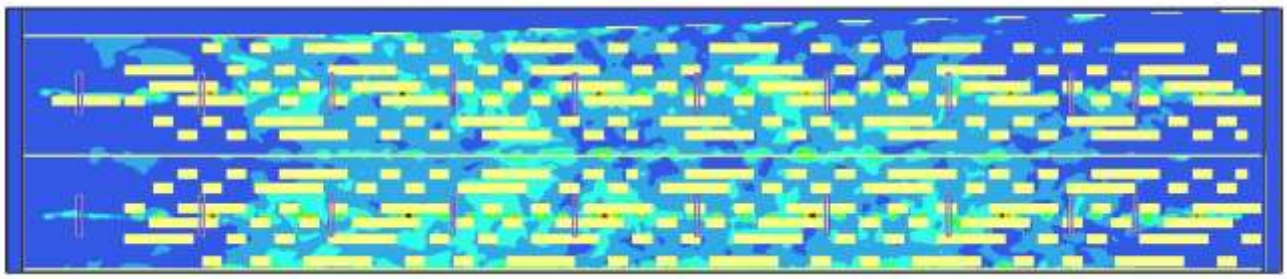

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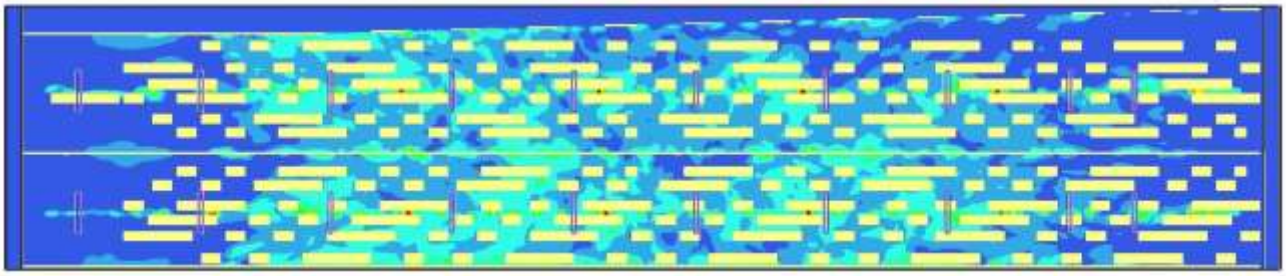

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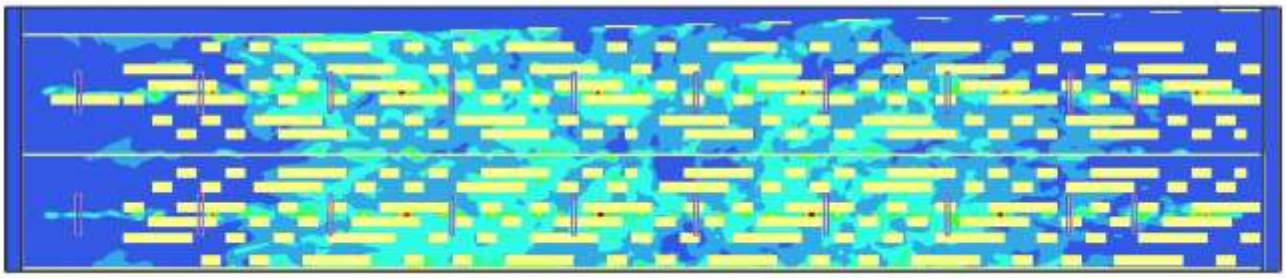

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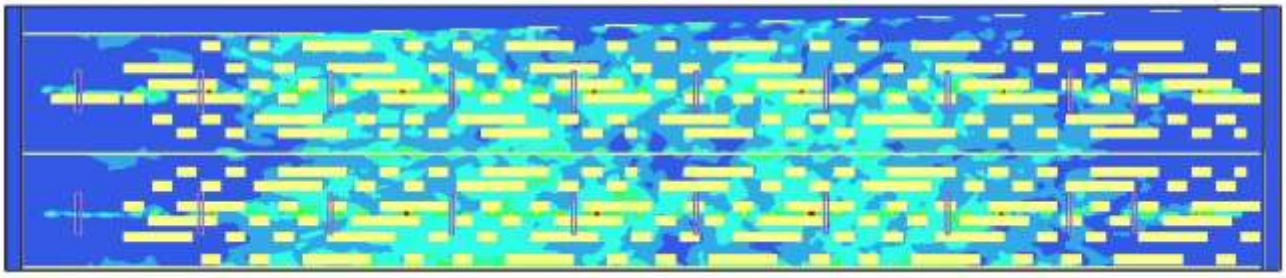

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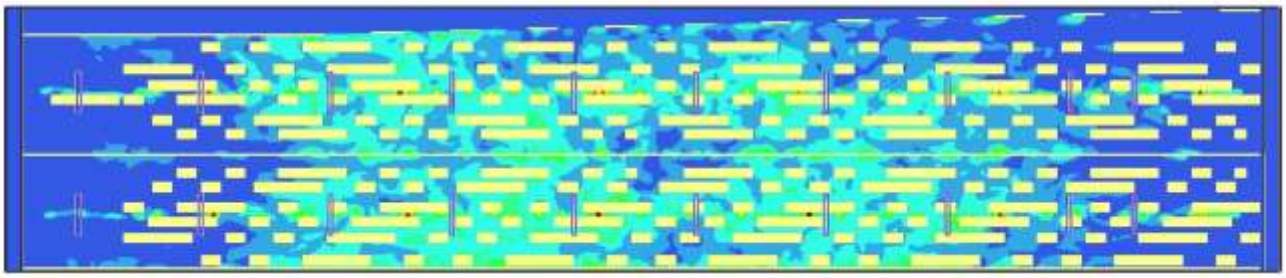

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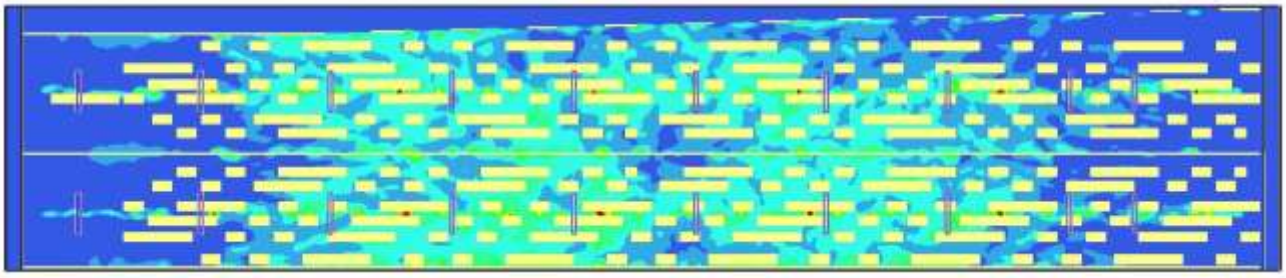

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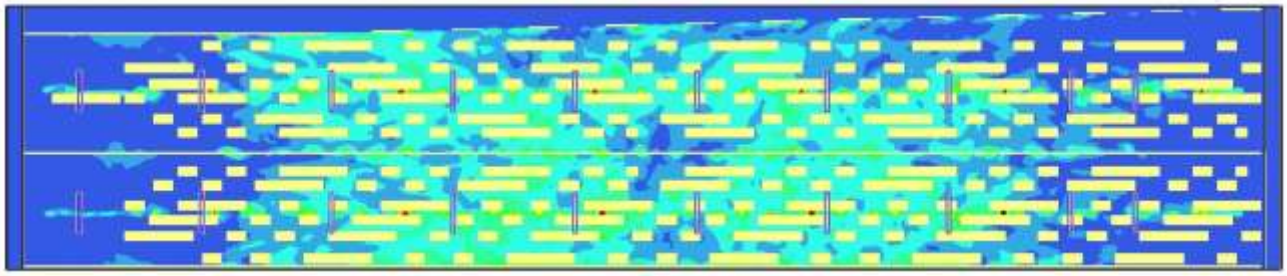

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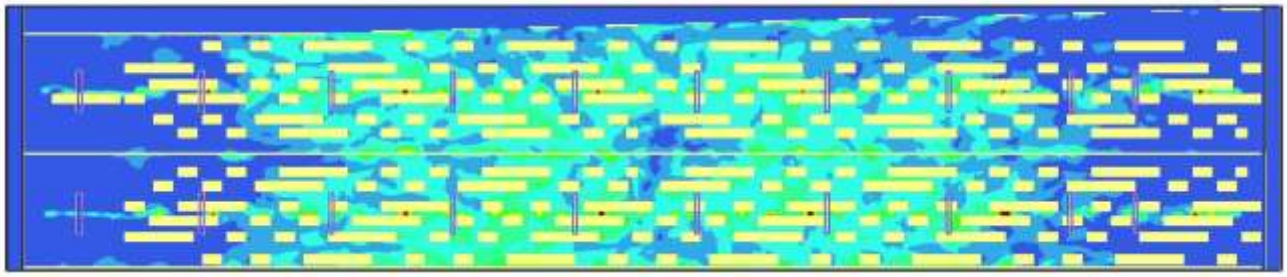

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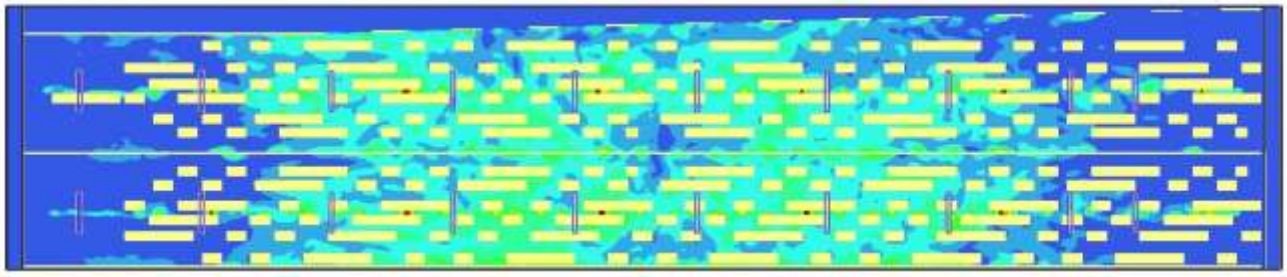

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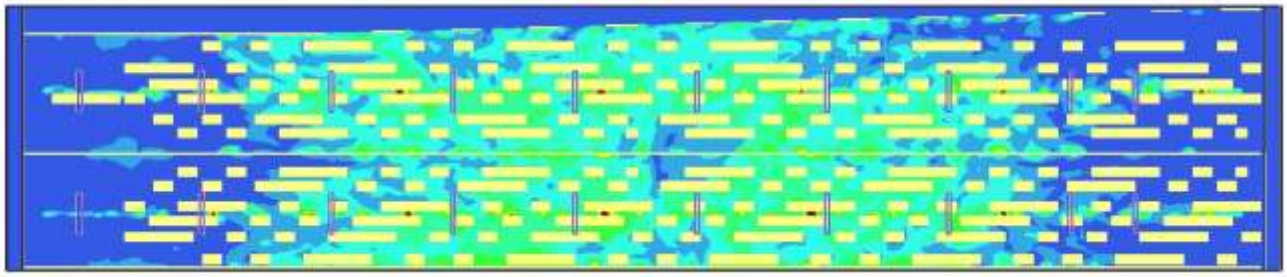

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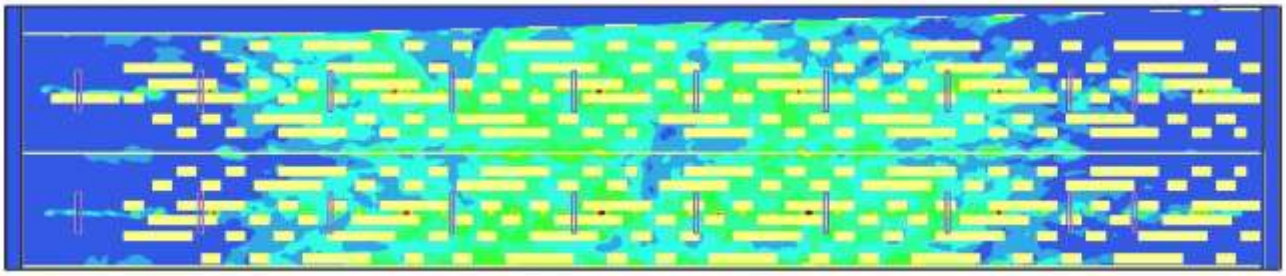

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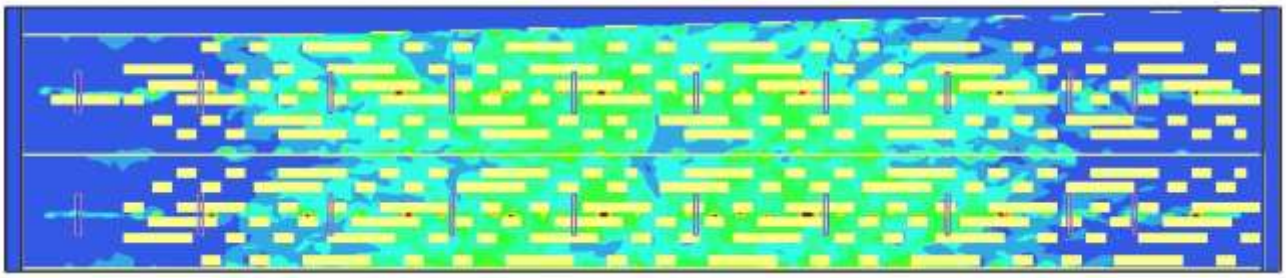

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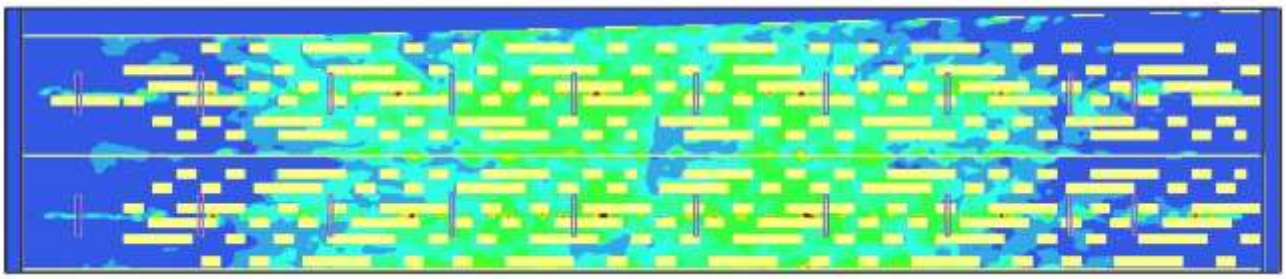

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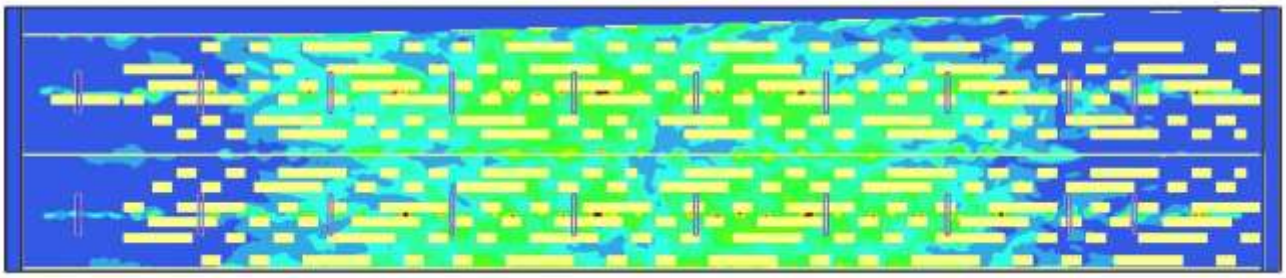

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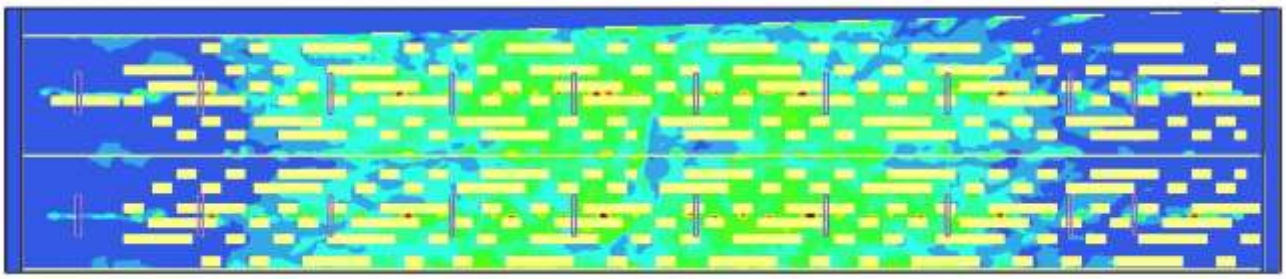

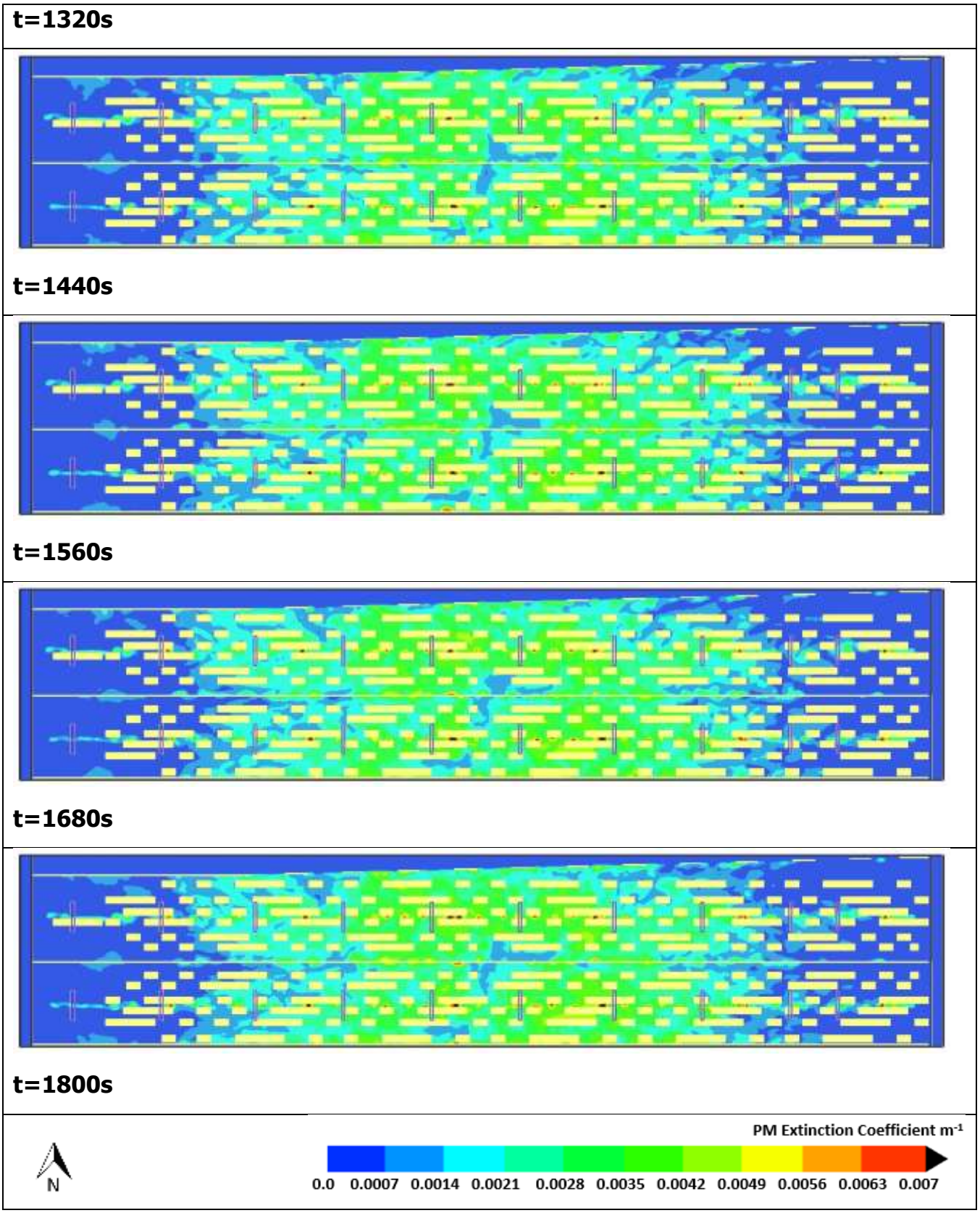

Figure B-4. PM Extinction Coefficient on a plane 8.2 ft above Tunnel floor (350 kcfm exhaust after 120s from start of fire)

Appendix C - Calculation Time for Egress

In Appendix C, the approximate time for egress during a fire emergency is calculated. The fire is located at the west portal.

Based on NFPA 130, the walking speed of passengers is assumed to be 2.2 ft/s. NFPA 130 is used as no guidance on walking speed is given in NFPA 502. As a comparison, based on Table 4.2.2 (Fire Protection Handbook, NFPA, 2008), the average walking speed of adult with walking disability is 2.58 ft/s.

It is assumed that there are 3 exit crosspassage doors in the tunnel. Two exit doors are assumed to be located at each portal and the other exit is assumed to be located at the center. However, the crosspassage door at the west portal is unavailable due to proximity to the fire. Also, the cross passage at the east portal is assumed not to be in use since the passengers instead choose to use the east portal to exit. Hence, only the center crosspassage door is used in this egress calculation.

Since the tunnel is 1000 ft in length, the distance to the nearest exit is 500 ft or less for any passenger.

The maximum travel time to the nearest exit (either the portal or the cross passage door) using a walking speed of 2.2 ft/s is $\frac{500\ ft}{2.2\ ft/s} = 3.8\ min$

Assuming there are 2 passengers per vehicle in the tunnel, there would be a total of 444 passengers in total in the 6 lanes of the tunnel. It is assumed that 150 passengers exit through the portal and the remaining 294 passengers exit using the center cross passage door.

It takes 3.8 min for the farthest person picking the exit to reach the exit (either the east portal or the door). There is no queuing for the passengers choosing to exit using the east portal, so all the 150 passengers that choose to exit through the east portal exit within 3.8 minutes.

But, the exit capacity of the center crosspassage exit door is limited by the width of the door. Based on Equation 4, 4-60 of the Fire Protection Handbook, NFPA, 2008, the maximum specific flow through the door can be calculated. For a 36” door, the effective width of the door is 24” or 2’ and the maximum specific flow is 24 persons/min/ft or 48 persons/min.

The number of people that exit the crosspassage door during 3.8 min is $48\frac{persons}{min} * 3.8\ min = 182.4$ persons=> 182 persons.

Considering the limited width of the door that would result in queuing at the door, the additional time to exit the door is calculated based on the maximum specific flow calculated earlier.

The additional time taken for the remaining 112 persons (294 persons-182 persons) due to queuing to exit through the crosspassage door is $\frac{112\ persons}{48\ persons/min} = 2.3\ min$

Hence, total time for evacuation = 3.8 min+ 2.3 min = 6.1 min

Hence based on egress through 1 crosspassage door and the east portal, a total of 6.1 minutes is needed to evacuate the passengers from the tunnel during a fire emergency at the west portal.

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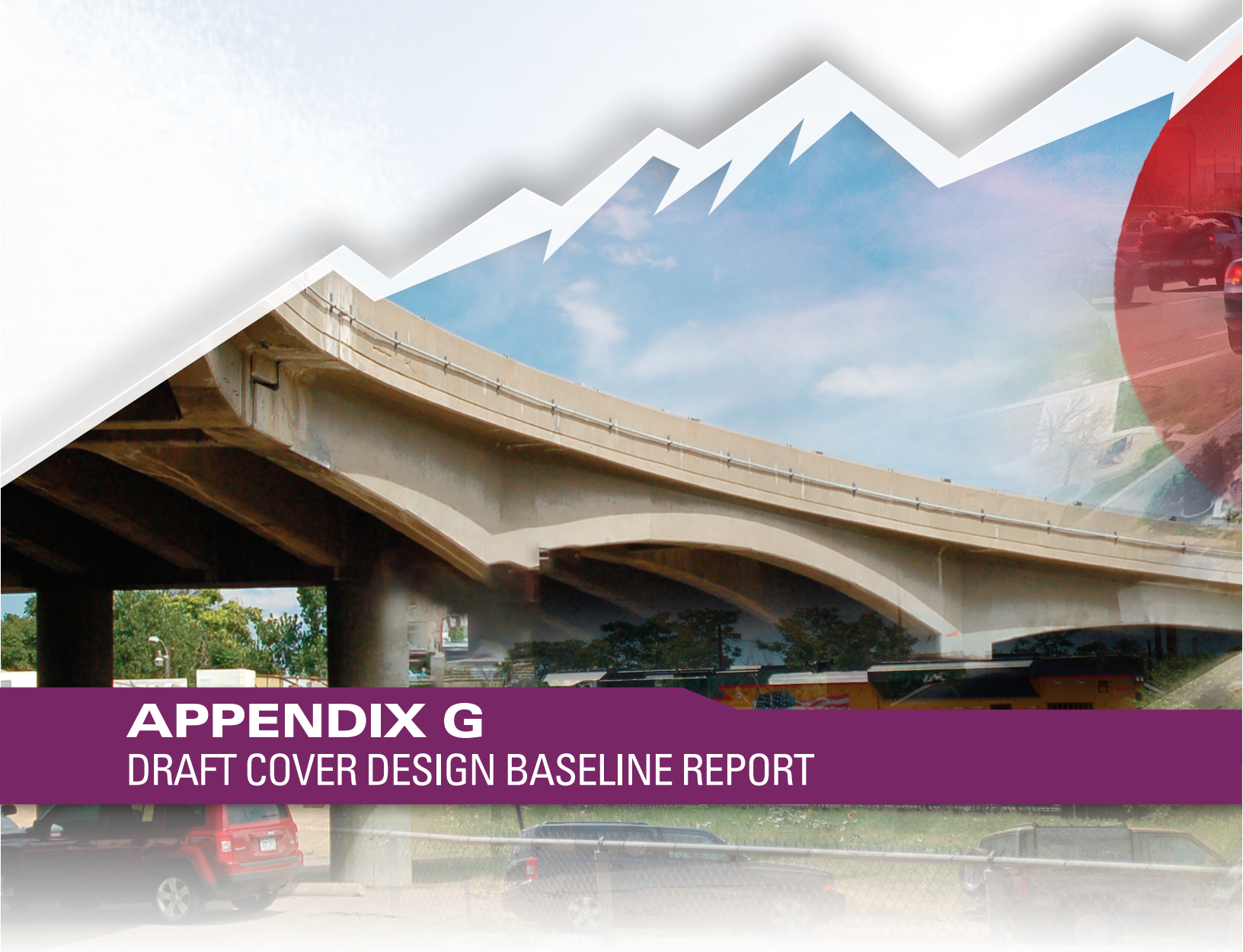


APPENDIX G
DRAFT COVER DESIGN BASELINE REPORT

VOLUME 2 – TECHNICAL SUBMISSIONS
Binder 12 of 18

CENTRAL 70 PROJECT

PUBLIC DISCLOSURE
Administrative and Technical Proposal:

Front Range Mobility Group

THE EXTRA MILE

APPENDIX H
DRAFT OPERATIONS MANAGEMENT PLAN

CONNECTING COMMUNITIES

Draft

Operations Management Plan

For

Central 70 Project

Prepared By:
Front Range Mobility Group

Table of Contents

Draft Operations Management Plan Appendices

Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
AVL	Automatic Vehicle Locator
Cat	Category
CCMS	Command Control and Monitoring System
CCP	Crisis Communication Plan
CDL	Commercial Driver's License
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
CPR	Cardiopulmonary Resuscitation
CTMC	Colorado Transportation Management Center
Department	Colorado Department of Transportation
DLA	Defense Logistics Agency
DOT	Department of Transportation
ECMTP	Environmental Compliance and Mitigation Training Program
EIS	Environmental Impact Statement
EOC	Emergency Operations Command
ETC	Electronic Toll Collection
FHWA	Federal Highway Administration
FRMG	Front Range Mobility Group
HASP	Health and Safety Plan
HazMat	Hazardous Material
HAZWOPER	Hazardous Waste Operations Training
HPTE	High Performance Transportation Enterprise
ICS	Incident Command System
ICS	Incident Command System
IMP	Incident Management Plan
IQC	Independent Quality Control
ITS	Information Technology System
MEP	Mechanical, Electrical and Plumbing

MMIS	Maintenance Management Information System
MMP	Maintenance Management Plan
MOCP	Maintenance and Operations Communications Plan
MOMS	Maintenance Online Management System
MOT	Maintenance of Traffic
MUTCD	Manual on Uniform Traffic Control Devices
NBIS	National Bridge Inspection Standards
NIMS	National Incident Management System
NRP	National Response Plan
NTIS	National Technical Information Service
NTP	Notice to Proceed
O&M	Operations and Maintenance
OJT	On the Job Training
OMQMP	O&M Quality Management Plan
OMP	Operations Management Plan
OSHA	Occupational Safety & Health Administration
PA	Project Agreement
PCM	Project Communications Manager
PI	Public Information
PI	Public Information
PNS	Pacific Northwest Snow
Project	Central 70 Environmental Impact Statement Project
ROR	Run-off-road
SAP	Sampling and Analysis Plan
SCADA	Supervisory Control and Data Acquisition
SHRP2	Strategic Highway Research Program 2
TIMS	Traffic Incident Management Responder Training Course
TMC	Traffic Management Center
U.S.	United States
USEPA	United States Environmental Protection Agency

Front Range Mobility Group	Central 70 Project Draft Operations Management Plan	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Introduction

Front Range Mobility Group's (FRMG) overarching objective is to ensure safe conditions during the Project and to protect the infrastructure investment of the Department. To that end, FRMG has developed an Operations Management Plan (OMP) that is consistent with the foregoing objective and that is designed to meet or exceed the operational obligations under Schedule 11 of the Project Agreement (PA).

In establishing the OMP, we first considered the Colorado Department of Transportation's (CDOT's) Central 70 Environmental Impact Statement (EIS) Project (Project) performance criteria, which analyzes each unique highway characteristic for operational efficiency during the design phase and considers the specific assets of all features, with the end goal of providing the traveling public with a safe, smooth and aesthetically pleasing roadway.

In order to facilitate the evaluation of our proposal, FRMG has structured this Draft OMP to follow the required contents listed under Section 9.2.1 and 9.2.2 of Schedule 11 in the Project Agreement. We anticipate that the final OMP for issuance prior to Notice to Proceed 2 (NTP2) will expand upon and be consistent with the content of this Draft OMP, however it will likely reflect an organizational structure that is consistent with typical industry practices and that efficiently consolidates activities within operations, safety, and quality categorically. FRMG will work closely with the Department to ensure Approval of our final OMP.

We will submit our final OMP for Acceptance prior to the issuance of NTP2 and will submit an updated version to the Department for Acceptance prior to substantial completion. In addition, we will update and submit the OMP for Acceptance annually and no later than 60 calendar days before the end of each contract year. We will update the OMP more frequently as required during the Construction or Operating Periods to reflect changes to relevant protocols, agreements, and other interactions with other entities and to indicate requirements for equipment and systems that have been revised, upgraded, or replaced. We will comply with the latest Accepted OMP at all times.

a. Facilities, Systems, and Equipment Operated by Developer

Table 1 provides an overview of the facilities, systems, and equipment that will be operated by FRMG in order to complete the Project on time, safely, and in a quality manner that meets the goals of the Department and the needs of the Community.

Table 1. Facilities, Systems, and Equipment.

Facilities/ Systems/ Equipment	Overview
Roadway Facilities General	In accordance with the Developer's O&M Limits During Construction drawings for the Construction Period reflecting FRMG's design as submitted prior to the issuance of NTP2 and subject to Approval by the Department. After construction, in accordance with the Developer's O&M Limits After Construction drawings Accepted by the Department reflecting the as-built condition for the Operating Period. Such drawings will reference the site, comply with all Schedule 11 requirements and reference the O&M Limits Reference Drawings 29.11.01 for both the Construction and the Operating Period.
Roadway Facilities I-70 Mainline Travel Lanes, Managed Lanes, and Ramps	From the I-25 interchange to Tower Road, Travel lanes, Ramps including most bridges and associated right-of-way for the I-70 Mainline. O&M Work is applicable to both the Construction and the Operating Period as indicated in Drawings 29.11.01.
Roadway Facilities Identified as Local Agency Infrastructure and CDOT Roadways	Local and CDOT roadway facilities adjacent to the site as indicated in O&M Limits Reference Drawings 29.11.01 and maintained by the Developer during the Construction Period and Operating Period whenever required under street occupancy permits for maintenance and rehabilitation work performed during the Operating Period.
Roadway Facilities Certain Additional Bridge Structures	Various structures requiring less than total maintenance and rehabilitation by the Developer as defined in Schedule 11, Appendix D and in the Intergovernmental Maintenance Agreement for the maintenance services of Central Park Boulevard Bridge, dated August 28, 2009 both during the Construction and Operating Periods.
Maintenance Facility Office, Yard and Storage Facility	During the Construction Period, the Maintenance Yard provided by the Department will be utilized. As further detailed in the Maintenance Management Plan (MMP), After Financial Close, contingent upon the availability of the Maintenance Yard, FRMG will acquire or rent an industrial yard space near the highway from which to stage our operations. The location will be selected to ensure all response time performance requirements can be met and in general to allow for minimal response times to the site. It is anticipated that the Maintenance Facility will provide: • Office space for up to five management and administrative personnel • Large training room • Common areas and restrooms • Approximately 2,000 square feet to 3,000 square feet of warehouse space with high ceilings, dual access bays, concrete floors, and proper lighting • Approximately 4,000 square feet to 8,000 square feet of lay down yard with high chain link fence and access for vehicles • Area for vehicle wash bays and runoff retention • Garage and shop area for mechanical support; with vehicle storage • Additional yard space for winter maintenance material storage and equipment (spreaders/plows), and for staging of winter operations • Additional chemical storage and winter equipment staging areas may be housed both at the main office/facility and at a sub-yard site for multiple points of access, logistics and a built-in redundancy

Facilities/ Systems/ Equipment	Overview
Drainage Systems	O&M Work will be performed by FRMG on both the On-site and Off-site Outfall Systems, the FRMG constructed groundwater treatment facility, FRMG dewatering systems (during Construction Period only), and FRMG will comply with all Permits identified in Section 8.33 of Schedule 10 and the conditions of the most recent version of the Departments MS4 Permit.
Lighting Systems	During the Construction Period and the Operating Period, Lighting Systems associated with the Cover will be the responsibility of FRMG. Other systems associated with the roadway segments will be monitored by FRMG for outages that will be reported to and the responsibility of Xcel Energy. During the Construction Period, FRMG will maintain lighting in relation to Local Agency roadways where work is being performed in accordance with street occupancy permits.
Signal Systems	During the Operating Period, Signal Systems associated with the Cover will be the responsibility of FRMG. Other signal systems associated with the roadway segments will be monitored by FRMG for outages that will be reported to and the responsibility of local agencies. During Construction FRMG will maintain signals in relation to Local Agency roadways where work is being performed in accordance with street occupancy permits.
ITS Systems	During the Construction Period, FRMG will ensure that all existing Information Technology System (ITS) facilities (including all items in Appendix B to Section 3 of Schedule 10) are maintained and operational. Any impact to the operation of these facilities will be rectified by FRMG. The Department will continue to operate the existing facilities during this time. During the first 2 years following Final Acceptance, FRMG will continue to maintain the ITS system in accordance with Appendix B to Section 3 of Schedule 10 Design and Construction Requirements and thereafter will maintain the ITS Infrastructure elements as detailed in the same Appendix.
ETC Systems	FRMG will inspect all Electronic Toll Collection (ETC) facilities (including all items in Appendix B to Section 3 of Schedule 10) and report any issues or required repairs to the ETC System Integrator and Colorado Transportation Management Center (CTMC) and keep a log of such reports as well as maintain ETC infrastructure in as detailed in the same document.
Tunnel Life Safety and Ventilation Systems	FRMG will be responsible for the operation, maintenance, and monitoring of the Command Control and Monitoring System (CCMS) as described in Section 12 Cover MEP System of Schedule 10 and immediate approaches. FRMG will provide a trained and dedicated staff with 24/7 presence co-located at the CTMC to operate the CCMS. Developer's 24/7 operation of the CCMS will not assume reliance or assistance from Department personnel at the CTMC to carry out the Developer's responsibility at any time.
Cover Top	As Cover Top facilities will be maintained by others, FRMG will develop a manual (the "Cover Top O&M Manual") that outlines the following: (1) Pertinent Cover design and construction information (2) Recommended operations and maintenance requirements, procedures and protocols (3) Recommended procedures and protocols for coordination between the Cover Maintainer and Developer, in all cases, relevant to the performance of the Cover Top O&M Work by the Cover Maintainer
Maintenance Management Information System	The Maintenance Management Information System further detailed in the MMP will be used to plan, monitor, track, and record maintenance activities and inspections performed. It accounts for all resources used to perform maintenance work, generates plan information for each activity, and provides key performance and compliance indicators.

Facilities/ Systems/ Equipment	Overview
Infrastructure Equipment	Various elements of equipment associated with the I-70 corridor will be maintained by FRMG including: • Ventilation systems including fans, ductwork, control dampers and associated mechanical elements necessary to maintain air quality in the Cover during normal operations and Emergency (fire) conditions using air quality monitoring systems • Fire control pumps, standpipes, fire suppression equipment, and distribution systems, within the Cover • Pumps associated with drainage and water control systems
FRMG Equipment	FRMG's vehicles and equipment that are anticipated for use in order to perform all required O&M Work will consist of owned, leased, subcontracted and rental equipment that will include: • Snow and Ice equipment as described in Appendix A • Incident Response equipment as described in Appendix B • Courtesy Patrol equipment as described in Appendix C • General purpose and specialty trucks for maintenance crews • Truck mounted impact attenuators • Aerial lift equipment • Hoist equipment • Various specialty equipment used for rehabilitation and/or other infrequent use

b. Organizational Structure to Ensure 24-Hour Response

The organizational charts depicted in **Section d. (*Staffing*)** indicate the personnel required to provide the O&M Work while also providing critical staffing and resources to ensure 24-hour response to Incidents and Emergencies per the Schedule 11 Requirements. FRMG will provide the management, supervision, professional and technical services, quality control, labor, materials, equipment, and training necessary to accomplish this.

During the Operating Period, the Health & Safety/Operations Superintendent will oversee the FRMG courtesy patrol (Courtesy Patrol) drivers (or company, if subcontracted) as well as the dispatch staff. All staff including maintenance technicians, Courtesy Patrol and winter maintenance operators will participate in an on-call program whereby additional off-hour resources are available for any major Incidents and/or Emergency repairs 24-hours a day, seven days a week.

If needed, this approach will be further supplemented with outsourced support for initial response requirements, and we will engage local traffic control companies located along the corridor as needed to support prolonged or major Incident traffic control (FRMG has already identified multiple firms adjacent to the Project corridor). FRMG will maintain an active and routinely updated list of potential firms for outsourcing support in order to ensure availability, the list will include current contact information and capacity.

Training as indicated in **Table 3 of Section d. (*Staffing*)** will ensure that all staff are adequately prepared for Emergency work on an open, high-speed facility, thereby allowing a wide distribution within the organization of on-call obligations.

During the Construction Period, the same strategies will be employed with a similar staffing organization as indicated in **Figure 2 of Section d. (*Staffing*).** Coordinated, synchronized, and efficient Incident response is always a critical need in construction zones, and this need is amplified on the I-70 corridor due to the high-volume traffic conditions and the complexity of traffic management required for construction of the Project, including the demolition of the viaduct.

For this reason, during the Construction Period Incident response will be performed by the Lead Contractor under the oversight of the Design-Build Manager, with support and oversight by the Developer and the O&M Manager. The O&M Superintendent will perform the roles relative to Incident response during the Construction Period as are attributed above to the Health & Safety/Operations Superintendent during the Operating Period. Procedures or response and call-out during construction will be as described for the Operating Period, with the significant advantage of large numbers of trained staff and a wide array of heavy equipment readily available on the corridor.

To facilitate timely response, FMRG will equip its trucks with traffic control equipment and arrow boards for quick delineation of an accident scene. Supervisors will be called to the scene to decide if additional equipment and response personnel are needed. In the event of an Incident, responses to all requests are given a priority, whether the Incident is a vehicle accident, hazardous materials spill, or natural disaster. FRMG will perform the necessary steps to respond quickly in order to expeditiously return the roadway back to normal traffic flows.

c. Monitoring Safety and Operational Performance

During both the Construction and the Operating Periods, procedures for each activity will include performance standards with threshold conditions and resources required for safe performance of each activity in accordance with Schedule 11, Section 4.1 Categorization of O&M Defects and 4.2 Performance and Measurement Mechanism. FRMG will review job hazard analysis and integrate them into weekly 'toolbox meetings' designed as a function of FRMG's O&M Quality Management Plan and O&M Safety Plan to facilitate monitoring of both safety and operational performance. Each activity will be planned and monitored with the use of a procedure that includes performance thresholds, anticipated work-loads, crew size and anticipated hours to complete, activity description and work methods.

Safety

FRMG will make full use of accident data collected by the Department and local enforcement agencies to monitor operational performance related to site-specific traffic safety. We will seek to identify patterns, paying particular attention to run-off-road (ROR) or barrier impact accidents, as these have the greatest likelihood of fatalities on high-speed facilities. We will review all accident locations resulting in fatalities and will use this review to identify optimal resources for implementing operational improvements, such as quick impact adjustments to signage or pavement markings. Further detail on this analysis is included in **Section m. (*Vehicular Accident Patterns*).**

FRMG will periodically monitor traffic safety on the facility via routine traffic operations reviews, which are routine drive-through inspections conducted by management with particular attention payed to identifying safety issues and opportunities for proactive improvements. Additionally,

Courtesy Patrols as well as maintenance management and staff will be trained to observe and report issues on an ongoing and constant basis.

FRMG values the safety and health of the public, the Department, and all FRMG employees above all other concerns. Our Project culture will exemplify leadership in assuring the safety of our employees and operations. FRMG's O&M Safety Plan, which is attached as **Appendix C (*O&M Safety Plan*)** to **Appendix I (*Draft Maintenance Management Plan*)** emphasizes the following elements:

1) Statement of Safety Policy
2) Occupational Safety & Health Administration (OSHA) and other requirements, Customer and Public Safety
3) Employee Safety Conduct, General Safety Rules
4) Hazard Communication Program/ Globally Harmonized System
5) Fire Safety
6) Personal Protective Equipment (PPE)
7) Fall Protection Program
8) Confined Space Awareness –Permit Entry
9) Ladders, Staging and Scaffold Safety
10) Aerial Lift Safety
11) Heavy Machinery Safety Practices – Excavators, Back Hoes, etc.
12) Safe Use of Fork Lift, Lull, Bob Cat, Powered Industrial Trucks (PITs)
13) Lock Out Tag Out & Machine and Process Guarding
14) Manual and Power Tool Safety
15) Trade Specific Safety and Health Practices
16) Trenching and Excavation
17) Ergonomics and Back Injury Prevention
18) Fleet Safety Program - Defensive Driving – Project Vehicle Policy
19) Highway Work Zone Safety Awareness
20) Defensive driving, positioning, and parking on Interstate Highways
21) Advanced safety practices for boots on the ground in Highway work zones
22) Types and techniques of upstream warning for highway work zone crash prevention

In order to have an effective safety program and reduce accidents and occupational illnesses, every employee must be responsible for safety. All managers and supervisors take an active role in safety both through training and ongoing monitoring of operations. This program will consist of safety committees made up of top management, safety meetings, audits and Incident investigations throughout all levels of the organization.

Crew foremen ensure that all necessary safety equipment is used, that all necessary traffic control equipment is available, and that the tools are right for the job and in safe condition. Crew Foremen will be responsible for documenting the above information daily in a Toolbox Meeting/Crew Report. Toolbox Meetings are informal safety meetings, which are generally conducted at the job site prior to the commencement of a job or work shift. During this meeting supervisors draw attention to hazards, processes, equipment, tools, environment and materials to inform all workers of the risks in their surroundings. Toolbox Meetings will be recorded on the daily Toolbox Meeting/Crew Report and forwarded to the Health & Safety/Operations Superintendent for review and approval.

Safety Reviews

Safety reviews are an important key to improved safety and operational performance. These reviews identify unsafe acts and practices before an injury takes place as well as point out best practices. Safety reviews, both announced and unannounced, will be performed by the Health & Safety/Operations Superintendent and Maintenance Superintendent as well as the O&M Manager. These reviews will take place monthly, at a minimum on a monthly basis. FRMG safety reviews will help:

- Maintain standards by ensuring that employees follow rules and procedures
- Identify where rules or procedures are insufficient
- Measure the effect of safety education
- Reveal weaknesses in the safety program
- Motivate employees by showing the results of their safety efforts
- Increase safety awareness

Results of reviews which have identified non-conformances will be corrected and a root cause analysis completed. A follow-up audit to confirm the correction has resulted in the desired affect will be completed within one month of the correction being implemented.

Investigations

A workplace incident is an event that could have, or did, result in personal injury or damage to FRMG or private property. Investigations of these incidents are important for the prevention of future accidents and for tracking the quality of our safety program. Investigations will be completed by the Health & Safety/Operations Superintendent. Incident investigations will not be a fault-finding process but rather a means of monitoring and implementing lessons learned. Once an Incident has occurred, these investigations are important tools to prevent a similar incident from happening again. Incident investigations will begin with the individual involved in the workplace incident completing a workplace incident form. The form will describe the details of the Incident, the first stage of which is a summary of the facts around what happened to lead to the incident. The second component of the form is to be filled out by the Health & Safety/Operations Superintendent and details his or her analysis of the root cause of incident and any preventative measures to be implemented to ensure the Incident does not take place again. These preventative measures could include additional training, purchase of different or additional safety gear and/or modifications to equipment or procedures.

Inspections

Inspection of Cover Systems

Cover structure, MEP and life safety systems components each have a specified inspection criteria and frequency based on statutory fire regulations, the Project Agreement, Federal Highway Administration (FHWA), American Association of State Highway and Transportation Officials (AASHTO), National Technical Information Service (NTIS), National Bridge Inspection Standards (NBIS), and applicable electrical requirements, all of which will be strictly adhered to.

Inspection of Safety Critical Roadway Assets

During the inspection of safety critical roadway assets, safety assurance will take precedence over all other concerns on the Project. We will plan our work to prevent or control hazardous conditions and exposures. We will provide a safe place of employment, free from recognized hazards. We will comply with OSHA, the Department and other safety regulations applicable to our work. FRMG's approach to inspection and monitoring of traffic services-related assets for the purpose of safety and operations performance is summarized in **Table 2**.

Table 2. Inspection Frequency Schedule.

Task	Responsibility	Frequency
Debris and Road Kill	Maintenance Patrols and Control Room Operators	Continuous observation by Courtesy Patrol, Dispatchers/CCMS Operators, with ongoing review by Management and Maintenance Staff.
Illegal Signs/Structures	Health & Safety/Operations Superintendent, Courtesy Patrols, and Control Room Operators	Continuous observation by Courtesy Patrol, Dispatchers/CCMS Operators, with ongoing review by Management, and Maintenance Staff
Unsafe Pavements (Asphalt or Concrete)	Health & Safety/Operations Superintendent, Courtesy Patrols, and Control Room Operators	Continuous observation by Courtesy Patrol, Dispatchers/CCMS Operators, with ongoing review by Management and Maintenance Staff along with automated testing
Concrete Barriers	Maintenance Patrols and Control Room Operators	Continuous observation by Courtesy Patrol, Dispatchers/CCMS Operators, with ongoing review by Management and Maintenance Staff. Annual corridor review
Signs (Static)-Post Mounted	Maintenance Patrols and Control Room Operators	Continuous observation by Courtesy Patrol, Dispatchers/CCMS Operators, with ongoing review by Management and Maintenance Staff. Bi-annual corridor review
Guardrails	Maintenance Patrols and Control Room Operators	Continuous observation by Courtesy Patrol, Dispatchers/CCMS Operators, with ongoing review by Management, and Maintenance Staff. Annual corridor review
Impact Attenuators	Maintenance Patrols and Control Room Operators	Continuous observation by Courtesy Patrol, Dispatchers/CCMS Operators, with ongoing review by Management and Maintenance Staff. Annual corridor review

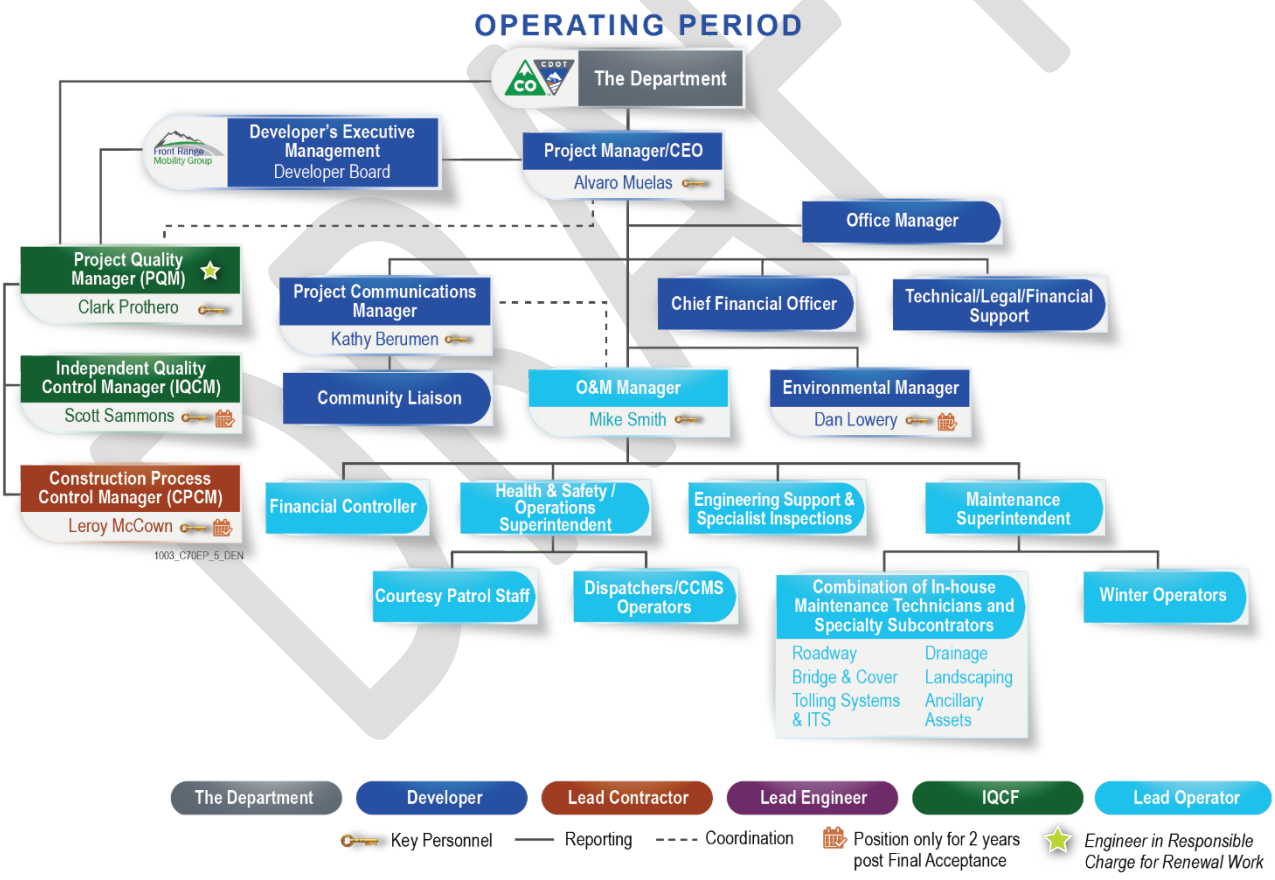
During the Construction Period, safe roadway operations will by necessity be integrated into the larger overarching Transportation Management and Safety Plans for construction. At no time will maintenance and construction lane Closures be allowed to conflict. During the Construction Period, the Lead Contractor will integrate operations and maintenance lane Closures with construction lane Closures to minimize impacts to traffic and unnecessary additional traffic interfaces.

d. Staffing

Figure 1 illustrates FRMG's organizational chart during the Operating Period and details the Lead Operator personnel required to provide critical staffing and resources needed for effective operations. FRMG will provide management, supervision, professional and technical services, quality control, labor, materials, equipment and all necessary training.

The Health & Safety/Operations Superintendent will oversee the Courtesy Patrol Operators (or company if subcontracted) as well as the Traffic Management Center (TMC) staff. All staff, maintenance technicians, Courtesy Patrol Operators, and winter maintenance operators will participate in an on-call program whereby additional off-hours resources are available for any major Incidents and Emergency repairs 24 hours a day seven days a week. Training as indicated in **Table 3** will ensure that all such staff have adequate preparation for the performance of Emergency work on an open, high-speed facility.

Figure 1. Operating Period Organizational Chart



* *During the Operating Period the role of Monitoring Technician will be performed by the Maintenance Superintendent. The role of Civil Rights Program Manager will be performed by the O&M Manager.*

During the Construction Period, FRMG will employ the same strategies through a similar staffing organization as shown in **Figure 2**. As noted above, there is a critical need for a coordinated and synchronized application of roadway operations and Incident response in construction zones and this need is amplified on the I-70 corridor due to the high volume traffic conditions and the complexity of traffic management required for construction of the Project and demolition of the viaduct. For this reason, during the Construction Period, O&M Work During Construction will be performed by the Lead Contractor under the oversight of the Design-Build Manager with support and oversight by the Developer and the O&M Manager.

The O&M Superintendent will perform the roles relative to Incident response as are attributed above to the Health & Safety/Operations Superintendent during the Operating Period. Procedures or response and call-out during construction will be as described for the Operating Period, with the significant advantage of large numbers of trained staff and a wide array of heavy equipment readily available on the corridor. **Figure 2** details the staff responsible for Operations during the Construction Period.

Figure 2. Construction Period Organizational Chart

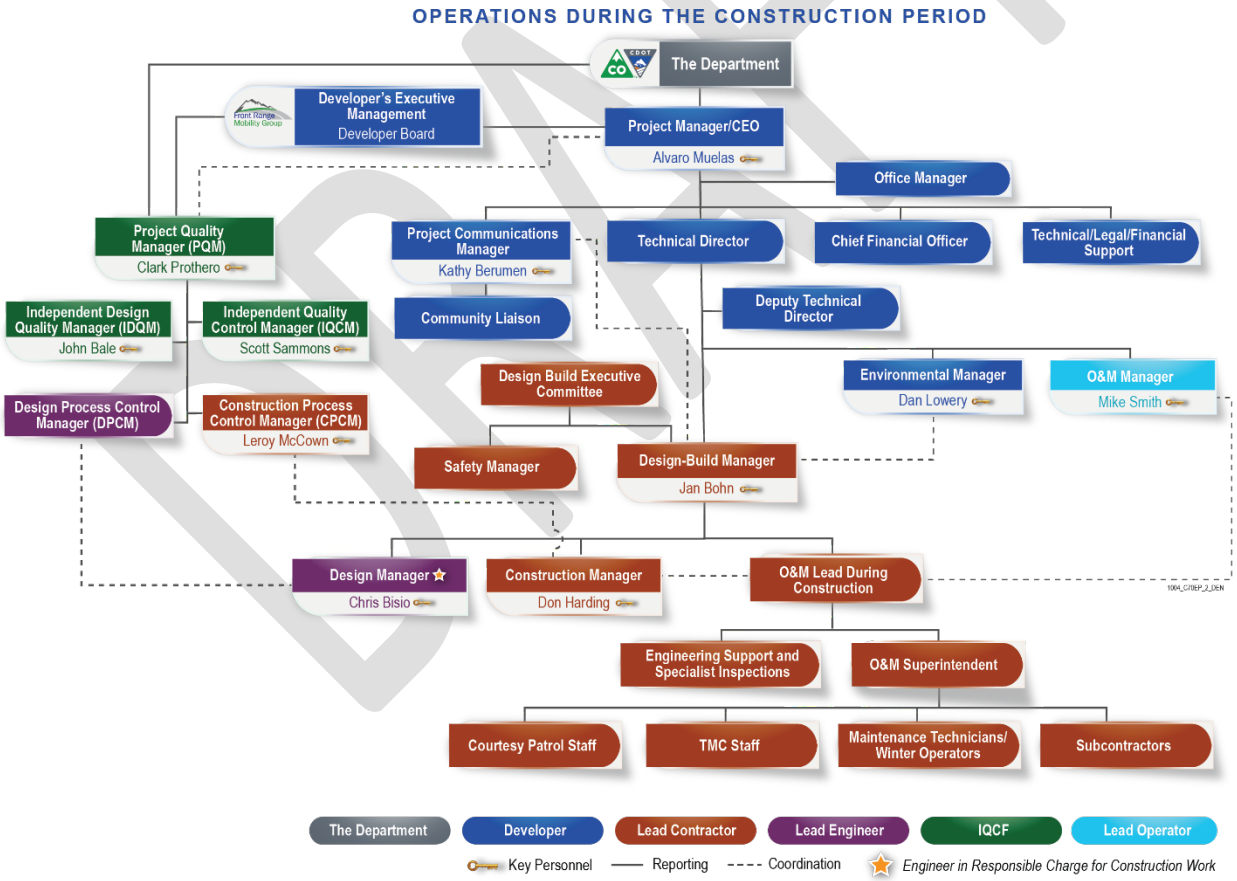


Table 3 provides a summary of FRMG's Operations Management personnel qualifications and their required training. The Key Personnel listed in this table are indicated with a "(**KP**)". If not already complete, all required training will occur during mobilization of the Lead Operator, with key technical, supervisor and management team members (as indicated in Table 3) attending training conducted by FRMG. All personnel will be provided with training materials that can be easily updated, when/if any revisions occur. During the Operating Period, FRMG will conduct periodic refresher training seminars.

All subcontractor employees and consultants engaged by FRMG will be required to adhere to the same safety and operational requirements.

Table 3. Operations Management and Support Personnel Qualifications and Training

Title	Qualifications	Required Training
Project Manager Alvaro Muelas (KP)	Demonstrated experience and expertise on a similar role in the delivery of projects similar in scope, value, nature, and complexity to the Project (per Key Personnel Schedule 27)	In addition to training and qualifications outlined in the Project Management Plan and resume, relative to his role as a member of the Operations team, training will include: • Incident response: National Incident Management System (NIMS) Incident Command System (ICS)-100 Introduction to ICS NIMS IS-700 National Incident Management System Intro • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
Design-Build Manager Jan Bohn (KP) *(During the Construction Period)*	A minimum of 20 years of experience including a minimum of 15 years' design-build experience in construction and management of design and construction on highway projects similar in scope, value, nature, and complexity to the Project. (per Key Personnel Schedule 27)	In addition to training and qualifications outlined in the Project Management Plan and resume, relative to his role as a member of the Operations team during the Construction Period, training will include: • Incident Response: NIMS ICS-100 Introduction to Incident Command System; NIMS IS-700 National Incident Management System Intro; • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
O&M Manager Michael Smith (KP) *(During the Operating Period)* *dual role as Civil Rights Program Manager during the Operating Period	Demonstrated experience and expertise in a similar role on managing the operations, maintenance and rehabilitation work on highway projects of similar scope, value, nature, and to the Project complexity (per Key Personnel Schedule 27).	In addition to training and qualifications outlined in the Project Management Plan and resume, relative to his role as a member of the Operations team, training will include: • Incident Response: NIMS ICS-100 Introduction to Incident Command System; NIMS IS-700 National Incident Management System Intro; • In-house orientation training in operational procedures and highway safety; • FRMG's Incident Management Plan; • OSHA 10 course; and • Basic First Aid and Cardiopulmonary Resuscitation (CPR)

Title	Qualifications	Required Training
Environmental Manager (KP) **Dan Lowery**	A minimum of seven years of progressive experience working on projects of similar scope, value, nature, and complexity to the Project. The Environmental Manager will also demonstrate the ability to work effectively with both design and construction staff. (per Key Personnel Schedule 27)	In addition to training and qualifications outlined in the Project Management Plan and resume, relative to his role as a member of the Operations team training will include: • Erosion and Sediment Control CDOT Certification; • Best Management Practices Selection and Design; • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
Health & Safety/ Operations Superintendent	Demonstrated experience and expertise in Highway operations	In addition to training and qualifications outlined in the Project Management Plan, relative to his role as a member of the Operations team, training will include: • Incident Response: NIMS ICS-100 Introduction to Incident Command System; IS-700 National Incident Management System Intro; • Traffic Control: Traffic Control Technician and Supervisor Course; • Erosion and Sediment Control CDOT Certification; • Safety: OSHA 10/30; Basic First Aid and CPR; OSHA 40-hour Hazardous Waste Operations (HAZWOPER) Training, • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
Maintenance Superintendent (dual role as Monitoring Technician during the Operating Period)	Demonstrated experience and expertise in Highway maintenance and Monitoring Technician training	In addition to training and qualifications outlined in the Project Management Plan, relative to his role as a member of the Operations team, training will include: • Incident Response: NIMS ICS-100 Introduction to Incident Command System; IS-700 National Incident Management System Intro; • Traffic Control: Traffic Control Technician & Supervisor Course; Erosion and Sediment Control CDOT Certification; • Safety: OSHA 10/30; Basic First Aid and CPR; OSHA 8 hour supervisory, 40-hour HAZWOPER. • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
Courtesy Patrol Operators	Successful criminal and driving record background check. Training consistent with Mile High Courtesy Patrol Program. Meets all requirements for operations of tow vehicles. Must be 18 years of age and have at least 1 year towing experience.	• In-house orientation training in operational procedures and highway safety. • OSHA 10 Course: Traffic Control Technician. Towing/Recovery specific safety and operational training. • In house training in correct identification and categorization of defects.

Title	Qualifications	Required Training
Winter Maintenance Operators	Class A Commercial Driver's License (CDL), successful criminal and driving record background check	• In-house orientation training in operational procedures and highway safety. • Annual Training: Plowing/Spreading and snow and ice control Plan
Maintenance Technicians	Successful criminal and driving record background check	• In-house orientation training in operational procedures and highway safety. • NIMS ICS-100 Introduction to Incident Command System; • OSHA 10 Course; OSHA 8-hour HAZWOPER. Traffic Control Technician • In-house training in correct identification and categorization of defects. • Vendor training as appropriate in proprietary systems.
Traffic Management Center Staff	Demonstrated ability to follow operational protocols, manage and control equipment and record data	• In-house orientation training in Operational Procedures and Project Specific Incident Management Plan. • NIMS ICS-100 Introduction to Incident Command System; • G-775 Emergency Operations Center Management & Operations; • Annual training in Tunnel Control Room Operations

** This table shows positions after Substantial Completion. Positions before Substantial Completion will differ in that full-time employees may be engaged in both O&M Work During Construction and Construction Work, with staffing levels sufficient to ensure compliance with performance requirements. The Maintenance Superintendent and the Health & Safety/Operations Superintendent will be combined to a single position during the Construction Period.*

As full O&M staffing for the Operating Period begins, an emphasis on utilization of existing construction staff or existing construction O&M staff (as included in the transition process described in Section t of the MMP) will allow for a smoother transition to full operations. The role of Monitoring Technician will be performed by the Maintenance Superintendent. The role of Civil Rights Program Manager will be performed by the O&M Manager.

The final OMP will be updated to include a complete contact list of Operations personnel, including Emergency numbers.

FRMG is sensitive to the necessity for prompt response to certain maintenance activities that may not be conducive to subcontracting by providing quick responses to critical tasks. For this reason, FRMG is committed to staffing the Project with internal crews supplemented by local Subcontractors.

FRMG will hire staff and crews in advance of the Operating Period at intervals adequate to ensure training and acclamation to the physical layout of the corridor. Legacy staff from the Construction Period will be retained where possible to further provide a seamless transition to the Operating Period.

e. Incident Response, Management and Reporting

Incident Response Management and Reporting procedures detailed in the following paragraphs will be the same for the Construction Period and the Operating Period except that during the Construction Period:

- Functions indicated as performed by the Health & Safety/Operations Superintendent during the Operating Period will be performed by the O&M Superintendent during the Construction Period
- Additional requirements imposed on the Lead Contractor entity for management and reporting for traffic management required for the Construction Work

The foundation of the FRMG Incident response program is continual readiness through effective management and constant communication in the form of proper reporting. *Readiness* means constant availability day or night, rain or shine, as detailed in **Section b. (*Organizational Structure to ensure 24-Hour Response*).** *Effective readiness* is the result of planning and proper management.

The FRMG Incident response planning team is composed of management staff including the O&M Manager, the Health & Safety/Operations Superintendent, the Maintenance Superintendent, and other personnel trained not only in Emergency response procedures but also in Emergency and Incident response planning. Full details of management staff training and roles are provided in **Table 3 of Section d. (*Staffing*)**.

During FRMG's mobilization, stakeholder and Local Agency contacts, which are listed in detail in **Section j. (*Standard Operating and Communication Procedures*)** are established and an Incident response phone directory is published and circulated. All FRMG vehicles are equipped with a "red" Incident response phone directory and guide to ensure current contact information is available in Emergency situations.

The Health & Safety/Operations Superintendent, Maintenance Superintendent, other senior managers, or, if after hours, on-call emergency staff, will be mobilized immediately and will respond within 1 hour (to supplement the Courtesy Patrol 15 minute response time) if management assistance is required or requested. FRMG will establish a dedicated emergency contact phone number to assist in the coordination, command, and support of emergency preparedness, response, and recovery activities performed by FRMG and its partners.

Courtesy Patrol communications with dispatchers and the FRMG personnel responding to the emergency, will be instrumental in the correct mobilization of manpower and equipment resources for urgent response. This may include specialized emergency subcontract support where needed and as determined by the Health & Safety/Operations Superintendent based on their analysis of response needs.

Courtesy Patrol Operators will be equipped with a two-way radio and telephone for reporting to FRMG dispatchers, CTMC, and FRMG response staff.

Courtesy Patrol reporting procedures will be followed as detailed in **Appendix C - Courtesy Patrol Service Plan.**

In order to properly manage and report any Incident response, it is important to be as knowledgeable as possible about the nature and extent of the Incident. Most initial calls come from law enforcement personnel experienced in emergency management but occasionally from persons with no emergency management experience. First calls often provide limited and fragmented information. The caller will need to be led toward the most critical information. FRMG's dispatchers will be trained to quickly obtain the required information, accurately assess the situation, and develop an appropriate response. It is critical to assess the severity of the accident or incident and the degree of compromise to public safety, in order to provide the most appropriate response for the situation at hand.

Dependent on the severity of the Incident there will be proportional response levels which will require a range of resource deployment, management, and reporting efforts dependent on the nature and severity of the Incident. The following subsections further detail the specific considerations that will be applied depending on the type of Incident.

Minor Incidents

Minor Incidents include disabled motorists, stopped motorists, minor debris, accidents not requiring specialized Emergency response or lengthy law enforcement investigation, and accidents not requiring heavy or specialized equipment to be mobilized for recovery or repair. After assessment of the site, the operator may request additional support in clearing the scene if needed. FRMG will act in support of law enforcement or first responder representatives until such time as the scene is released to FRMG to perform any needed cleanup or repairs.

Severe Vehicle Accidents

Severe vehicle accidents may require a lane Closure for significantly greater periods of time due to severe vehicular damage or injury. The initial response is much the same as for a minor vehicle accident. After assessment of the site, the operator may request additional support in clearing the scene, for performing hazard mitigation repairs, or to perform temporary traffic control. FRMG will act in support of law enforcement or fire department representatives until such time as the scene is released to FRMG to perform cleanup or repairs. Closures will be implemented in order to mitigate Category 1 hazards to safety with permanent repairs scheduled for low traffic periods where possible. Further detail can be found in the Incident Response Plan, behind the tab titled **Appendix B - Incident Response Plan**.

Significant Damage to Infrastructure

Where significant infrastructure damage has occurred, the operator will, through the FRMG dispatcher, notify FRMG. The Health & Safety/Operations Superintendent or his/her on-call designee will be dispatched to coordinate mobilization of additional resources with relevant Emergency response agencies and the Department. FRMG will calibrate its Emergency response plan with other official response teams, including the Department, local Emergency management agencies, law enforcement, and key local, state, and federal agencies. Each entity's role during an Incident is defined and synchronized in advance. When dealing with a structural damage, FRMG will immediately notify and coordinate with the Department's structures engineers in accordance with the Incident Response Plan.

Workplace Incidents

A workplace Incident involves injury of FRMG or Subcontractor staff in the performance of O&M services. It is an event that could have, or did, result in personal injury or damage to FRMG or private property. Investigations of these Incidents are important for the prevention of future accidents and tracking the quality of our Safety Plan.

Incident investigations will not be a fault-finding process. Once an Incident has occurred, it is important to prevent it from happening again. The O&M Manager will review all investigation reports. The O&M Manager is responsible for ensuring that the recommendations are implemented and the Health & Safety/Operations Superintendent or Maintenance Superintendent will certify that corrective actions have been taken.

Closures

In order to safeguard highway users, FRMG will upon observation of an Emergency, an Incident, an O&M Defect or any other hazard, immediately implement a Closure or other action necessary to mitigate the hazard. FRMG will immediately inform the Department of the circumstances and conditions of any such Closure and will coordinate with the Department, and other relevant authorities impacted by lane Closures as further highlighted in **Appendix B - Incident Response Plan**.

As part of the planning process, FRMG will coordinate with the Department in advance related to any Closures required for Renewal Work.

With respect to Closures required for Renewal Work performed by FRMG on Local Agency infrastructure to be maintained by the Developer, and where the relevant Local Agency is responsible for providing Incident response, sweeping, and snow and ice control services such as cross street structures, the Maintenance Superintendent coordinates with the relevant Local Agency to coordinate the provision of such services and traffic management for the duration of the work.

Reporting

Inspection, Incidents, work orders, and activity data will be logged into the Maintenance Management Information System (MMIS). The MMIS generates key components of the Monthly O&M Report and the Annual O&M Report, including Incident response. Additionally, FRMG will report via Incident response logs related to maintenance activities, including a time-based report of all actions and activities performed by the Developer including a description of any damages including the date, infrastructure component, details of the resulting Category 1 Defect or Category 2 Defect or damage.

Incident Reports

Courtesy Patrol Operators will report all Incidents, including those that require a response by the Developer, and the beginning and ending times for such response to the Department-designated dispatcher when the Incident occurs. They will also communicate data collection reporting requirements to the CTMC dispatch for detection (if the operator is the first to identify the Incident) and verification (location of the Incident based on the initial radio report). Where Courtesy Patrol Operators encounter a motorist that refuses the service, the Courtesy Patrol

Operator will contact the Department's dispatch to determine if the Courtesy Patrol Operator should leave the scene to continue patrolling or protect the vehicle until law enforcement arrives. Each Incident and subsequent action will be documented including all actions and activities performed by Developer.

FRMG will provide monthly Incident reports for any Incident, in the previous month that results in damage to any elements or require response of Emergency services. The report will identify the nature of the Incident, time, date, location, parties involved, and actions taken. For Incidents involving fatalities, FRMG will submit the Incident report to the Department within 24 hours of the Incident. As part of the Annual Report, FRMG will provide an Incident response log including a time-based report of all actions and activities performed by the Developer.

Project Meetings

FRMG will also report via Project meetings monthly meetings, or as needed with the Department representatives to discuss the O&M Work, including future Closures, Incidents and emergencies, and Incident management coordination.

Incident Debriefs

For major Incidents, FRMG will conduct Incident debriefings to review lessons learned and best practices. These debriefings will be summarized at subsequent meetings. FRMG will attend quarterly meetings with the Department to review any safety and traffic operations issues or requests related to the O&M work of any elements.

Hazardous Materials Reporting

Reportable spills of hazardous materials will be reported in compliance with the *C*DOT *Procedures for Hazardous Materials Spills That Occur on State and Federal Highways within Colorado as a Result of a Highway Transportation*.

f. Traffic Operations Restrictions

FRMG will always strictly adhere to Closure hour restrictions for O&M work in accordance with Schedule 10 including the Excused Closure schedules of Schedule 10, Section 2.11.9 for the Construction Period. Full detail of FRMG's approach to operations restrictions, including permitted Closures, is provided in the Transportation Management Plan.

During the Operating Period, given the anticipated volume of traffic and unique operational constraints of the managed lanes, night operations will be required to complete most maintenance activities safely and efficiently. The Health & Safety/Operations Superintendent or his or her designee will coordinate any lane Closures with the CTMC in accordance with lane Closure restrictions and requirements.

Non-Emergency traffic lane and shoulder Closures will be limited to off-peak operations during the Operating Period. FRMG will submit a Lane Closure Report each Thursday as required by Schedule 10, Section 2, Maintenance of Traffic, for the following week (Saturday through Friday). Any activity outside of lane or shoulder Closures that could interfere with the flow of traffic will be reviewed very closely by our O&M Manager and his management team to decide when night operations are required.

Non-Emergency lane Closures will not occur during special events, such as the National Western Stock Show. Within 15 Working Days after the issuance of NTP2 and prior to the commencement of each contract year thereafter, and additionally when requested by the Department, FRMG will coordinate with the Department's Communications Manager and with local agencies to develop a list and schedule of special events (see Appendix J Draft Strategic Communication Plan for more details on this). The list will be updated as events are identified and scheduled.

Activities not requiring in-lane activity or lane Closures will be carefully scheduled so as to not impact traffic flow by their presence in the right-of-way. These activities may include vegetation control, barrier and minor guardrail repair, shoulder repair, drainage element repair, highway lighting, and light litter removal. Off-peak activities requiring nightly lane Closures or shoulder Closures include pavement maintenance, bridge repairs, overhead sign repair, barrier repair, and attenuator repair.

Unplanned Closures will occur where FRMG becomes aware of an Emergency, an Incident, an O&M defect, or any other hazard as a result of which the normal use of any part of the Project would compromise the safety of users, FRMG will immediately implement a Closure or other action necessary to mitigate the hazard. Regardless of the circumstances, FRMG will immediately inform the Department of the circumstances of any such Closure and will coordinate with the Department, and other relevant Governmental Authorities that may be impacted by such Closure.

g. Operations Performance Monitoring

FRMG's objective is to maintain safe, smooth, and unobstructed traffic flow on a 24/7 basis, 365 days a year. FRMG's approach to monitoring the operations performance of the Project and inspecting the assets on a routine scheduled basis is proactive and aimed at correcting observed deficiencies before operational or maintainability issues arise.

FRMG's operations performance monitoring includes monitoring against all the performance requirements identified in Schedule 11, Appendix A-1 during the Construction Period and A-2 during the Operating Period. During both the Construction Period and the Operating Period, operations performance monitoring will be accomplished through effective management and proper data collection and review.

FRMG's O&M Manager will work directly with the Health & Safety/Operations Superintendent to ensure that operations performance monitoring is being completed and contributes to setting strategic initiatives of monitoring targets.

FRMG's Health & Safety/Operations Superintendent will manage the processes related to traffic management, lane Closures, and Incident response and is responsible for monitoring the Project's operations performance.

Whenever an event or Incident impacting operational performance occurs, the Courtesy Patrols and the TMC Staff collect data, such as response time and relevant criteria for the Courtesy Patrol records (this is further detailed in **Appendix B - Incident Response Plan**). The data is entered into FRMG's MMIS for record keeping and to allow for the efficient review and analysis of FRMG's operations performance.

FRMG's Health & Safety/Operations Superintendent will periodically review the information entered into the MMIS to monitor the achievement of the performance requirements and applicable regulations, including safety. As part of the completion of the review, any non-conformance will identify a root cause and will be followed up by the Health & Safety/Operations Superintendent with a root cause analysis. The findings and any continual improvement are shared with all staff through monthly staff meetings and posted on lunch room bulletin boards. As an example, a method through which the Health & Safety/Operations Superintendent can complete a review is to access the automatic vehicle locator records, this allows for a direct review of actual past performance.

In addition to monitoring the performance of operations, FRMG' inspects and monitors asset conditions as part of the O&M Work. FRMG's Lead Operator and Developer staff will work in tandem to ensure that Schedule 11 requirements are met, particularly in relation to the identification of asset deterioration that could affect the safety of the Project.

FRMG's management and Maintenance Technicians, supplemented by Courtesy Patrol Operators will, in addition to directly monitoring operational performance, perform regular condition and performance monitoring inspections in a manner that allows it to better understand both operating condition and remaining life of its assets. FRMG's personnel receive extensive training in agency-generated design standard specifications, as well as applicable national standards such as Manual on Uniform Traffic Control Devices (MUTCD).

FRMG training gives particular emphasis to areas of traffic services and technical components such as lighting, signing, guardrail, and pavement markings that are paramount to the users' safety. The training provides all O&M personnel with an understanding of the desired levels of service and performance.

During the Construction Period, routine patrolling of the O&M Limits During Construction will occur throughout normal work hours. This provides a snapshot of existing conditions and enhances readiness to respond to Incidents and Defects that impact the Construction Work. Performance monitoring occurs through FRMG's MMIS, which maintains records of all work orders, selected resource allocation, and daily inspection reports in a database that is backed up daily. FRMG will continue to utilize the Project performance criteria to assess the travel way conditions during construction similar to the O&M period as described below.

Additional detail on FRMGs approach to monitoring the safety and operational performance of the Project is provided in **Section c. (*Monitoring Safety and Operational Performance*).**

h. Establishment of Plans and Procedures in Meeting Notification and Database Requirements

FRMG will notify the Enterprises via various procedures that will be dependent on the nature of such notification, including by email, phone call, and/or through FRMG's Noncompliance and Closure Database that the Department will have full time access to.

Upon identification of a Noncompliance Event, FRMG will notify the Enterprises as soon as reasonably practical but at all times within 24 hours. This notification will include the following information:

- Reasonable detail of the circumstances of the Noncompliance Event (e.g., start time)
- The number of Noncompliance points, the grace period (if any), and the cure period (if any) for the Noncompliance Event
- If such Noncompliance Event has been cured by the time notice is given, identify its Noncompliance Rectification Time (if such Noncompliance Event has a Cure Period) or the date and time that such Noncompliance Event was fully cured (if such Noncompliance Event does not have a Cure Period)

Upon identification of a Non-Permitted Closure or Excused Closure, FRMG will notify the Enterprises as soon as reasonably practical but at all times within 24 hours. This notification will include the following information:

- Reasonable details of the circumstances of such Non-Permitted Closure or Excused Closure, its commencement time, and, if it has ended by the time notice is given, its end time
- In the case of an Excused Closure:
  - explain the basis on which FRMG considers that the relevant Closure is an Excused Closure
  - confirm that the relevant Closure did not arise as a result of any breach of Law, Governmental Approval, Permit or this Agreement, fraud, willful misconduct, criminal conduct, recklessness, bad faith or negligence by or of any Developer-Relate Entity
- Explain the steps being taken by FRMG to:
  - mitigate the impact
  - reopen the affected part(s) of the Project as quickly as possible to traffic
  - if such Closure arose as the direct result of an Emergency, respond to the Emergency in accordance with the requirements of this Agreement

Within ten Calendar Days after receiving a notice as described above, the Enterprises will deliver a written notice either confirming their agreement to, or disputing (with reasons), the information contained in FRMG's notice. In the case of a dispute, FRMG will follow-up with any required additional information.

FRMG will notify the Enterprises in writing as soon as reasonably practicable, and in any event within 24 hours, after the occurrence of the Noncompliance Rectification Time in relation to any Noncompliance Event that has a Cure Period, the date and time that any Noncompliance Event that does not have a Cure Period has been fully cured, or the end time of any Non-permitted Closure or Excused Closure, including this information in a Noncompliance and Closure Database (as further described below).

- In the case of a Noncompliance Event:
  - the Noncompliance Rectification Time of such Noncompliance Event or, as the case may be, the date and time that such Noncompliance Event was fully cured
  - a detailed description of the manner in which such Noncompliance Event was cured
  - a calculation of the total Noncompliance Points that accrued in respect of such Noncompliance Event

- in the case of a Non-Permitted Closure or Excused Closure:
  - the end time of such Non-Permitted Closure or Excused Closure
  - in the case of a Non-Permitted Closure, a calculation of the total Construction Closure deductions or Operating Period Closure Deductions, as the case may be, that accrued in respect of such Non-Permitted Closure

Noncompliance and Closure Database

FRMG will establish and maintain an electronic database that records on a real-time basis, and retains, information in relation to each and every Noncompliance Event, Non-Permitted Closure and Excused Closure that occurs or commences, as the case may be. The following data will be recorded in such database:

- In respect of each Noncompliance Event
  - a description of such Noncompliance Event in reasonable detail, including the circumstances giving rise to such Noncompliance Event, its Noncompliance Start Time, any applicable Cure Period or Grace Period and the number of Noncompliance Points
  - the location of such Noncompliance Event within the Project (if applicable)
  - for any Noncompliance Event that is not yet cured:
    - the calculation of the Noncompliance Points that have accrued in respect of such Noncompliance Event up to that time
    - the steps being taken to cure it
  - for any Noncompliance Event that FRMG considers to be cured:
    - the Noncompliance Rectification Time of such Noncompliance Event (if such Noncompliance Event has a Cure Period) or the date and time that such Noncompliance Event was fully cured (if such Noncompliance Event does not have a Cure Period) and, in either case, the calculation of the total Noncompliance points that accrued in respect of such Noncompliance Event
    - the nature of the cure in reasonable detail and the measures that have been, and will be, taken to prevent the reoccurrence of such Noncompliance Event
- In respect of each Non-Permitted Closure and each Excused Closure:
  - a description of such Non-Permitted Closure or Excused Closure in reasonable detail, including the location thereof within the Project, the circumstances giving rise to such Non-Permitted Closure or Excused Closure and its commencement time
  - for any Non-Permitted Closure or Excused Closure that is continuing:
    - in the case of a Non-Permitted Closure, the calculation of the Construction Closure Deductions or Operating Period Closure Deductions, as the case may be, that have accrued in respect of such Non-Permitted Closure up to that time
    - a description of the steps being taken by FRMG to
      - mitigate the impact thereof
      - reopen the affected part(s) of the Project as quickly as possible to traffic
      - if such Closure arose as the direct result of an Emergency, respond to the Emergency in accordance with the requirements of this Agreement

- for any Non-Permitted Closure or Excused Closure that has ended:
  - the end time of such Non-Permitted Closure or Excused Closure
  - in the case of a Non-Permitted Closure, the calculation of the total Construction Closure Deductions or Operating Period Closure Deductions, as the case may be, that accrued in respect of such Non-Permitted Closure
  - all of the steps taken by FRMG as referred to during the subsistence of such Non-Permitted Closure or Excused Closure and the measures that have been, and will be, taken to prevent the reoccurrence of similar Non-Permitted Closures or Excused Closures

The database will also record on a real-time basis the cumulative number of Noncompliance Points that have accrued and cumulative number of relevant Noncompliance Events that have occurred in such a manner as to allow the parties to establish at any time whether any Noncompliance Default Event or any Increased Oversight Threshold has occurred as well as the cumulative amount of Construction Closure Deductions and Operating Period Closure Deductions that have accrued in such a manner as to allow the parties to establish at any time whether any Closure Default Event has occurred.

Information will be input into the database by FRMG staff that include Operations and Maintenance Supervisors and the O&M Manager. As information is input into the database it is automatically made available to read only users.

FRMG will provide to the Enterprises unrestricted electronic access to the Noncompliance and Closure Database at all times, and the database will be designed to enable the Enterprises to:

- Inspect all entries by FRMG
- Flag a request for further information from FRMG related to any entry
- Flag any entry where the Enterprises dispute the entry
- Enter information in respect of each Noncompliance Event and Non-Permitted Closure notified to FRMG by the Enterprises to the same level of detail as FRMG is required to enter in respect of Noncompliance Events and Non-Permitted Closures notified by it to the Enterprises
- Record for each Noncompliance Event or Non-Permitted Closure the issuance of a notice by the Enterprises
- Automatically generate a report recording the number and details of:
  - Noncompliance Events that have been cured and remain uncured
  - Non-Permitted Closures and Excused Closures that have ended and are continuing, in either case, including:
  - Separate counts of:
    - Noncompliance Events, Non-Permitted Closures and Excused Closures notified by FRMG
    - Noncompliance Events and Non-Permitted Closures notified by the Enterprises
  - The number of Noncompliance Points, Construction Closure Deductions and Operating Period Closure Deductions:
    - accrued by FRMG
    - subject to dispute by either party, in any such case, within any user-defined time period

- Flag the Enterprises' concurrence or otherwise that the Noncompliance Rectification Time has occurred in respect of Noncompliance Event or a Non-Permitted Closure has ended

i. Operating Protocols, Agreements and Interaction with Various Entities

Protocols for interaction with and implementation of agreements with various entities will be based on ready and appropriate communication and coordination between FRMG, the Department, Railroads, Utility Owners and other relevant stakeholders such as Local Agencies and residents and commercial neighborhoods. As further detailed in Appendix J Draft Strategic Communications Plan, protocols will be established that will meet the following objectives:

- Provide open lines of communication and establish a routine schedule for FRMG to hold coordination meetings with the Department and other relevant stakeholders
- Provide a name, address and telephone number of the FRMG O&M Manager (and/or Project Communications Manager) for members of the public who may have a concern to register
- Designate the Project Communications Manager to maintain close contact with appropriate state and local officials and a general public liaison
- Provide a single point of contact for customer service requests and questions
  - All customer requests reviewed by FRMG will be provided and initial response as soon as practical

Interaction related to operations and maintenance activities and related communication are handled in compliance with applicable Third-Party Agreements including the Denver Intergovernmental Agreement, the E-470 related agreements, the Railroad agreements, and the Cover Maintenance Agreement.

Protocols for interaction with the operator of the Tolled Express Lanes will not only adhere to all Project Agreement requirements, but will include procedures designed to enhance operational communication, coordinate in field activities, and ultimately allow FRMG to avoid any interference with and to support the safe and effective collection of revenue by others within the high-speed Tolled Express Lanes.

Interaction related to numerous assets on the corridor that will be maintained by others will include reporting of observed deficiencies in full accordance with FRMG obligations for reporting and liaison to either the Department or CTMC as may be appropriate and to the maintaining entity including ETC System Integrator, Xcel Energy and CCD. Protocols for close coordination with and reporting on activities performed by the Cover Top Maintainer in accordance with the Cover Top Agreement are critically important to the preservation of the Cover's waterproof membrane and can be found in the Cover Top Manual.

The Department will be given access to the O&M Manager's mobile and home telephone numbers, along with a list of other FRMG Key Personnel contact numbers for specific and direct communication on identified issues. When face-to-face meetings are required, the FRMG Project office will be used as the main meeting location and Emergency rallying point. Staging areas will be identified for pending weather-related Emergency operations.

The O&M Manager will also develop and carry out a systematic schedule of contacts with appropriate state, district, local, federal, and other affected (e.g. utilities) officials including the agency contact list detailed in **Section k. (*Planning and Coordination with Governmental Authorities).***

j. Standard Operating and Communication Procedures

Emergency communication procedures detailed in the following paragraphs will be the same for the Construction Period and the Operating Period except that:

- Functions indicated as performed by the Health & Safety/Operations Superintendent during the Operating Period will be performed by the O&M Superintendent during the Construction Period
- Additional requirements imposed on the Lead Contractor for management and reporting for traffic management required for the Construction Work

Dedicated Emergency Contact Phone Number

FRMG will establish a dedicated Emergency contact phone number to assist in the coordination, command and support of Emergency preparedness, response and recovery activities performed by FRMG and its partners. The FRMG Emergency Operations Command ("EOC") Hotline will provide communications support to EOC operations, and will be monitored continuously by trained Emergency and Incident response personnel in order to ensure that FRMG responds and deploys resources, 24 hours per day, 7 days per week, including holidays. The Health & Safety/Operations Superintendent or his on-call designee will be responsible for dispatching FRMG forces in response to Incidents occurring within the Project limits. The continuous operation of the Emergency contact phone number will ensure timely Incident response and consistent compliance with the Department's goals for arriving on scene, assuming MOT responsibilities from law enforcement, and restoring safe travel.

The FRMG Emergency contact phone number will be manned continuously by a trained Emergency and Incident response dispatcher who will direct FRMG responding teams and Subcontractors. The dispatcher will also notify the proper Department official of the status of the Incident and provide updates as they become available. The dispatcher will have the authority to make decisions and gather all relevant information from the agency or person reporting the Incident. The dispatcher will monitor response operations to ensure that FRMG responds and deploys resources 24 hours per day, 7 days per week, including holidays.

Communication during Emergency Preparation

Proper training and effective communication is key to the establishment of a ready state from which FRMG can be prepared for Emergency work and Emergency situations. Further detail of training provided for Emergency response as a means of Emergency preparation is provided in **Section d. (*Staffing*)**. Communication during the Emergency preparation phase of any major Incident or extreme weather event will be through the same means as during normal operations except that for anticipated extreme weather events or other system wide Emergency situations, the cessation of nonessential or non-safety-related routine activities will allow a more streamlined communication.

General Communication with Stakeholders

An updated contact sheet of appropriate strategic communications personnel for the Project will be maintained. The contact sheet will be updated annually throughout the Term and at such other times as are reasonably required to ensure that all contact information remains current. This contact sheet will include, at a minimum:

- Developer and Department
  - Project Director
  - High Performance Transportation Enterprise (HPTE) Director
  - Project Communications Manager
  - Project website administrator
  - Community Liaison
  - Project CTMC contact
- City and County of Denver
  - Mayor's Office
  - Public Works
  - Public Information (PI) Office
  - Chamber of Commerce
  - Fire/rescue
  - Police department
- City of Aurora
  - City Manager's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/rescue
  - Police department
- City of Commerce City
  - City Manager's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/Rescue
  - Police Department
- Local State Patrol Office
- Local hospitals
- Key stakeholders: to be provided by the Department, including but not limited to the following:
  - Local schools and school districts

Communication during Emergency Response

Courtesy Patrol communications with FRMG dispatch, CTMC, FRMG Management, and O&M responders will be instrumental in allowing correct mobilization of manpower and equipment resources for urgent response. This may include specialized Emergency subcontract support where needed.

To ensure continued communication during any outages or interruption to phone services, Courtesy Patrol Operators are equipped with a two-way radio and telephone for reporting to FRMG dispatchers, CTMC, and FRMG response staff. Please refer to **Appendix B - Incident Response Plan** appended to this OMP for further information pertaining to emergency response, including specific information identified for responding to Cover Incidents.

k. Planning and Coordination with Governmental Authorities

Planning and coordination with Governmental Authorities will be based on effective communications protocols. The O&M Manager will develop and carry out a systematic schedule of contacts with appropriate local and state officials. An initial set of meetings with local Governmental Authorities will be arranged to introduce FRMG as a member of the community and to explain FRMG's purpose on the Project corridor and how it may relate to their organization. FRMG will coordinate with these organizations on Incident response and routine meetings to ensure that the Department's objectives are being met.

Similar to **Section j. (*Standard Operating and Communication Procedures*)**, Developer and Governmental Authorities coordination contacts will include the name, address, phone number(s), and email addresses for the following individuals or organizations. The PI Contact Sheet will be submitted to the Department for information prior to the issuance of NTP1 and updated annually throughout the Term, and at such other times as are reasonably required, to ensure that such information remains up-to-date.

- Developer and Department
  - Project Director
  - HPTE Director
  - Project Communications Manager
  - Project website administrator
  - Community Liaison
  - Project CTMC contact
- City and County of Denver
  - Mayor's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/rescue
  - Police department
- City of Aurora
  - City Manager's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/rescue
  - Police department

- City of Commerce City
  - City Manager's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/Rescue
  - Police Department
  - Local State Patrol Office

FRMG will establish a dedicated Emergency contact phone number to assist in the coordination, command and support of Emergency preparedness, response and recovery activities performed by FRMG and its partners. The FRMG dedicated Emergency contact phone number will provide communications support to operations, and are monitored continuously by trained Emergency and Incident response personnel in order to ensure that FRMG responds and deploys resources, 24 hours per day, 7 days per week, including holidays. The dedicated Emergency contact phone number will be responsible for dispatching FRMG forces in response to Incidents occurring within the Project limits. The continuous operation of the dedicated Emergency contact phone number will ensure timely consistent compliance with the Department's goals for arriving on scene, and restoring safe travel.

As both roadway and information networks are interconnected, interagency coordination is critical for smooth traffic flow, predictable travel times and overall efficient traffic operations.

I. Coordination with the Colorado Traffic Management Center (CTMC)

The following levels of liaison will be established to ensure coordination between FRMG and the CTMC.

O&M Manager

On all policy and operating issues, the primary liaison with the CTMC will be the O&M Manager (or the O&M Lead During Construction) who will have the authority to commit FRMG on all operations during both Construction and Operating Periods. The O&M Manager will meet regularly with their counterpart at the CTMC, but in addition will be available (or their designate) at all times in order to address any immediate requests for coordination.

Health & Safety/Operations Supervisor

The Health & Safety/Operations Supervisor will manage coordination with the CTMC at a senior level when coordination is required above the level of responsibility that can be managed by the dispatchers. The Health & Safety/Operations Supervisor will be available to meet at the CTMC on short notice to address coordination should it be required.

Dispatchers

The Dispatcher(s) will be the liaison on a day-to-day basis to coordinate operations with the CTMC. They will have the authority to make decisions and gather all relevant information from

the agency, CTMC, or person reporting. A Dispatcher is required to notify the O&M Manager and the Health & Safety/Operations and Maintenance Supervisors of all Emergencies.

The dispatcher monitors response operations and coordinates with the CTMC updating traffic conditions and Incident status. Additionally, FRMG dispatchers coordinate any pre-planned lane Closures with the CTMC and provides any updates or changes in planned activities while monitoring the ongoing operations.

m. Vehicular Accident Patterns

FRMG will review accident data collected by the Department and local enforcement agencies to monitor operational performance related to site-specific traffic safety. FRMG will review data collected to identify patterns. FRMG will pay particular attention to ROR or barrier impact accidents, as these usually result in the most fatalities on high-speed facilities.

FRMG will complete a review of all accident locations resulting in fatalities.

We use these reviews to identify and propose strategies to the Department for implementing operational improvements which will have the greatest impact on safety such as adjustments to signage or pavement markings.

FRMG will monitor safety on the facility overall via routine traffic operations reviews. These are routine drive-through inspections conducted by FRMG management with particular attention to identification of safety issues and where proactive improvements can be made. Additionally, Courtesy Patrols and maintenance management and staff will be trained to observe and report issues on an ongoing and constant basis.

n. Hazardous Substance Spills and Reporting

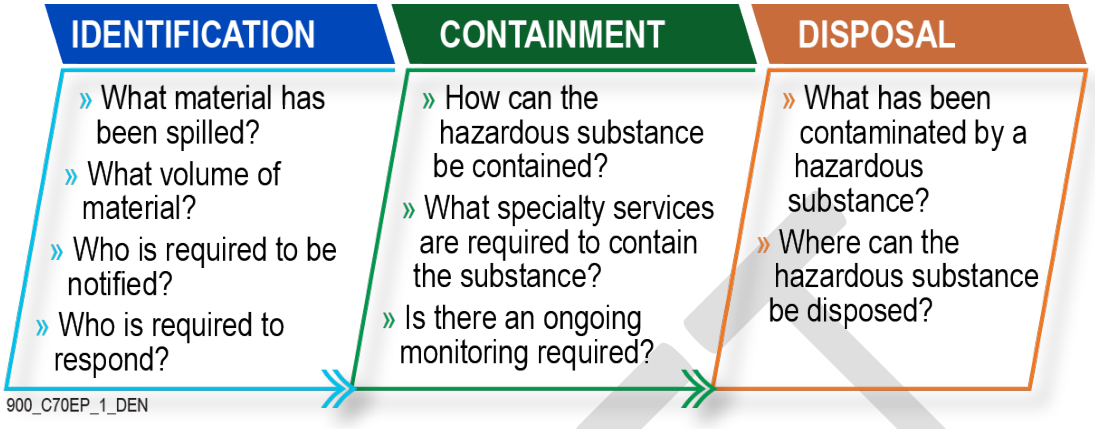
FRMG will be responsible for and maintain compliance with all provisions set out in each of the Approved or Accepted MMP, Sampling and Analysis Plan (SAP), Health and Safety Plan (HASP), CDOT's *Procedures for Hazardous Materials Spills That Occur on State and Federal Highways within Colorado as a Result of a Highway Transportation Incident for traffic Incidents* and the Spill Prevention Control Countermeasures Plan (SPCC).

In each case, FRMG will maintain documentation of all pertinent certifications required thereunder for all Subcontractors (which certifications will be made available to the Department upon request). For the purposes of this draft OMP the procedures have been modelled off of CDOT's *Procedures for Hazardous Materials Spills That Occur on State and Federal Highways within Colorado as a Result of a Highway Transportation Incident for traffic Incidents.*

Additionally, FRMG will prepare a Spill Prevention Control Countermeasures Plan for Acceptance by the Department according to 40 CFR C.F.R. Part 112, and Section 208.06 (Materials Handling and Spill Prevention) of the CDOT Standard Specifications found in Schedule 17. The SPCC Plan shall be considered a "living document" and, as such, be amended as construction and operation of the Project progresses during the Term.

Figure 3 presents a high-level flow chart indicating the decision making process to ensure FRMG meets all requirements for identifying, containing, and disposing of Hazardous Substances.

Figure 3. Identifying, Containing, and Disposing of Hazardous Substances.



The following subsections detail how FRMG will identify, contain and dispose of hazardous substances

Identification

For detailed Incident response information please refer to the tab titled **Appendix B - Incident Response Plan.** Upon identification, the first priority action is to protect the scene of the Incident. This will involve the application of appropriate signage and setting up of cones and other appropriate markers. This would also include for example, preventing vehicle/pedestrian access and moving to a location upwind to await first response agencies if appropriate. Field staff will be trained in CDOT Traffic Standards, in addition all Field staff will have available in their vehicles reference documents for identifying Hazardous Substances.

As referenced by the CDOT *Procedures for Hazardous Materials Spills That Occur on State and Federal Highways within Colorado as a Result of a Highway Transportation Incident* for traffic Incidents, where a transportation accident/Incident results in product/fuel spill, reporting and cleanup by the responsible party is necessary if:

- the amount of petroleum fuel spilled exceeds 25 gallons, or other reportable quantity according to EPA SARA Title III, List of Lists
- the spilled materials have impacted or threaten to impact waters of the state

Where a transportation accident/Incident results in a product/fuel spill, any accidental discharge to a sanitary sewer system will be reported immediately to the local sewer authority and the affected wastewater OSHA Permissible Exposure Limit treatment facility. If the spill has affected surface water, downstream water users will be notified immediately. This may be coordinated with the Colorado Department of Public Health and Environment (CDPHE) through the 24-hour spill reporting line.

Outside of the management of Hazardous Spills, in the event that during construction work or renewal work FRMG disturbs soil and any Unexpected Hazardous Substances are encountered or discovered, FRMG will submit a remedial plan as part of any Detailed Supervening Event Submission. The remedial plan shall describe FRMG's approach including a sampling plan; means and methods of management, and the disposal facility; the required personnel for remediating the Unexpected Hazardous Substance; the estimated cost of implementing the remedial plan; and the required coordination with Governmental Authorities and associated Governmental Approvals and Permits. The remedial plan shall be subject to Department Acceptance and may, upon such Acceptance, be used to satisfy the FRMG's applicable obligations under Section 23.9 of Schedule 17.

Containment

All maintenance vehicles will carry spill kits capable of containing small-scale spills. The typical spill kits consist of:

- Heavy absorbent pads
- Goggles
- Nitrile gloves
- Oil Dri granular absorbent
- Re-Form universal SOC's
- Hazardous Materials Identification book

Large-scale spills will require additional specialized services. FRMG will retain contact information updated regularly for 24 hour short response hazardous material (HazMat) containment service providers. Prior to being placed on the Emergency contact list, these service providers will be interviewed and briefed on the Project infrastructure. This briefing includes identification of FRMG responsible contacts, review of asset inventory and jurisdictional boundaries, and reporting requirements (data to be collected).

At all times when a HazMat Subcontractor is completing cleanup, an FRMG representative will be on-site to observe and document any additional information that may be required for subsequent reports or immediate communication to other members of the FRMG team. When necessary, equipment to help prevent fuel spills from getting into streams and drainage structures is deployed. FRMG will coordinate the response to spills with the party responsible for the spill, this coordination will include leveraging any additional resources available to the transport company to work with FRMG to mitigate the scene of the spill.

Traffic control is handled like a severe vehicle accident, with particular attention given to individuals entering the accident site. Protection of the motoring public is of major concern because the public may not see or otherwise be aware of the danger. A safe distance from the spill is maintained and only qualified persons are allowed in the hazard zone. FRMG personnel are trained to identify hazardous materials by utilizing a Hazardous Materials Identification book.

Disposal

Spills need to be remediated to CDPHE and US Environmental Protection Agency (USEPA)-approved thresholds where applicable and the strictest standards where different. Other

cleanup thresholds may depend on the material spilled, the media affected (soil, groundwater, surface water), and the risk of leaving the material in place. Cleanup thresholds need approval by the Department in order to issue a “No Further Action” determination to the responsible party.

If the Hazardous Substance impacts soil excavation and offsite disposal is the preferred and most common method of soil remediation at Colorado highway spill sites. If excavation is not feasible or allowed, cleanups may also include a variety of technologies, including, but not limited to, some combination of: excavation, air sparging, soil venting, bioremediation, steam cleaning, physical collection, and monitored natural attenuation

Even though vehicle owners are responsible for cleanup, FRMG has qualified and pre-approved contractors available for cleanup and disposal when necessary. All federal, state and local requirements are adhered to, regardless of who cleans up the site and disposes of the waste.

Reporting

FRMG is responsible for any reporting or notification with respect to RHMs required by Governmental Authorities, including, CDPHE, EPA, CCD Department of Environmental Health, Colorado Department of Labor and Employment, Division of Oil and Public Safety, and TriCounty Health Department. The O&M Manager will be responsible for and will complete this reporting requirement.

Management

FRMG will prepare, implement and comply with a Materials Management Plan for applicable handling, storage and suitable disposal of RHMs during the Term. The Materials Management Plan shall be written to assure compliance with all Environment Requirements and will incorporate the Beneficial Reuse and Materials Management Plan (BRMMP) provided in the Reference Documents. Any changes proposed to the BRMMP (as it is incorporated in the Materials Management Plan) shall be submitted to the Department for Approval in advance and shall also require subsequent approval by CDPHE. All RHMs shall be tracked from identification to final disposition. Subject to Section 23.1.3 of Schedule 17, FRMG will identify, manage, remove and dispose of RHMs in accordance with Section 23.1.2 of Schedule 17. Notwithstanding any standards for reuse of soils set forth in BRMMP, the Materials Management Plan shall not allow the reuse of any soils contaminated with concentrations of chemical constituents above standards for unrestricted reuse (as defined in the BRMMP) in any portion of the Site located west of Colorado Boulevard.

o. Investigation of Reports or Complaints

FRMG will conduct prompt investigations of reports or complaints by implementing the following systems:

- Hierarchical Call-Out Tree
- Identification of on-call FRMG representatives at all times
- Training on identification of appropriate FRMG personal to receive communication depending on source
- Training on identification of severity of communication
- Training on performance requirement response times

FRMG will use the Call-Out Tree to ensure timely and appropriate availability of personnel to investigate complaints. The Call-Out Tree provides the individual receiving the call at the call center clear direction on the names for all individuals within FRMG and their responsibilities. Any current out of office is noted as well as alternate contacts if the primary contacts are not available. The contact information for the FRMG personnel will include call signs, work phone contact information, and email. In addition, the O&M Manager and the Health & Safety/Operations and Maintenance Superintendents home phone contact information will be included. In, addition the O&M Manager, Health & Safety/Operations and Maintenance Superintendents along with the designated shift lead will have dedicated cell phone access.

Call center personnel will be trained to evaluate the nature of the complaint and to categorize the response into two response categories (immediate and intermediate) the same procedure applies for both Category 1 and 2 Defects as shown in **Table 4**.

Table 4. Category 1 and 2 Defects

Immediate

Category Of Incident/ Description	Complainant indicates an existing or imminent threat to road users Complainant identifies Defect which requires immediate response and categorization as Category 1 or Category 2
Procedure	• If available, call recipient views complaint on camera to clarify categorization • Call recipient identifies senior on shift individual as per Call-Out Tree and makes notification providing all pertinent information. • If confirmed via camera this information is communicated to individual to immediately action response. • If not viewable on camera as much detail as possible from complainant is provided to responder • Call recipient notes if a call back is requested or not • Call center representative logs call and actioned individual may start work order • Actioned individual notified by call center call recipient investigates complaint based on information provided from complainant or if viewable on camera actions defect repair procedures. Individual notified by call center may in their evaluation escalate awareness of the complaint to management based on training in identification of severity of complaint. • On completion work log is updated, call log is updated and if requested complainant receives return call explaining actions taken
Additional Considerations	FRGM will employ a Community Liaison throughout the Term. Depending on the nature and origin of the complaint, the Community Liaison may receive the call from the complainant or be the point of contact for ongoing communications or responses to the complaint. FRMG will employ a Project Communications Manager (PCM) throughout the Term. Depending on the nature and origin of the complaint, the PCM may receive the call from the complainant or be the point of contact for ongoing communications or responses to the complaint.

Intermediate

Category Of Incident/ Description	Complainant indicated no immediate threat to road users Complainant indicates Defect which call center recipient identifies as not requiring immediate response
Procedure	• If available call recipient views complaint on camera to clarify categorization • Call recipient identifies senior on shift individual as per Call-Out Tree and notifies individual
Additional Considerations	FRGM will employ throughout the Term a Community Liaison. Depending on the nature and origin of the complaint, the Community Liaison may receive the call from the complainant or be the point of contact for ongoing communications or responses to the complaint. FRMG will employ a PCM throughout the Term. Depending on the nature and origin of the complaint, the PCM may receive the call from the complainant or be the point of contact for ongoing communications or responses to the complaint.

FRMG uses several methods to receive and process customer complaints. A toll-free number is advertised and displayed on all FRMG equipment. All advertising provides a telephone number, address and the name of a person to whom requests should be directed. FRMG will install Developer identification signs depicting the name and contact information for FRMG.

Through the MMIS service request module, the system documents and tracks all Project service requests from customers and clients. The documentation of all calls and requests for action on the system are entered into the computerized service request program at the call center. The MMIS system logs the time and date of the request and thereafter begins tracking FRMG's action.

This process does not vary from Construction or Operating Periods.

p. External Communication System Messaging

Maintenance and Operations Communications

The primary source of FRMG's external communication system messaging is detailed in the Maintenance and Operations Communications Plan (MOCP), which is part of Appendix J Draft Strategic Communication Plan. This MOCP will be used throughout the duration of the Operating Period to manage and implement the PI process.

The PCM will be responsible for overseeing all FRMG communications efforts during the Term. In addition, FRMG will provide a Spanish/English bilingual Community Liaison with knowledge of the Swansea-Elyria neighborhoods. The Community Liaison will coordinate closely with the Department and be responsible throughout the Term for ensuring that local residents, businesses and nonprofit groups are informed about the Project and have a single point of contact for all questions and concerns.

Throughout the duration of the Term, FRMG will hold weekly Strategic Communication meetings, to include the Department's communications team, at the Project office. At these

meetings, FRMG and the Department will discuss weekly communications issues and provide details for upcoming media advisories/press releases, community meetings, lane Closure reports, website updates and information line recordings. The agenda for each meeting will be the responsibility of the PCM and will be submitted to the Department in advance of each meeting

FRMG's external communications system messaging will focus on providing stakeholders the information they need to make short-term and long-term decisions about how they cope with the construction and O&M work, potential detours, and temporary lane Closures with as little disruption as possible. FRMG's means of communication during the Construction and Operating Period will consist of but not be limited to:

- A Project dedicated website, press releases and regular interviews on local radios' newscast to inform users on the Project status and upcoming construction and O&M work affecting traffic within the O&M limits
- Alerts on social media and third-party mobile technology/information providers
- Liaison with the TMC for ITS messaging to inform users of any safety hazards and detours
- The MMIS to generate alert related to lane Closures and traffic Incidents to the Department

FRMG follows the detailed procedures and protocols of the MOCP to ensure well-coordinated two-way communications with all stakeholders during each phase of the Project. FRMG will prepare a PI Contact Sheet containing the names of appropriate Strategic. Communications personnel for the Project updated annually throughout the Term and at such other times as are reasonably required to ensure that such information current. This contact sheet will include at a minimum:

- Developer and Department
  - Project Director
  - HPTE Director
  - PCM
  - Project website administrator
  - Community Liaison
  - Project CTMC contact
- City and County of Denver
  - Mayor's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/rescue
  - Police department
- City of Aurora
  - City Manager's Office
  - Public Works
  - PI Office
  - Chamber of Commerce

  - Fire/rescue
  - Police department
- City of Commerce City
  - City Manager's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/Rescue
  - Police Department
- Local State Patrol Office
- Local hospitals
- Key stakeholders: to be provided by the Department, including but not limited to the following:
  - Local schools and school districts
  - Businesses
  - Community centers
  - Visitor/tourist destinations
  - Churches
  - Registered Neighborhood Organizations and neighborhood associations
- Railroads
- Airports
- Utility Owners
- Commercial vehicle operators, including airport shuttles and taxi companies
- Others as defined by the Department

Crisis Communications

External communication system messaging of a crisis nature will follow the procedures identified in the Crisis Communication Plan (CCP), which is part of Appendix J: Draft Strategic Communication Plan that has been included with the Technical Submission.

In the event of a crisis, the Department will be the lead agency to handle communication with the media, public, the Department staff, and other external and internal audiences. The FRMG will be available to help support the Department and provide information necessary to respond to the crisis. FRMG will manage an Emergency response telephone and email tree with all appropriate personnel included to facilitate immediate response in an Emergency. The telephone/email tree will be divided into areas of expertise so the proper people are contacted for specific Emergency situations.

The Project Director, PCM, and the FRMG will be included on the Call-Out Tree for notification of any Emergency that may arise. FRMG will develop and maintain a contact list of Emergency service providers as part of its CCP. The FRMG will also provide information to Emergency service providers.

Planned Project Communications

Outreach regarding planned Project communications consists of providing regular and continuous PI services throughout the duration of the Operating Period and must adhere to the

specifications outlined in the HPTE Strategic Communications and Transparency Plan. FRMG will coordinate with the Department to determine which level of PI management activities are warranted prior to commencement of planned O&M Work (including Renewal Work) projects.

q. System Failures

FRMG will detect and resolve failures in strict compliance with all requirements of Schedule 11. Emphasis will be placed on those involving critical systems such as safety systems, tunnel systems and MEP systems. The procedures will be configured and installed in the control systems applications, as the Supervisory Control and Data Acquisition (SCADA) for the tunnel and MEP systems. The response plans and actions in the procedures could be configured to be automatic without operator confirmation or require a manual confirmation in the software application as appropriate depending on the nature of the action.

The Project systems will be automated and integrated to minimize staffing requirements and response times for operations and maintenance. The tunnel, MEP and safety field equipment that can be automatically monitored will be connected to the SCADA and automatic alarms set to be triggered. The control and software components for the tunnel life safety and MEP systems will reside in both the Cover Control Center and the CTMC where the operators will monitor the roadway and its equipment via the SCADA systems.

The SCADA system will provide automatic event/alarm notification for all monitored systems, for failures of equipment and also for unusual situations, e.g. monitored conditions beyond threshold limits. Alarm and Incident notifications will be shown to FRMG operators, as well as, where required, center to center interfaces, text message, email, or phone calls. Staff of FRMG will also receive the notification and assigned actions automatically so that they can respond promptly to critical Incidents and alarm conditions. The SCADA system will provide trending, reporting and long-term data storage for operators to analyze both past and current tunnel and highway operations. Reports of system history will be generated as defined by operations staff (i.e. on daily, weekly or monthly basis).

Integrated in the SCADA, or via a MOMS, notification will be sent to maintenance technicians with tasks to fulfill and a form where they will include information of the event of the failure (respondent team number, type of repair, arrival time, photos, parties involved, etc.). This will allow SCADA/MOMS operators to create a fault log, including time of fault and time of repair. Operators will also be able to open a log for every Incident and include corresponding information like detection details, Incident response team arrival, Incident Command System notification, and clearance times.

Monitoring requirements of the self-monitoring process will be in tune with the procedures and plans created within the SCADA. The integrated system will provide logs and reports that will be used to develop the operations and maintenance reports.

r. Fuel Spills or Other Contamination-Causing Events

Fuel spills and other contamination-causing event response and cleanup will be managed as prescribed in **Section n. (*Hazardous Substances*)**. The following section includes identification of staff qualifications and equipment availability specifically to address fuel spills and other

contamination-causing events. Further information will be found in FRMG's Spill Prevention Control Countermeasure Plan.

Training Plan

Function specific training will be conducted based on implementation of job hazard analysis. All environmental training will be coordinated with safety training to ensure coverage of topics applicable to both aspects.

Training for environmental tasks will be carried out in two phases. The initial phase will be part of the initial orientation of all employees during the pre-operating period and after commencement of operations. During orientation, this training will be coordinated closely with other training such as safety training. The second phase of training will be an update to the initial training. This phase will include regularly scheduled retraining on basic operations practices and specially focused re-training to be determined by management to ensure ongoing high standards and results are met in terms of quality, effectiveness and efficiency. The second phase training will also involve training of current staff in revised operational procedures that have been put in place to improve operations.

Training courses for Project personnel will be delivered by three methods:

- Off-the-shelf courses – This training includes both programmed learning courses that an individual can implement according to his/her own schedule and scheduled short courses or seminars given by organizations that provide training on specific topics (e.g., sediment and erosion control, storm water management, etc.).
  Specific training includes:
  - CDOT Procedures for Hazardous Materials Spills that Occur on State and Federal Highways Within Colorado as a Result of a Highway Transportation Incident
  - Asbestos Awareness Training in accordance with OSHA 29 Code of Federal Regulations (CFR) and 29 C.F.R. 1926.1101
  - OSHA training
  - Spill Prevention Control and Countermeasure's Plan
  - Workplace Hazardous Materials Information System
- Customized courses – Courses specifically developed to focus on operations and given by personnel who are certified or otherwise qualified to lead such training. These efforts will take place in a classroom, office or field environment. Specific training includes: Safe Material Handling Practices for Winter Maintenance
- On-the-job training (OJT) and exercise participation – OJT efforts will be organized to allow individuals or groups to participate in drills that allow them to see the job requirements and practice skills in real-time. Project personnel who are qualified in the activities being taught will direct these efforts

For construction and Renewal Work, FRMG will have staff complete an Environmental Compliance and Mitigation Training Program (ECMTP), this includes Subcontractors who will enter within the Site boundaries to perform Construction Work and Renewal Work. All such personnel shall complete this training prior to performing Construction Work and any Renewal Work on the Project. In addition, Independent Quality Control (IQC) inspectors, IQC supervisory staff, and the IQCM shall participate in the ECMTP. The ECMTP shall cover the Environmental

Requirements for the Project and train personnel to stay in compliance with the Environmental Requirements. The ECMTP shall include the following elements:

- Water quality requirements
- Wetlands and waters of the U.S.
- Maintaining approved limits of disturbance
- Tree and shrub protection
- Avoidance and minimization of impact to waterways and stormwater conveyances
- Seasonal work restrictions – trees, waterways, and migratory birds
- Pumping and dewatering operations
- Discovery of archaeological material or human remains
- Discovery of paleontological resources
- Hazardous Substances
- Historic property protection requirements
- Construction noise mitigation
- Dust and construction emissions mitigation
- Site general housekeeping measures
- Concrete and asphalt waste material management
- Spill prevention, response, and cleanup
- Protection and access requirements for parks and maintenance of trail detours
- Impacts and consequences for departure from approved operating procedures
- Additional topics as needed to maintain compliance with the Environmental Requirements
- Responsibilities of supervisors and inspectors in connection with environmental compliance

Equipment Availability

FRMG will have the following equipment available to attend and manage fuel spills and other contamination-causing events:

- Dump trucks
- Multipurpose tractor with sweeper attachment
- Pressure washer
- Traffic management signs and cones
- Oil Dri granular absorbent
- Re-Form universal SOC's
- Spare tanks

In addition, FRMG will keep a list of qualified Subcontractors who are available on a 24-hour basis to assist FRMG with additional services. These Subcontractors will form part of FRMG's ongoing training process to ensure they come prepared to follow all of FRMG's health and safety regulations and local contract passed performance requirements. This list will be updated regularly to ensure these Subcontractors are consistently available and no changes have been made to their fleet, Call-out contact information, business status or other changes, which may affect their ability to assist FRMG.

s. Training on the National Traffic Incident Management Responder Training Course

The following Strategic Highway Research Program 2 (SHRP2) Solutions for the National Traffic Incident Management Responder Training Course (TIMS) training requirements are maintained for FRMG personnel and Subcontractors working on the Project and for those who have a direct role in Emergency management and response operations. These positions include Operations and Maintenance Supervisors, and all field staff. FRMG's plans for Emergency operations and Incident management, are further documented in **Appendix B – Incident Response Plan** and have been designed to ensure compliance with TIMS and NIMS requirements.

National Traffic Incident Management Responder Training Program (L12/L32A/L32B)

To better coordinate with Local Agencies, FRMG staff that are designated as Incident responders or that may be required to fill the role of Incident responders, will complete an on-site training in National TIMS. In addition to the L12/L32A/L32B classes, all personnel attending this training will have completed the recommended perquisites offered by FEMA of ICS 100 Introduction to Incident Command System, ICS 200 ICS for Single Resources and Initial Action Incidents as well as IS 700 NIMS- an Introduction is further discussed below. This training will apply to personnel for both the Construction and Operating Periods.

The National Response Plan (NRP) and the NIMS provide a consistent nationwide method for Emergency responders from government, private sector and nongovernmental public organizations to work effectively together during domestic emergencies and Incidents.

The ICS has been adopted to establish the method for operating, managing and structuring Incident management organizations at the federal, state, regional and local level. It is for this reason that FRMG will train in ICS as it pertains to Incident response and Emergency management, and has become a nationwide framework for Emergency responders in planning for, responding to, and recovering from Incidents. The ICS governs the coordination, roles and responsibilities of Emergency responders from different organizations including on scene response operations at Emergency events.

FRMG's plans for Emergency operations and Incident management, are further documented in the FRMG Incident Response Plan, and have been designed to ensure compliance with National TIM and NIMS requirements.

NIMS Training Requirements

In addition to the TIMS training, the following NIMS and ICS training requirements are maintained for FRMG personnel and Subcontractors working on the Project and having a direct role in Emergency management and response operations:

- ICS–100 (IS-100) Introduction to the Incident Command System Field Supervisors
- IS-100 (ICS-100) Introduction to the Incident Command System
- IS-200 (ICS-200) ICS for Single Resources and Initial Action Incidents
- IS-700 NIMS- an Introduction

Appendix A
Snow and Ice Control Plan

Front Range
Mobility Group

Appendix A - Snow and Ice Control Plan

FRMG's Snow and Ice Control Plan and updates will address requirements for operations, management, equipment, maintenance yards, materials, staffing and any other items necessary to meet or exceed the Department's requirements for snow and ice control services. This plan has been designed to meet the requirements of Schedule 11 including all appendices.

FRMG will submit an annual update to this Snow and Ice Control Plan by September 1st of each year for acceptance by the Department. FRMG's outlined procedures below will be implemented for the I-70 Mainline and other infrastructure elements and portions of the CDOT roadways identified in the FRMG O&M Limits Reference Drawings.

a. Management and Administration

FRMG has extensive experience planning and implementing snow and ice programs which includes, pre-event planning and training, imminent storm preparation, storm response and post event activities. Additionally, FRMG management staff and O&M team members have served in operations management positions with the Departments of Transportation (DOTs) from across the U.S. With this experience both as a operator and as a public servant, FRMG has a clear understanding of the demands of winter maintenance and the potential for increasing cost efficiency without sacrificing performance. FRMG will coordinate with the Department and Local Agencies with statutory duties or functions in relation to the Snow and Ice Control Services. Coordination will include interface, edge areas, and boundaries between FRMG, the Department, and the Local Agency to ensure the Site and adjacent vicinity is covered. This includes facilitating meetings with all stakeholders prior to each winter season for such coordination, and after each winter season for debriefing, and shall include documenting the conclusions of such coordination. Such meetings shall occur annually at a minimum and more frequently as required or as requested by the Department or Local Agency.

FRMG will provide a level of service 'A' with respect to all snow and ice control "survey items" as identified in CDOT's Maintenance Levels of Service Manual, including condition 1 with respect to "snow removal's road condition" requirement in the manual and will complete the work in a manner that will minimize the delay and inconvenience to users as required by Schedule 11, Section 11.5c. This can be accomplished through timely snow and ice program implementation to avoid high volume times and extensive advance programs such as pre-wetting.

FRMG will provide a level of service 'A' with respect to all snow and ice control "survey items" as identified in CDOT's *Maintenance Levels of Service Manual*, including condition 1 with respect to "snow removal's road condition" requirement in the manual.

Furthermore, FRMG will meet with the Department and Local Agencies with adjacent infrastructure prior to the winter season to ensure coordination including interface, edge areas, and boundaries between the Developer, the Department, and the Local Agency to ensure the site and adjacent vicinity is covered. This includes facilitating meetings with all stakeholders prior to each winter season for such coordination, and after each winter season for debriefing, and will include documenting the conclusions of such coordination. Drawings which depict boundaries will be presented to ensure accurate

coordination. These meetings will be attended by the O&M Manager, the Health & Safety/Operations and Maintenance Superintendents.

To achieve this goal, FRMG will begin and continue snow and ice removal activities in full force from the onset of a Precipitation Event until pavement travel lanes achieve bare pavement within the Category 1 remedy defect period.

FRMG recognizes the logistical challenge and importance of snow and ice removal operations. To aid in the management of snow and ice operations, FRMG utilizes a four-step approach. The four steps include:

- Pre-event planning and training
- Imminent Precipitation Event preparation
- Precipitation Event response
- Post-event activities

Imminent Precipitation Event Preparation

FRMG's O&M Manager and Health & Safety/Operations and Maintenance Superintendents will begin with imminent Precipitation Event preparation after receiving communication indicating inclement winter weather from the National Weather service, private meteorological service (for example Meteorlogix) and local weather forecast. Once the decision to proceed with imminent storm preparation has been made, the following items take place:

1. A meeting with FRMG in-house and supplementary contract crews is held to review snow and ice removal plans and safe operating procedures; all snow and ice attachments are mounted to equipment and checked for proper mechanical operation
2. All equipment is fueled and lubricated; communication equipment is checked and tested for adequate operation
3. Crew compliments are reviewed and appropriate shifts assigned to insure safe operation of equipment
4. Trucks are pre-loaded with appropriate de-icing materials
5. Actively participate in meetings scheduled by the Department to plan for all forecast Precipitation Events and for debriefing after all Precipitation Events as per Schedule 11, Section 11.5.j

Precipitation Event Response and Assumptions

Starting the snow and ice removal activities at the beginning of a winter storm is key to effective and timely snow and ice removal. FRMG will use anti-icing technology when appropriate to proactively manage snow and ice build-up and assist with ongoing snow and ice removal operations. The following steps will be taken to insure an effective operation:

1. Crewmembers are dispatched to their previously designated and rehearsed individual route assignments prior to the Precipitation Event beginning
2. Crews are on standby pending authorization by their supervisor to begin snow and ice removal operations; predefined communication protocol is utilized to insure proper dissemination of information

3. FRMG Shift Supervisors are in constant contact with the Maintenance Superintendent and are relaying needs and any updated information to these Supervisors
4. Status reports are compiled by the Maintenance Superintendent
5. The O&M Manager reviews the accuracy of the reports and track the progress of the crews
6. The O&M Manager and the Maintenance Superintendent review the progress reports of the crews and makes adjustments in the equipment and personnel compliments as necessary

In regards to chemical applications, FRMG will take the following actions:

1. Spreader trucks and operators will be mobilized prior to the commencement of any Precipitation Event
2. Bridges are treated early as a priority in the event or in advance of the event. Normally, bridges freeze before the roadway and prompt treatment of bridge decks will avoid many accidents. Liquid anti-icing is used for these areas to help with our anti-icing efforts.
3. Early treatments as a priority in the event or in advance of the event of busy interchanges help to keep traffic moving and avoid accidents
4. Once we apply granular de-icing mixture; we allow sufficient time before plowing (see section below “Plowing Snow and Ice”)
5. We keep abreast of anticipated changes in weather conditions. All operators are informed as soon as information on new weather is received. Weather conditions often are improving or additional snow is anticipated, and by staying current on any forecast changes, we can anticipate changing conditions.

Plowing Snow and Ice

Storms can produce a range of different snow types with regards to moisture content. Wet or heavy snow seals to the pavement quickly under traffic and, normally, requires chemical treatment before plowing. Dry or powdery snow can usually be plowed away if the plowing operations begin in a timely manner. Dry snow occurs during very cold weather conditions (below 25ºF. or -4ºC.) and as long as the pavement remains dry, plowing operations can keep the surface of the road clear. The critical decision making process is the determination of when to plow and apply chemicals. As a general rule of thumb the operator can tell when to plow by watching the passing traffic. As long as the slush is soft and fans out behind the tires of passing vehicles, the salt is working, but when the slush begins to stiffen and is thrown directly to the rear of the tires, it is time to plow and spread more chemicals.

The decision making process for material usage is supplemented in the subsequent subsections of the Snow and Ice Plan please see **Sections i. (*Materials and Chemicals*) j. (*Snow Routes*) and n. (Application Procedures)**. For a complete list of equipment please refer to **Section h. (*Equipment*)**.

Drivers are trained to observe potential impacts of their plowing activities to minimize the risk of 3rd party damage, disturbance and destruction. This training includes pre-event discussion and identification of locations which have the greatest potential for 3rd party damages. In the situation that a 3rd party damage has occurred, these incidents are recorded and analyzed to identify causes and measures to avoid re-occurrence.

Post-Event Activities

As the end of the storm nears, the following items will be addressed:

1. Snow and ice on the shoulders are moved as far from the travel way as possible and to meet Category 1 requirements for removal of snow from shoulders
2. Drainage structures are cleared of obstructions so that melting snow will not be trapped on or near the travel way
3. Windrows of snow on bridges, along traffic medians and barrier rail are removed as required to avoid melting and refreezing on the pavement
4. Hauling of snow piles from the outer paved shoulders and other areas occur at the cessation of the precipitation using front end loaders and dump body trucks
5. Tree limbs and other debris is removed from the right-of-way as soon as possible
6. All equipment is checked for damages and repairs scheduled
7. Equipment is thoroughly cleaned and sprayed with an appropriate protective coating if necessary prior to storage. Parts and material inventories are restored to adequate levels
8. The O&M Manager and Maintenance Superintendent conduct a post-event review of the snow and ice operation
9. Actively participate in meetings scheduled by the Department to plan for all forecast Precipitation Events and for debriefing after all Precipitation Events as per Schedule 11, Section 11.5 j

In summary, FRMG accomplishes successful snow and ice removal through detailed planning, aggressive training, and utilization of multiple equipment and material suppliers, proactive storm response, effective communication, and post-event follow-up.

b. Safety Approach

The primary driver behind FRMG's approach to safety is a thorough training program that provides education to new operators and refreshes experienced operators on a regular basis. A well-prepared, well-trained workforce is key to an effective snow and ice response with safety protocols as a major focus of all training regimens. FRMG will implement the following training regimes and management protocols:

- The O&M Manager and the Health &Safety/Operations Superintendent and the Maintenance Superintendent will ensure that job assignments and responsibilities have been clearly defined for all subcontracted and FRMG crews before the beginning of each winter season
- Individual route assignments will be designated and rehearsed utilizing a practice run with the full equipment compliment. Dry-run rehearsals are necessary for coordination of the activity and identifying hazards that may be covered by snow during an event, such as monolithic islands, manhole covers and curbing
- A pre-winter shop training will include full reviews of the equipment for all staff. This training includes not only a review of the mechanical elements of the equipment but of safe operating procedures for elements unique to snow and ice control.

- Shift times are to be closely monitored to avoid driver fatigue and provide alert truck drivers

Please refer to the O&M Safety Plan found in **Appendix C (*O&M Safety Plan*)** to **Appendix I (*Draft Maintenance Management Plan*)** in Volume 2 for the complete outline of FRMG O&M safety procedures.

c. Quality Approach

A critical factor in meeting Project expectations, maintaining schedules, and ensuring service reliability is FRMG's O&M Quality Management Plan (OMQMP).

Quality in operations is manifested in the attention to detail of the maintenance and customer service efforts. Quality is achieved and maintained through the proper use of resources and by doing more than is expected; doing better through intentional and ongoing process improvement programs; and by applying different, new, and innovative techniques and technologies to routine tasks and assignments. FRMG has planned and will implement an intensive OMQMP program for operations through its proven uniform internal Project performance review process, thus ensuring that quality is consistently achieved and maintained on all Department assets under its care.

The FRMG OMQMP program provides a means of identifying, tracking, and resolving areas in both constant and special need of improvement. The program also provides the appropriate documentation required for compliance with its monitoring plan. Quality on snow and ice control is manifested in pre-event planning and monitoring of road conditions and truck movements and activity. FRMG will engage a number of specific tools to ensure quality compliance for snow and ice control.

A key component of FRMG's quality management of Snow and Ice Control Services is the use of full featured automatic vehicle locator (AVL) vehicle locating, tracking, alerting and management reporting systems to track snow and ice trucks. The active, full-featured AVL locating, tracking, alerting and detailed vehicle usage GPS reporting system is a live action tool used to make adjustments should problem areas be identified. The FRMG AVL system can be operated in a "Big Board" mode allowing our managers to see the current or last position of all or any part of the fleet displayed on a map-automatically updating in virtually real-time. It can alert groups or individuals via email to their computers or cell phones of any designated sensor activity or Geofence movement activity. Different sensor alerts or Geofence activity can be sent to multiple groups or individuals. Our AVL system allows FRMG to locate the nearest vehicle to a specific location to aid in dispatching vehicles to where they are needed quickly.

Quality assurance and quality control of tasks and processes related to snow and ice control will include reviewing/auditing of all three phases of Snow and Ice Control Services as detailed in **Figure 1**, reviewing/auditing will be completed by the Health & Safety/Operations Superintendent and Maintenance Superintendent.

Figure 1. Quality Assurance and Quality Control for Snow and Ice Control.

Pre-Event	During Event	Post Event
Have all winter maintenance materials been adequately prepared?	Are maintenance materials being stored and loaded in accordance with Health, Safety and Environmental best practices and Agreement requirements?	Did FRMG meet required response times for Snow and Ice Control?

The O&M Manager, the Health & Safety/Operations and Maintenance Superintendents will conduct a post review of the snow and ice operation and review performance outcomes for each event. Adjustments are discussed with the lead foreman and drivers when necessary before the next event. Communication protocols are reviewed and adjustments made.

In summary, we accomplish quality through detailed planning, comprehensive training, proactive storm response, utilization of multiple equipment and material suppliers, effective communication and post-event follow-up.

FRMG's O&M Quality Management Plan, can be found in **Appendix 4 (*O&M Quality Management Plan*)** to **Appendix I (*Draft Maintenance Management Plan*)**.

d. Facilities

For a detailed description of the facilities to be used by FRMG during Operations, please refer to Volume 2, Appendix I, the draft Maintenance Management Plan. Within this subsection, we discuss the facility in regard to snow and ice control only.

FRMG will use its primary O&M facility to stage and dispatch all snow and ice control equipment. This facility designated for snow and ice operations will be strategically located within the maintenance yard facility to maximize utilization of the equipment compliment. It is anticipated that a minimum de-icing material storage capacity of these facilities equal one-half its anticipated annual requirement. It is also anticipated that de-icing material storage capacity planning will include a 25% contingency to cover multiple applications that might be necessary on bridges, hills, intersections, etc.

Equipment specific to snow and ice control, which will be housed at the O&M facility, will include:

- Brine/alternative liquid anti-icing storage tanks
- Salt or alternative granular anti and de-icing material storage shelter with loading pad
- Hopper, blades, tank hoists, and storage space

The facility will be audited during August or September and then prepared for use. The O&M facility will have access to a generator established to provide emergency power and communications if necessary.

Prior to the winter season, adequate inventory of snow and ice, anti and de-icing materials will be stockpiled at the covered storage facilities. Storage sites are planned to maintain de-icing chemicals on hand throughout the snow and ice season and replenished as necessary to maintain one-half of the calculated annual storage needs.

e. Monitoring and Oversight

During a snow and ice event monitoring and oversight will be carried out by the O&M Manager, the Health & Safety/Operations Superintendent, the Maintenance Superintendent, Winter Maintenance Operators and TMC Operators as detailed in **Table 1**.

Table 1. Monitoring and Oversight.

Position	Oversight
O&M Manager	• Field monitoring in vehicle • Office monitoring via CCTV • Reviewing Incident reports • Oversight via AVL • Oversight of weather forecast • Oversight of communication from media and stakeholders • Actively participate in meetings scheduled by the Department to plan for all forecast Precipitation Events and for debriefing after all Precipitation Events
Health & Safety/Operations and Maintenance Superintendents	• Monitoring in the field through patrols • Reviewing Incident reports • Oversight via AVL • Oversight of weather forecast • Actively participate in meetings scheduled by the Department to plan for all forecast Precipitation Events and for debriefing after all Precipitation Events
Winter Maintenance Operators	• Monitoring in the field and reporting back to Superintendents of field conditions
TMC Operators	• Monitoring Incidents • Assist by communicating superintendent's coordination requirements to Operators following information gathered by O&M Manager and Health & Safety/Operations and Maintenance Superintendents

Following the event, information collected from the monitoring and during event oversight will be reviewed by the O&M Manager, the Health & Safety/Operations Superintendent, and the Maintenance Superintendent. The review will focus on identifying any deficiencies that could be improved as a tool for our continual improvement approach.

f. Frequency of Monitoring

During the snow event, management and winter maintenance crew members are in constant communication with operators via cell phones, or in-vehicle radios. AVL equipment will also allow for the tracking of operators and patrol crews during Precipitation Events. During a Precipitation Event, the Health & Safety/Operations Superintendent, Maintenance Superintendent or Winter Maintenance Operators will patrol the Project hourly. As an added element to FRMG's monitoring program the AVL equipment will be monitored by the O&M Manager, the Health & Safety/Operations Superintendent or the Maintenance Superintendent on a continuous basis during an event.

Post-event monitoring occurs within one hour of the event's end by the Health & Safety/Operations Superintendent, Maintenance Superintendent or Winter Maintenance

Operators. Segment assignments occur under routine patrols observing melt down areas of super elevated curves where black ice may occur after sundown, ice packs that may cause ramping of vehicles upon subsequent hits.

g. Weather Forecasting

FRMG will use a series of system to monitor weather forecasting. These systems include:

- Private weather forecasting provider
- Public weather forecasting including the National Weather Service
- Communications with adjacent jurisdictions

The private weather forecaster, will distribute information on a prescribed schedule during the winter twice daily. The details of the forecast include current and anticipated temperature, precipitation and wind conditions. This information will be distributed to the O&M Manager, Health & Safety/Operations Superintendent, Maintenance Superintendent and designated shift lead. The Health & Safety/Operations Superintendent will use this information to direct crew activities or adjust crew activities. In addition regardless of the prescribed schedule, changes to the forecast which impact road conditions will be sent via both email and text messages to the O&M Manager, the Health & Safety/Operations Superintendent, the Maintenance Superintendent and designated shift lead when weather conditions change suddenly or the National Weather Service issues winter weather advisories or warning.

FRMG's on-site management keeps abreast of anticipated changes in weather conditions. All operators are informed as soon as information on "new" weather is received. Often times, weather conditions are improving or additional snow is anticipated and by staying current on any forecast changes allows us to anticipate changing conditions. Weather services provide text notifications of anticipated precipitation to managers and on-call personnel. Routine patrols of Courtesy Patrols, maintenance crews and management coordinate observations of road conditions and report any ice packs or black ice conditions to the on-call supervisor, who will then initiate action with the standby crew.

h. Equipment

Table 2 provides a list of the equipment that FRMG anticipates using for snow and ice control. Any changes to equipment fleet shall be determined based on an annual review or updated route analysis conducted by FRMG, and in accordance with Good Industry Practice.

Table 2. Snow and Ice Control Equipment Requirements.

Equipment	Number	Size and Type
Tandem Snow Plow Trucks	7	VCL2635DLA-V Combination granular hopper with Defense Logistics Agency (DLA) spreader
Tow Plows	5	TP26-H 26-foot with 26-foot moldboard and pre-wet tank with power unit

Equipment used during storm recovery efforts includes tandem snow plow trucks with a combined granular hopper and DLA spreaders, and tow plows and digital infrared temperature

indicating system. The digital infrared temperature indicating system will be for both road surface and ambient temperatures, suitable for vehicle mounting and operation. The sensor shall accurately sense road surface and ambient temperatures in all weather conditions and will be capable of taking samples at a minimum of 10 times/second, while the vehicle is not moving or in full motion, to provide "real time" temperature readings. The system accuracy will be +/- 1.0^0F @ 32^0F, in all operating ambient temperatures from -40^0F to 150^0F. The availability of equipment assets is guaranteed through in-house operations and multiple source contracts with Subcontractors and procurement of specialty type attachments such as chemical spreaders and plows as necessary to equip trucks. FRMG will provide adequate fleet to meet or exceed snow and ice Category 1 defect, remedy's along the mainline and ramps. This equipment will be calibrated and tested for mechanical problems prior to the above referenced practice run.

1. Estimated Chemical Capacity of Equipment - It is estimated that the average salt payload for the following combinations of equipment will be:
    a) 64,000 GVW Hopper with 10 to 2 cubic yard DLA Spreader - 10 tons/load
    b) 50,000 GVW Hopper with 8 to 10 cubic yard DLA Spreader - 8 tons/load

Each item of Snow and Ice Control Equipment used will have the necessary valid registrations, permits, licenses, insurance and certifications, and will include warning light system to signify snow and ice operations.

FRMG will maintain each item of Snow and Ice Control Equipment to the minimum standard established by commercial vehicle inspection as enforced by the Colorado State Patrol Motor Carrier Safety Section, which is charged with ensuring the safe operation of all commercial vehicles and operators within the State, and the Federal Motor Carrier Safety Regulations which apply in the State of Colorado.

If any item of Snow and Ice Control Equipment is not in a safe condition, then it will be removed from the work site and immediately replaced with an item of Snow and Ice Control Equipment that meets all requirements of the Project Agreement. Any such item of Snow and Ice Control Equipment will not be returned to service until the necessary repairs or modifications have been made.

Each item of Snow and Ice Control Equipment used by FRMG will bear the name of FRMG and will be assigned a unique number that is prominently displayed on either side of the Snow and Ice Control Equipment while in use.

FRMG will equip all winter operations spreading equipment with an on board electronic spreader control system designed to control the application of highway de-icing chemicals that meets all of the requirements of Schedule 11, Section 11.6.5. All winter vehicles will be equipped with the AVL system as required in Section 12 of Schedule 11.

i. Materials and Chemicals

Similar to CDOT practices, FRMG will use a variety of treatment materials both before and after the Precipitation Events to ensure the safety of the roadways. All de-icing and anti-icing chemical materials used by FRMG will meet or exceed Pacific Northwest Snow Fighters (PNS) criteria, and materials used will be materials identified on the PNS approved products list.

Further, it will be verified that such materials will not have any known adverse reactions when used with CDOT anti-icing and de-icing materials as well as adhering to CDPHE, Air Quality Control Commission's Regulation 16.

Salt/IceSlicer will be typically applied when the temperature range is above 14^0F and brine will be applied as a pre-wetting agent for the same temperature range. We anticipate that salt will be applied at the rate of 250lb/lane mile, while the IceSlicer will be applied at the rate of 150lb/lane mile as it is more efficient.

Liquid calcium will be applied for the lower temperatures range, and sand will be used on compacted snow surface areas.

j. Snow Routes

FRMG has programmed four tandem snow plow trucks along with three tow plow attachments to the mainline. This will be sufficient to plow the entire width from left to right including the internal and external shoulders. This determination evolved as a result of FRMG's analysis of snow route requirements using SnowEx software which considers the physical features of the asset, to produce customized plow routing.

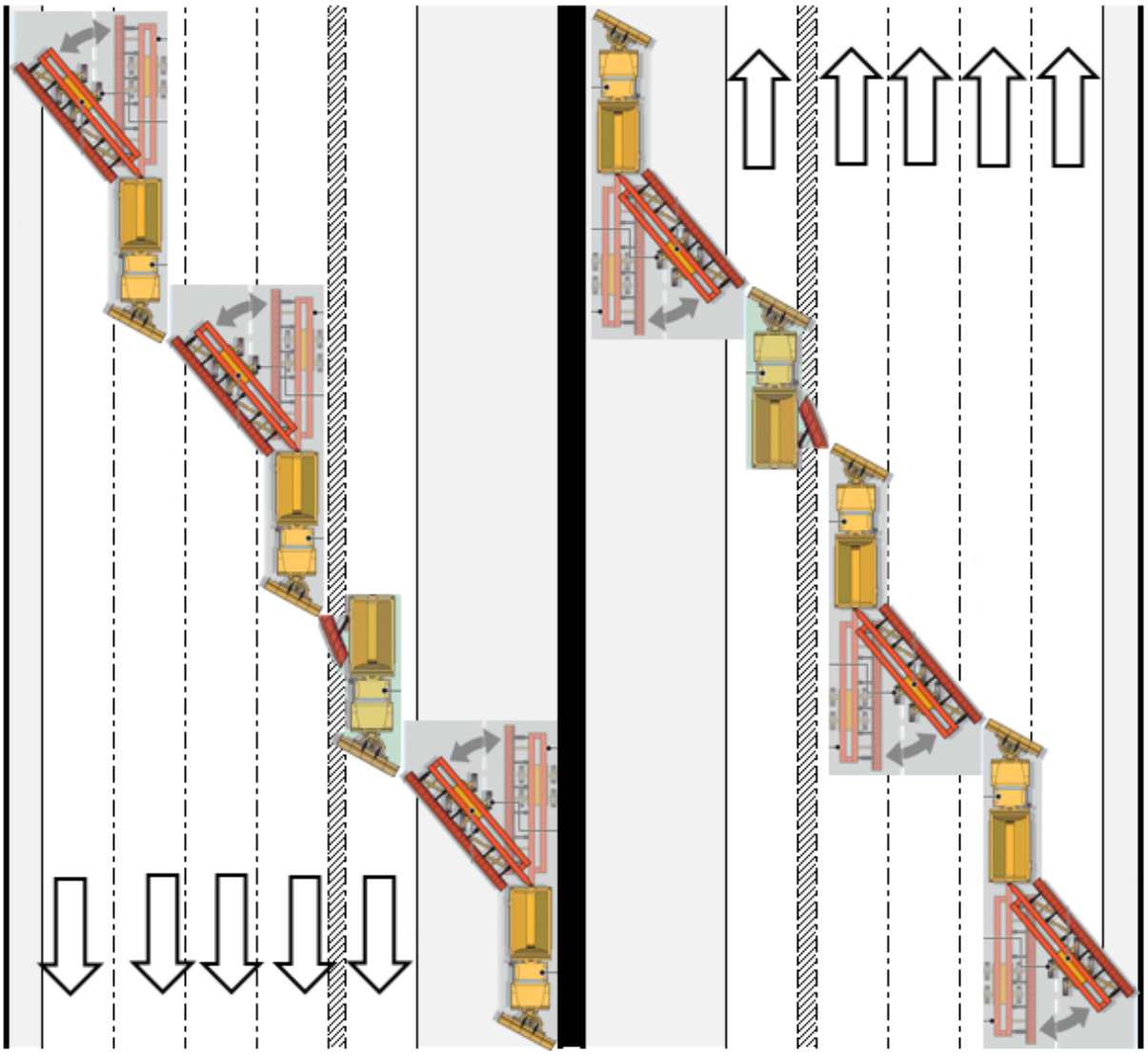
Ramps will be maintained with tandem trucks and two tow plow attachments. This will be sufficient to plow the entire width from left to right including the internal and external shoulders. This determination has been as a result of FRMG's analysis of snow route requirements.

Shoulders will be pushed clear during mainline and ramps plowing. On the lowered section of the mainline, the snow will be accumulated on the right shoulder and then will be hauled in a timely manner in compliance with response times in the Project Agreement.

Plowing patterns in and around interchanges will conform to the needs and physical characteristics of the individual location. Pavement obstructions such as curbs, rumble strips, and the like will be considered when establishing the plowing patterns on interchanges. The most prevalent problem on interchanges is the lack of adequate area for storing snow. For this reason, specific plowing patterns for each interchange are developed and the assigned operators thoroughly indoctrinated in the plowing sequence. Circuit/cycle time for the mainline and ramps is calculated at 45 to 50 minutes. Routes and fleet will be adjusted during the Term for optimal execution and to ensure that all Performance and Measurement Criteria are met.

Figure 2 represents the snow plow trucks' configuration as anticipated on a typical segment on the mainline. Trucks will enter the mainline in the order of furthest ahead in the echelon; trucks will maintain their echelon and plow all snow from left to right. FRMG plowing along multi-lane facilities utilize a left to right staggered gang plowing formation with minimal 18-inch overlapping to pick up windrows.

Figure 2. Snow Plow Trucks Configuration.



*** Please note that the detailed snow routes have been included immediately behind this Appendix A – Snow and Ice Control Plan as **Attachment 1 – Snow Plow Routes**. Routes will be adjusted during the Term for optimal execution and to ensure that all Performance and Measurement Criteria are met. In addition, **Attachment 2 – Snow Plow Route Summary Map** provides an overview drawing demonstrating FRMG's intended routing on a single map.*

k. Patrol Size

FRMG's philosophy of plowing is to fully staff and resource plowing operations such that all required cycle times and Performance Targets are safely met. Plowing resources and staffing are provided in detail in this Appendix A, **Sections h. (*Equipment*), i. (*Chemicals*) and j. (*Snow Routes*)**

FRMG Patrols are continuous every hour during snow and ice events. FRMG cross training will allow for patrols to be carried out by multiple individuals. For example, a plow truck driver may be required to complete a patrol depending on event requirements.

FRMG plans to use a 12-hour split shift during the winter season snow and ice events to avoid multiple shift changes during events and minimize the downtime for units, which occurs during a shift change. The Day Shift start will be 6am.

l. Call-Out Procedures

During winter months, FRMG maintains a continuous on-call shift responsibility of in-house personnel to operate winter maintenance equipment. FRMG maintains adequate operator coverage for spreader/plow truck operation to maintain the continuous 24-hour nature of an event. Project personnel are informed of inclement weather predictions and placed on stand-by several hours prior to anticipated precipitation. Both on call outsourced supplemental drivers and trucks, fully equipped and fully operated may be utilized to supplement the fleet. All outsourced contractors are part of the Call-Out procedure and are integrated with FRMG trucks. Backup vehicles are placed on standby as needed. Specific names and telephone numbers will be provided with the final OMP.

FRMG's O&M Manager and Operations and Maintenance Supervisors will begin imminent storm preparation after receiving communication indicating inclement winter weather from the National Weather Service, private meteorological service (i.e. Meteorlogix) and local weather forecast. Once the decision to proceed with imminent storm preparation has been made, the following items take place:

1. A meeting with FRMG in-house and supplementary contract crews is held to review snow and ice removal plans and safe operating procedures; all snow and ice attachments are mounted to equipment and checked for proper mechanical operation
2. All equipment is fueled and lubricated
3. Communication equipment is checked and tested for adequate operation
4. Crew compliments are reviewed and appropriate shifts assigned to insure safe operation of equipment
5. Trucks are pre-loaded with appropriate de-icing materials

m. Response Times

Response times of all plowing and spreading vehicles ready to load anti-icing or de-icing materials within a half hour are addressed as measured by winter operation records and AVL system monitoring. Project personnel are informed of inclement weather predictions and placed on standby several hours prior to anticipated precipitation.

FRMG's O&M Manager will begin imminent storm preparation after receiving communication indicating inclement winter weather from the National Weather Service, private meteorological

service (Meteorlogix) and local weather forecast. Once the decision to proceed with imminent storm preparation has been made, the following items take place:

1. A meeting with FRMG in-house and supplementary contract crews is held to review snow and ice removal plans and safe operating procedures. All snow and ice attachments are mounted to equipment and checked for proper mechanical operation.
2. All equipment is fueled and lubricated.
3. Communication equipment is checked and tested for adequate operation.
4. Crew compliments are reviewed and appropriate shifts assigned to insure safe operation of equipment
5. Trucks are pre-loaded with appropriate de-icing materials
6. All snowplow vehicles on any route have left the yard and ready to begin work within a half hour as measured by winter operation records and AVL system monitoring. All snowplow vehicles will complete one entire route within one hour from the time a winter unit begins its plowing and/or material application route.

n. Application Procedures

Effective de-icing chemical applications must be done as soon as practical to prevent accumulation on the road, preferably before the accumulation of 1/8 inch, and always before the accumulation of snow reaches half an inch. To assist in planning equipment requirements, the following criteria are offered:

1. Pre-treating with liquid anti-icing (brine or combination IceSlicer) will be performed at an estimated rate of 29 gallons per lane mile. All bridges and cold spots will be pre-treated within 24 hours of the predicted start of the snow/ice event. If the forecast for the predicted event calls for heavy accumulation, then the entire mainline will be treated.
2. Maximum sodium chloride (NaCl) / application rate/lane mile. The routine recommended application rate for granular chlorides is 150 pounds per lane mile and upwards to 400 lbs/ln-mile depending upon the snowfall intensity (see **Table 3** Salt Institute Application Rate Guidelines); however, we are estimating 250 pounds per lane mile for stockpile planning purposes. If timely applications are made, we estimate an average requirement of two applications per storm.

Table 3. Salt Application Rate Guidelines.

Pavement Temperature and (F) Trend	Weather Condition	Maintenance Actions	Salt Pre-wetted/Pre-treated with salt brine	Salt Pre-wetted/Pre-treated with other blends	Dry Salt	Winter and Abrasives
			Lbs./24 feet of pavement/mile			
Less than 30 F temp increasing	Snow	Plow	80 lbs.	70 lbs.	100 lbs.	Not Recommended
	Freezing Rain	Apply chemical	80-160 lbs.	70-140 lbs.	100-200 lbs.	Not Recommended
30 F	Snow	Plow & apply chemical	80-160	70-140	100-200	Not Recommended

Pavement Temperature and (F) Trend	Weather Condition	Maintenance Actions	Salt Pre-wetted/Pre-treated with salt brine	Salt Pre-wetted/Pre-treated with other blends	Dry Salt	Winter and Abrasives
			Lbs./24 feet of pavement/mile			
temp dropping	Freezing Rain	Apply chemical	150-200 lbs.	130-180 lbs.	180-240 lbs.	Not Recommended
25-30 F temperature rising	Snow	Plow & apply chemical	120-160	100-140	150-200	Not Recommended
	Freezing Rain	Apply chemical	150-200 lbs.	130-180 lbs.	180-240 lbs.	Not Recommended
25-30 F temperature dropping	Snow	Plow & apply chemical	120-169 lbs.	100-140 lbs.	150-200 lbs.	Not recommended
	Freezing Rain	Apply chemical	160-240 lbs.	140-210 lbs.	200-300 lbs.	400 lbs.
20-25 F temperature rising	Snow or Freezing Rain	Plow & apply chemical	160-240 lbs.	140-210 lbs.	200-300 lbs.	400 lbs.
20-25 F temperature dropping	Snow	Plow & apply chemical	200-280 lbs.	175-250 lbs.	250-350 lbs.	Not recommended
	Freezing Rain	Apply chemical	240-320 lbs.	210-280 lbs.	300-400 lbs.	400 lbs.
15-20 F temperature rising	Snow	Plow & apply chemical	200-280 lbs.	175-250 lbs.	250-350 lbs.	Not recommended
	Freezing Rain	Apply chemical	240-320 lbs.	210-280 lbs.	300-400 lbs.	400 lbs.
15-20 F temperature dropping	Snow or Freezing Rain	Plow & apply chemical	240-320 lbs.	210-280 lbs.	300-400 lbs.	500 lbs. for freezing rain
0-15 F Temperature rising or dropping	Snow	Plow, treat with blends and sand high-traffic areas	Not recommended	300-400 lbs.	Not recommended	500-750 lbs., spot treat as needed
Less than 0 F	Snow	Plow, treat with blends and sand high-traffic areas	Not recommended	400-600 lbs.	Not recommended	500-750 lbs., spot treat as needed

Source: Salt Institute

o. Calibration of Equipment

Calibration is an essential procedure to measure the pounds of salt and sand applied to the roadway at various auger settings in relation to truck speed. FRMG will always calibrate yearly with a supervisor/mechanic present with the operator at the beginning of the winter season. In addition, calibration will be audited as part of FRMG's quality program.

- Because spreaders vary, each truck is independently calibrated. Re-calibration is required if changes are made to the hydraulic system, if the augers have extensive wear or are resurfaced or replaced, or a different material is used.
- Since various manufactured equipment may be used, it is imperative that we follow the manufacturer's guidelines for calibration. Calibration will be completed as part of the annual winter preparation activities.
- Calibration is done separately for chemical/sand mix versus chemical only
- Each calibration chart is placed in the truck for operator reference to see how much material will be applied at each setting

p. Training

Managers and supervisors involved in operations of all levels will make preparations on an annual basis during August or September for the Precipitation Events that are likely to occur during the coming winter months. An early and continuous response throughout each storm is the most effective method of keeping roadways as safe and passable as possible. Proper planning and scheduling in the fall provides the basis for successful snow and ice removal operations. Each year FRMG will review events from the previous storm season and initiate training changes as needed. Annual training for all personnel involved in snow removal will include the following subjects:

1. Annual equipment refresher review of safe operating procedures, equipment changes (e.g.. blades), electronic application systems
2. Field and yard reviews of safe operating procedures of snow and ice equipment
3. Winter operations staff training includes environmental compliance requirements. All applicable environmental topics are covered including water quality regulations, air quality regulations, and compliance procedures in particular for loading and spreading of snow and ice chemicals
4. Performance specifications per the Project Agreement

During a Precipitation Event, direct contact between shift supervisors and employees or Subcontractors removing the snow and ice from the roadways is essential. Each piece of equipment will be provided with a standard means of communication to allow direct contact between supervisors and other crewmembers. Communication equipment will be inventoried, checked for proper operation and repairs will made prior to the winter season. A communication protocol will be established and included in the snow and ice training program.

q. Precipitation Event

FRMG records begin and end Precipitation Events by date/time of fleet mobilization for active spreading and plowing. This data is retrieved from the AVL in the vehicles providing information on all movements and actions, including real-time access, with instant live replay every ten seconds to 12 seconds while in use. This is reconciled with Supervisors' record and employee time sheets during the post-event review.

Reports from the AVL on all spreader and plowing activity are summarized with precipitation accumulation data and time return entries to each chemical storage facility. Similar to FRMG's Incident response logs, our winter precipitation reports include time-based report of all actions

and activities performed during an Event. FRMG will complete the Traction Control Survey at least two hours after start of precipitation

r. Post-Precipitation Event

As the end of the storm nears, the following items will be addressed:

1. Snow and ice on the shoulders are moved as far from the travel way as possible; drainage structures are cleared of obstructions so that melting snow will not be trapped on or near the travel way
2. Clearing of stockpile excess snow in gore areas and along barrier wall will occur using front end loaders and open bed tandem trucks
3. Windrows of snow on bridges, along traffic medians and barrier are further removed as required to avoid melting and refreezing on the pavement
4. Tree limbs and other debris is removed from the right-of-way as soon as possible
5. All equipment is checked for damages and repairs scheduled
6. Equipment is thoroughly cleaned and sprayed with an appropriate protective coating if necessary prior to storage
7. Parts and material inventories are recorded and restored to adequate levels
8. The O&M Manager or the Health & Safety/Operations Superintendent conduct a post review of the snow and ice operation
9. Identify all O&M Defects and damage which are caused by any Precipitation Event or that FRMG causes in the provision of the Snow and Ice Control Services and correct all such O&M Defects and damage

s. Sweeping

FRMG's general sweeping process (includes curb and gutter, bridges decks/curb line, concrete barrier and paved shoulder areas). The desired performance threshold indicated in Schedule 11, Appendix A-2, Section 17.1 will be met with a consistent and routine sweeping of barrier walls, bridges, gutters and special locations.

As required, during snow and ice season (for sweeping at the end of Precipitation Event) sweeping will occur within 48 hours following the end of the precipitation the event. All paved shoulders in addition to barrier walls, bridges, gutters, ramps and gore areas are swept.

Monthly cycles are scheduled and additional intermittent cycles may be necessary along the interior lanes segments. Trash and minor debris on the roadway will be removed manually where mechanical means are unnecessary or impractical. Curb and gutter sections on roadway and ramps and concrete barrier walls will be swept as needed to eliminate accumulation of material. Curb and gutter areas will be swept on a routine basis to avoid drainage problems. All bridge decks will be swept on a regular 28-day reoccurring basis.

Traffic control is managed in accordance with part six of the MUTCD manual and will include attenuators for a safe mobile operation.

t. Air Quality

Since the adoption of PM10 emissions analysis by the Department, the amount of sand spread on the streets during snow storms has been reduced by about 40%. FRMG's strategy is to use de-icing chemicals during active spreading and plowing and to use sand only on compacted snow. These mimic strategies used by the Department. Actions followed by FRMG to maintain PM10 reductions include:

- Limiting the total amount of sanding materials used
- Primary use of anti-icers, deicers, and other sand substitutes in place of sanding materials
- Comply with all requirements in Performance and Measurement Criteria for sweeping within 48 hours following the End of Precipitation Event

u. Reporting

The MMIS work module provides access to reports and also tracks all Project winter weather events similar to other work orders. The documentation of all calls and requests for action on the system are entered into the computerized service request program at the Project office. All actual work items of labor, equipment and materials are placed on the work order, and the system allows AVL data to be combined into the work order.

The AVL system will be capable of the following:

- A programmable microprocessor control console, with light emitting diode (LED), vacuum fluorescent display (VFD), or liquid crystal display (LCD) that are easy to read during both day and night operation. The controller shall display to the Spreader operator, application rate settings, gate setting, spinner speed setting, material selected both granular and liquid, and shall indicate errors. The system operating mode shall indicate manual or automatic. The system shall include a means to transfer data to an Automated Vehicle Locator (AVL) system. The discharge of de-icing material will be controlled proportional to road speed at the pre-programmed application rates
- The Spreader control system shall incorporate a data collection system that records all specified data for each event during an operation. A new event occurs every time that the system power is turned on or off, the application rate is changed, material selection is changed, data is downloaded, the operating mode changes, incorrect gate setting, or insufficient material detected
- The data collected per event shall include, truck number, event start date, event start time, 24-hour clock (HH:MM), material type solid, spinner mode (single or dual), spread rate (lbs/mi), total distance (mi), spread distance (mi), spread quantity (lbs), blast distance (mi), blast quantity (lbs), event type, material type liquid, pre-wet liquid rate (%) and pre-wet volume (gal)
- The system shall have sufficient memory to store a minimum of 100 events per category before downloading is required

The MMIS system logs the time and date of the event and thereafter begins tracking FRMG's actions. Reports can be generated in summary or detail of each work order. There may be separate work orders for cleanup activities and for spot treatments of potential black ice. In turn

the O&M Manager answers all routine maintenance requests with a narrative summary in each report.

Specific to Precipitation Events, the MMIS system will record the required information in the following two forms shown in **Figure 3** and **Figure 4** on the following pages.

Figure 3. Appendix C I-70 Snow Removal Survey

Appendix C

I-70 Snow Removal Survey

Notification No._____Date _____

Route _____Begin MP_____Interchanges? Y N

Part 1 – Traction Control Survey - Sample DURING the storm – at least 2 hours after start of precipitation

Roadway Treatment: Outcome of Sanding & Anti/Deicing

Condition indicator: Presence of traction due to bare pavement from anti/deicing chemical application or presence of sand on an icy surface. Entire highway plus emphasis areas are defined in PD 1055.2 to include bridges, hills, curves and intersections.

Outcome Measurement: Percent (%) of traction on traveled way

☐ Anti/deicer Treatment

☐ Sand Treatment

0 <50% of Emphasis Areas

1 >50% of Emphasis Areas (Curves, Hills, Intersections)

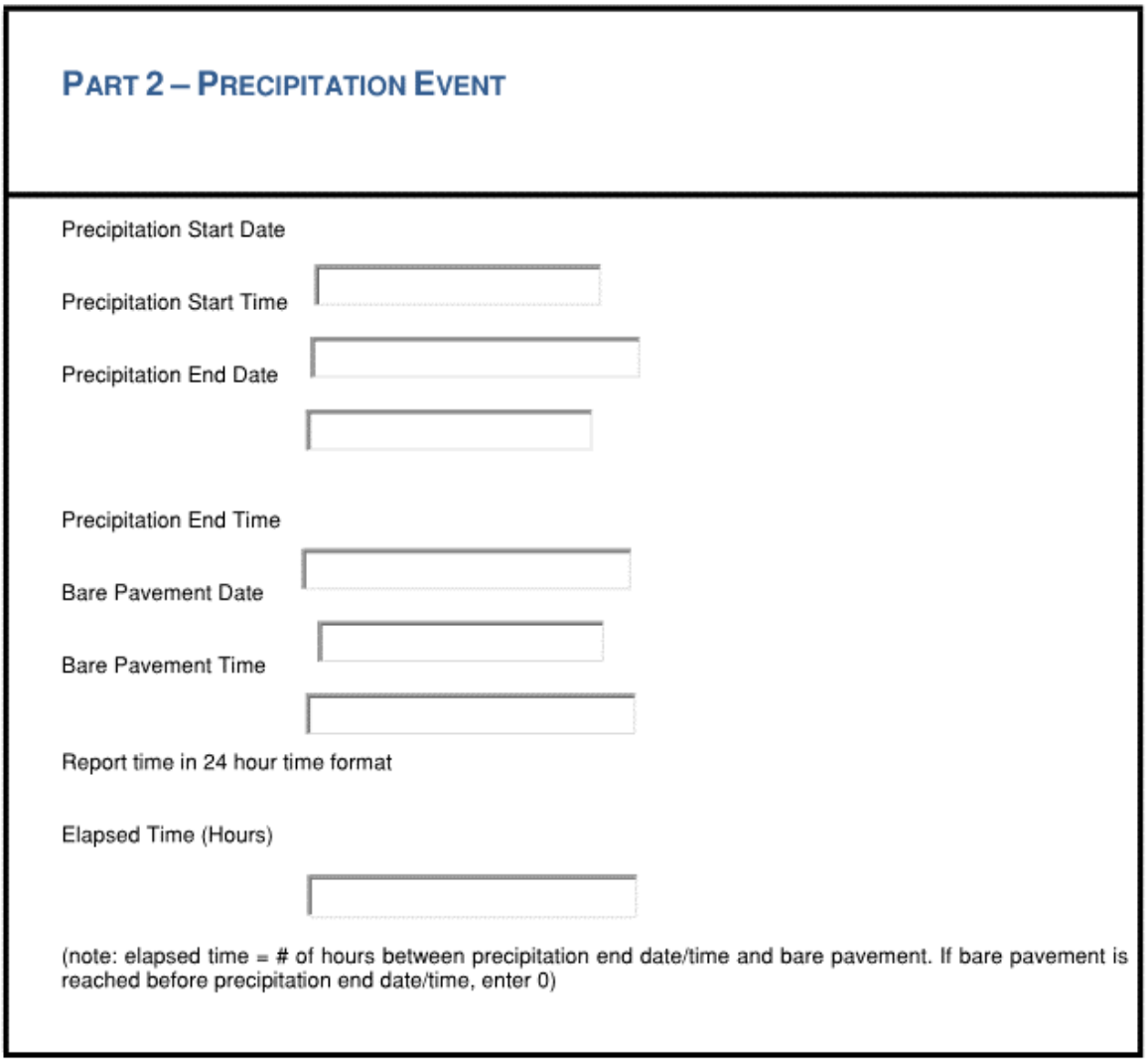
2 Emphasis Areas Only

3 All Emphasis Areas & >50% of Remaining Areas

4 Entire Area Bare Due to Deicer or Entire Area Sanded

Circle One Only

Figure 4. Part 2 – Precipitation Event



PART 2 – PRECIPITATION EVENT

Precipitation Start Date

Precipitation Start Time

Precipitation End Date

Precipitation End Time

Bare Pavement Date

Bare Pavement Time

Report time in 24 hour time format

Elapsed Time (Hours)

(note: elapsed time = # of hours between precipitation end date/time and bare pavement. If bare pavement is reached before precipitation end date/time, enter 0)

The O&M Manager follows up with reviews of each event report during routine meetings with his staff, allowing the team to analyze performance and make any necessary adjustments to future event responses.

These adjustments could include the following:

- Adjustments to application rates
- Identification of new hot spots/changing priorities
- Modifications to truck routing
- Application of alternative materials

FRMG will also actively participate in meetings scheduled by the Department to plan for all forecast Precipitation Events and for debriefing after all Precipitation Events.

The AVL equipment will be the primary source of data for reporting results along with the shift supervisor's observations and QA performance monitoring. The performance requirements are for a LOS A, which represents the highest level of service, and ranges from proactive efforts to maintain bare and wet pavement throughout a Precipitation Event. Traffic speed is to remain consistent with wet pavement and prevailing weather. In addition, Appendix A of Schedule 11, further details specific Project Performance Requirements such as response times for material application, circuit time, vehicles, and hazards which will be included in the reporting.

FRMG will update road conditions compared to the threshold performance standard as conditions change and in any event will always do so after each 12-hour shift. We will note any projected deficiency by time stamp and by corrective action taken. Response times for material application vehicle, plowing vehicles, plowing and material, application, circuit time, hazards, and isolated slippery conditions will be analyzed as part of internal and external post storm event meetings.

Minutes to each pre- and post- event meeting with be recorded and summarized for record. FRMG will use a standardized format that records location, date and time of meeting along with attendees. The minutes will serve as FRMG's official record of pre- and post- event meetings. Minutes will be distributed to all attendees and stored in FRMG's field office files for review by the Department or others as requested. The minutes will also be included in FRMG's monthly O&M Report submitted to the Department for Acceptance no later than the 10th Working Day of each month. In addition, externally FRMG will actively participate in meetings scheduled by the Department to plan for all forecast Precipitation Events and for debriefing after all Precipitation Events.

Attachment 1 – Snow Plow Routes

Attachment 2 – Snow Plow Route Summary Map

Appendix B
Incident Response Plan

Front Range
Mobility Group

CONNECTING COMMUNITIES

Appendix B - Incident Response Plan

Introduction

The Incident Response Plan demonstrates how FRMG will comply with Incident management requirements of Project Agreement, good industry practice, and the requirements and needs of relevant Governmental Authorities. The following demonstrates FRMG's understanding of these requirements. FRMG will establish a dedicated Emergency contact phone number to assist in the coordination, command and support of Emergency preparedness, response and recovery activities performed by FRMG and its partners.

FRMG's crews will perform routine patrolling to allow for a proactive and quick response to all accidents. All trucks are equipped with traffic control equipment and arrow boards for quick delineation of an accident scene. Supervisors are marshaled to the scene to decide if additional equipment and response personnel should be called.

In the event of an Incident, responses to all requests are given a priority, whether it is a vehicle accident, Hazardous Substances spill or natural disaster. FRMG will perform the necessary steps to expeditiously return the roadway back to normal traffic flows.

FRMG's Incident management plan will be implemented with multi-purpose vehicles equipped with a variety of safety equipment (including arrow boards) which double as Incident response vehicles for collisions, spills and investigations.

The foundation of the Incident response program is continual readiness and state of the art communication. Readiness means constant availability day or night, rain or shine. Effective readiness is the result of exceptional planning. The FRMG Incident response planning team includes transportation professionals, trained not only in Emergency response procedures but also in Emergency and Incident response planning, along with outside experts with special knowledge and applicable skills.

Colorado Traffic Management Center

FRMG will immediately be advised of all roadway Closures and re-openings that may affect the general lanes or off system routes through the CTMC. We will advise and notify CTMC and any surrounding community officials of any releases of Hazardous Substances into the environment, major Incidents, and the status of adverse weather events affecting the transportation system when they occur.

Post-Event Review

FRMG reviews each Emergency response and recovery operation, and in conjunction with the Department and other response agencies, may make recommended improvements to the Incident Response Plan through lessons learned. FRMG will conduct Incident debriefings to review lessons learned and best practices. These Incident debriefings will be summarized at subsequent meetings. FRMG will attend quarterly meetings with the Department to review any safety and traffic operations issues or requests related to the O&M work of any elements.

National Response Plan / National Incident Management System

The NRP and the NIMS provide a consistent nationwide method for Emergency responders from government, private sector and nongovernmental public organizations to work effectively together during domestic emergencies and Incidents.

The ICS has been adopted to establish the method for operating, managing and structuring Incident management organizations at the federal, state, regional and local level. The ICS pertains to Incident response and Emergency management, and has become a nationwide framework for Emergency responders in planning for, responding to, and recovering from Incidents. The ICS governs the coordination, roles and responsibilities of emergency responders from different organizations including on scene response operations at emergency events.

FRMG's plans for Emergency operations and Incident management, as described in this section have been designed to ensure compliance with NIMS requirements.

NIMS Training Requirements

The following NIMS and ICS training requirements are maintained for FRMG personnel and Subcontractors working on the Project and having a direct role in Emergency management and response operations:

Entry level:

- NIMS IS-700 NIMS, An Introduction
- ICS–100 (IS-100) Introduction to the Incident Command System Field Supervisors
- IS-100 (ICS-100) Introduction to the Incident Command System
- IS-200 (ICS-200) ICS for Single Resources and Initial Action Incidents
- IS-700 NIMS- an Introduction

a. Response to Incidents

Incident Response Types

In order to properly respond to any roadway Incident, it is important to be as knowledgeable as possible about the nature and extent of the Incident. Most initial calls come from law enforcement personnel experienced in Emergency management and occasionally from persons with no Emergency management experience. First calls provide limited and fragmented information. The FRMG's dispatcher is trained to get the most information possible, accurately assess the situation, and develop an appropriate response. It is critical to assess the severity of the accident or Incident and the degree of compromise to public safety, in order to provide the most appropriate response for the situation at hand. FRMG will respond to Incidents within one hour as required in Appendix A, Ref 13.1.

Minor Vehicle Accidents

A Courtesy Patrol vehicle is dispatched to the Incident site and checks in with the officer in charge. Strict adherence to the procedures is further detailed behind the tab titled "Appendix C - Courtesy Patrol Service Plan will then take place.

Severe Vehicle Accidents

These are accidents requiring a permanent lane Closure that may last from several hours to several days. The response, however, is much the same as for a minor vehicle accident. After assessment of the site, the first responder if required, may call in a crew to place a lane Closure or detour, or to perform temporary traffic control until permanent signage is in place. The FRMG responder assumes the role of site commander for FRMG and stays close to the accident site, working with the officer in charge until the site is clear or until the officer turns the area over to FRMG for repairs or removal of traffic control devices.

Structure Hits or Failures

When dealing with a structures Emergency, FRMG will immediately notify and coordinate with the Department's structures engineers. FRMG's response includes immediate preliminary assessment of damage in close coordination with the Department, and timely corrective action as appropriate to restore bridge functionality and condition. Any included bridge repairs are coordinated with the CDOT District and completed in an urgent manner.

FRMG will evaluate damage to structures and liaise with Emergency services to ensure safe working in clearing the Incident within two hours as required in Appendix A, Ref 13.3. Depending on that evaluation, FRMG's response may take one of two courses of action:

1. **No indication of structural damage** - FRMG will provide the necessary assets to protect public safety, supply adequate MOT, secure the area, and further assess impact to the structure.
2. **Structural damage indicated**: FRMG will inspect the asset for damage and failures and will work with the Department to coordinate this effort.
    a) Provide the necessary assets to protect public safety and supply adequate MOT
    b) Secure the entire area of impact, which may be the structure, adjacent/intersecting roadways
    c) Coordinate with the Department to evaluate the structural condition (loss of strength) of the overall structure or structural member

Fire Including Fire within the Cover

Detection of a fire anywhere on the corridor may occur via field observations, stakeholder communications or TMC Operators observations. Upon detection of a fire this information will be reported immediately first via 911 and then to FRMG staff using the Emergency protocol Call-Out Tree. Protocols for fire detection, reporting, prevention, and extinguishing where possible are included in Appendix 3 of the MMP.

Fires within the Cover present a uniquely serious hazard due to issues of confined space and airflow. Fire and air quality including carbon monoxide and nitrous oxide will be automatically monitored via SCADA and automatic alarms set to be triggered. Pull stations within the Cover will allow patrons to initiate an Emergency notification. FRMG TMC dispatchers will actively monitor the Cover SCADA systems from the TMC, or in the redundant Cover control room. The system will provide automatic event/alarm notification for fire or air quality conditions beyond threshold limits. Alarm and Incident notifications will be shown to FRMG TMC Operators, as well as, where required, center to center interfaces (including Fire Department), text message, email,

or phone calls. As detailed in the design submission, ventilation will be automatically controlled to achieve best results for air quality in case of fire.

The O&M Manager, Health & Safety/Operations Superintendent and Maintenance Superintendent will also receive the notification and assigned actions automatically so that they can respond promptly to alarm conditions. FRMG TMC Operators will provide redundant manual notification to appropriate FRMG staff for response.

In most cases, initial response will be by Fire Department personnel. Manual override of fire suppression or ventilation systems control should it be required will be performed by Fire Department Personnel or FRMG staff at the direction of Fire Department Personnel. Response to Cover Fire's will be a critical component of FRMG's routine Emergency service provider preparatory meetings so that it is clear which parties are responsible for which actions during an event.

Given the seriousness of fire within the Cover, all available FRMG resources will be mobilized for traffic control, incident response and Category 1 repairs. Assessment of Cover Damage will be performed as detailed in the subsection above, Structure Hits or failures.

Resources and Personnel

FRMG will use a variety of equipment to respond to Incidents, including its own mobile equipment fleet and Emergency equipment inventory, as well as that of Subcontractors and rental agencies.

Each patrol truck is equipped with absorption material for fuel spills, cold patch for emergency asphalt repair, flares, etc. Each respondent is equipped with a two-way radio/telephone to facilitate communication with the dispatcher and other responders, including Subcontractors.

FRMG will use a variety of equipment to respond to Incidents, including its own mobile equipment fleet and Emergency equipment inventory, as well as that of Subcontractors and rental agencies.

A second line of response vehicles is used for longer duration lane Closures or detours. They are equipped with flashing beacons, full size arrow boards, crash cushions, and flares. A separate vehicle equipped to work in traffic and capable of placing signs, cones and approved barricades are also available. Crash cushion vehicles are provided as necessary and are of a size and weight that meet impact requirements.

Heavy equipment such as front end loaders, cranes and emergency generators are used when necessary to restore service. Towing agencies, local equipment rental agencies and highway Subcontractors will be called upon using annual contracts with response times to provide fully operated equipment on an as-need basis. Based on the experience of FRMG's Lead Operator members, instances where heavy equipment is required will be rare. Crews and Subcontractors utilize in-house trailer-mounted arrow boards and variable message boards that are on standby if the need arises.

The role of specific FRMG personnel in Incident response is detailed in the following subsections of the OMP: **Section b. (*Organizational Structure to ensure 24-hour Response*), Section e. (*Incident Response, Management, and Reporting*) and Section j. (*Standard Operating and Communication Procedures*).**

b. Monthly Incident Reports

All monthly reports are the responsibility of FRMG's O&M Manager. The report includes time stamps of Incident notifications, nature of Incident, scene arrival with supervisory personnel and detail of location, parties involved, and actions taken for any Incidents that in the previous month resulted in damage to asset elements or required response of Emergency services.

For Incidents involving any fatalities, FRMG will submit the Incident report to the Department within 24 hours of the Incident. All non-fatality Incidents will be included in the O&M Monthly report for any Incidents that in the previous month result in damage to any elements or require response of Emergency services.

Electronic versions of any Incident report can be submitted electronically via email distribution as a PDF attachment.

c. Hazardous Substances Spills

Hazardous Substance accidents include fuel or chemical spills, which may be dangerous due to their potential corrosive or toxic nature. A HazMat team and a contractor specializing in hazardous materials may be required to conduct the cleanup. FRMG has ongoing contracts to address potentially hazardous cleanups.

Traffic control is handled like a severe vehicle accident, with particular attention given to individuals entering the accident site. Protection of the motoring public is of major concern because the public may not see or otherwise be aware of the danger. A safe distance from the spill is maintained and only qualified persons are allowed in the hazard zone. FRMG personnel have been trained to identify hazardous materials from the placard on the vehicle by utilizing a Hazardous Materials Identification book.

Even though vehicle owners are responsible for cleanup, FRMG has qualified and pre-approved and licensed contractors available for cleanup and disposal when necessary. All federal, state and local requirements are adhered to, regardless of who cleans up the site and disposes of the waste. When necessary, equipment to help prevent fuel spills from getting into streams and drainage structures is deployed.

d. Coordination of Responsibilities

Pre-Incident Contact

FRMG will calibrate its Emergency response plan with other official response teams, including the Department, Emergency management agencies, law enforcement, and key local, state and federal agencies. Each entity's role during an Incident is defined and synchronized in advance. During FRMG's mobilization, important personal contacts are established and an Incident response phone directory is published and circulated. FRMG vehicles are equipped with an Incident response phone directory and guide. Training (in-house personnel and Subcontractors):

- MOT
- Hazardous materials identification
- Communications

- Emergency response
- NIMS IS-700 NIMS, An Introduction
- ICS–100 (IS-100) Introduction to the Incident Command System

Responders rely on these publications to aid them in their decision making processes:

- Part V1 of the *MUTCD*
- CDOT *Standards and Specifications*
- Planned Detour Routes
- Detailed drawings on how to close the various traffic lanes using the first responder vehicle (FRMG drawings)
- Chemical Placard Identification Manual

Appendix C
Courtesy Patrol Service Plan

Front Range
Mobility Group

Appendix C - Courtesy Patrol Service Plan

FRMG Courtesy Patrols (Courtesy Patrols) will be utilized to reduce congestion and potential safety risks on the Project, and will provide assistance when motorists are stranded or disabled. FRMG will provide Courtesy Patrol vehicles and staff along with dedicated dispatch staff (including colocation with CTMC staff unless otherwise agreed by the Department) responsible for dispatching of Courtesy Patrol vehicles when there are Incidents, accidents, or other events requiring the services of Courtesy Patrol vehicles. FRMG's Courtesy Patrol will interface with the Department's Mile High Courtesy Patrol program and in coordination with the Project Incident Management Plan. Courtesy Patrol Services will include the following:

- Continuously patrol within the Project during peak and non-peak traffic hours and weekends
- Providing towing and motorist assistance services that quickly locate, assist or remove disabled vehicles
    - Locate a disabled vehicle on the shoulder of the highway segment and at the motorist's election, move the vehicle to an appropriate Drop Site and provide the limited assistance available to FRMG (i.e. flat tire, out of gas, etc.) if such assistance will make the vehicle operational
    - Locate a disabled vehicle on the highway segment and at the motorist's election, move the vehicle either to the shoulder of the highway segment or to an appropriate Drop Site, and provide the limited assistance available to FRMG if such assistance will make the vehicle operational
    - Assist motorists, local agencies or Emergency services as requested, concerning an accident or other Emergency on the highway segment. Such assistance includes, without limitation: towing or pushing vehicles as directed, protecting the scene of an accident, cleaning up debris caused by an accident, and calling and assisting local law enforcement in the event of an accident
- Provide on-call severe weather emergency or planned Special Event towing services
- Remove debris or other hazards from the roadway not requiring additional resources or equipment
- Collect and report data to FRMG dispatchers and CTMC/the Department

Courtesy Patrol Operators, vehicles, and dispatchers will adhere strictly to the specifications described within this plan.

1.1 General Requirements

A. The location and limits of the patrols will be the I-70 Mainline within the O&M Limits.
B. FRMG will patrol and monitor the Project within the O&M limits every Calendar Day except for New Year's Day, Thanksgiving Day, and Christmas Day. The hours for patrol and monitoring will be 6:30 am to 8 pm for weekdays, and 10 am to 7 pm for weekends. FRMG will patrol and monitor regardless of weather conditions. Any extensions of operating hours due to Emergencies, Severe Weather Event or planned Special Events as identified by FRMG and accepted by the Department, or as required by the

Department, (up to 30 hours per contract year for all required vehicles, dispatch staff, and required personnel and equipment) will be the responsibility of FRMG.

C. FRMG will provide full-time dedicated dispatch staff responsible for dispatch of FRMG's Courtesy Patrol Vehicles when there are Incidents, accidents, or other events requiring the services of the Courtesy Patrol Vehicles. FRMG will also interface with the Department's Mile High Courtesy Patrol program. FRMG's dispatch staff will be co-located with the Department's CTMC dispatch staff, unless otherwise agreed by the Department. FRMG's dispatch staff may also operate the CCMS as required in Section 3.2.3 of Schedule 11 if FRMG can demonstrate to the Department's satisfaction that both functions can be carried out as per the requirements of Schedule 11.

D. FRMG will respond with vehicles to any calls on the Tolled Express Lane(s) or General Purpose Lane(s) within 15 minutes of being dispatched from the Department's call center or authorized Department representative. All vehicles will be towed to a designated Drop Site. Drop Sites will be open at all times during the patrol and monitoring hours set out in Section 1.1.B. of Appendix B of Schedule 11. Furthermore, Incidents or accidents will be moved to the nearest shoulder, or a location that is safe to all, to open all lanes of the Tolled Express Lane(s) and General Purpose Lanes. FRMG will use flatbed or wrecker tow trucks to remove vehicles from the scene, and these trucks will meet the requirements in Schedule 11 and contain all the equipment that is set forth by the Colorado PUC. No gas, tire change, or jump start will be given to anyone in the Tolled Express Lane(s) and General Purpose Lanes due to the danger of the location. Cell phones will be provided for Emergency uses only.

E. FRMG will provide the Courtesy Patrol Service vehicles needed to perform the assistance services mentioned above.

F. FRMG will comply with all Laws regarding travel on the shoulders of any highway areas.

1.2 Specific Work Requirements

A. Work Requirements - FRMG will provide such services according to the following requirements:

1. All services will, at all times, be provided by FRMG free of any charge to, or payment from, the disabled motorists or any other person or entity, public or private. FRMG will refuse any offers of other payment or gratuities of any kind.
2. FRMG will provide the services to disabled motorists only after FRMG explains to the motorist the services to be provided (including the Drop Site, and that the services are free of charge), and only after requesting and obtaining the motorist's consent to such services. The services may be refused by the motorist at any time.
3. Subject to the motorist's consent, it is preferable for FRMG to move the vehicle from traffic or from the shoulder (whichever is applicable) off of the highway to a Drop Site before providing additional services, in order to eliminate any hazard or congestion that might result if FRMG provided service in traffic or on the shoulder.
4. FRMG will move a disabled vehicle that is in traffic to the shoulder of the highway and provide limited assistance to the vehicle on the shoulder, as an alternative to having the vehicle moved from the highway to a Drop Site.
5. FRMG will provide service(s) chosen by the motorist; however, FRMG will not provide any service not described herein.

6. FRMG will report all occurrences causing traffic congestion, all Incidents requiring FRMG to be in and out of service, and each beginning and ending shift to the Department when the event occurs.

B. Drop Sites - FRMG will obtain the right to use suitable "Drop Sites" near the Project. A "Drop Site" is defined as any business location to which the FRMG can tow (and leave) the disabled vehicle, and from which the motorist of the disabled vehicle can safely make arrangements to be picked up and/or to have the vehicle repaired, subject to the specific conditions described below.

1. Specific Drop Site Conditions - Drop Sites will satisfy all of the following specific conditions:
    a. The site(s) will be located as close as reasonably possible to the highway, and within the Project limits
    b. The sites will be well lighted and must have a working phone (pay or business) available to the public on the premises
    c. It is preferable, but not required, that each business Drop Site be able to provide assistance to the disabled vehicle, e.g. full service gas stations, tire stores, or other repair facilities
    d. Businesses used as Drop Site(s) must allow a disabled vehicle to remain on-site, free of charge, for at least three hours, in order to provide sufficient time for the motorist to make suitable arrangements
    e. FRMG will have written evidence from the owner/operator of the business of FRMG's right to use that business as a Drop Site

2. General Drop Site Requirements - FRMG will also comply with the following general requirements concerning Drop Sites:
    a. FRMG will not receive any payment or compensation of any kind from such businesses in connection with, or as a result of, the program services, including for any repairs made to the vehicle by the business.
    b. The particular Drop Sites used by FRMG may vary from hour to hour, depending on the conditions at each site during the hours of operation of the patrol.
    c. FRMG will provide a list of Drop Sites, listed by hour each Drop Site is available for use, to the Colorado State Patrol and to any local law enforcement agency with jurisdiction over such sites immediately upon commencement of the O&M Work. FRMG will also provide any modification of such list to such agencies and the Department within one Working Day of that modification.
    d. As described above, FRMG will obtain the motorist's consent to move the motorist and the disabled vehicle to a Drop Site. FRMG will explain to the motorist that they have only three hours at the Drop Site to make suitable arrangements or their vehicle can be towed away at their expense.
    e. The Department will not be responsible for any motorist injury or vehicle damage resulting from FRMG’s selection or use of a particular Drop Site.

f. FRMG will not leave a motorist and/or a disabled vehicle at a particular Drop Site if, under the circumstances, that Drop Site presents an unreasonable risk of harm to the motorist or vehicle.

3. Work Prohibitions - The success of this Courtesy Patrol program relies heavily on public relations and on the public's perception of the program's purposes and operation and, therefore, on the conduct of FRMG and its operators in performing the program services.

The Department has determined that all of the actions listed below would create a negative public image, present a problem for local law enforcement concerning traffic management, and interfere with the operation and success of the program. Therefore, at all times during the performance of the Courtesy Patrol Services, FRMG, its operators, and its employees will not:

1. Solicit membership in any commercial/business organization or association, including vehicle repair or service associations
2. Recommend or pressure motorists to use any towing service other than the Courtesy Patrol for a disabled vehicle
3. Recommend, or pressure motorists to use, any business (including Drop Site businesses) for service on a disabled vehicle
4. Radio for an alternative towing service, except when specifically asked by a motorist to do so, after the free Courtesy Patrol Services have been offered and explained to the motorist
5. Tow a vehicle to a location other than the shoulder of the highway segment, or to the designated Drop Site nearest the vehicle location
6. Interfere with a private sector towing service that is already present at the immediate location of a disabled vehicle. When FRMG arrives at the vehicle in such circumstances, FRMG should stop and offer assistance only to the motorist
7. Patrol near another Courtesy Patrol Services vehicle off the Project limits
8. Stay at the scene of an accident on the highway segment after the local law enforcement authorities have arrived at the scene, unless requested by local authorities to assist at the accident scene
9. Refuse the orders of a law enforcement officer, or any directions the Department, or his/her designee, as provided to the FRMG
10. Tow a disabled vehicle while the motorist, or other occupants of the disabled vehicle, are in the towed vehicle, or leave any unattended occupants on the freeway while towing the vehicle. Patrol staff will contact FRMG dispatcher and request alternate transport of such occupants (e.g. other Courtesy Patrol Service vehicle or police vehicle).
11. Accept tips, money, or any other payment or compensation of any kind from the disabled motorists for the services provided
12. Patrol with any other person in the patrol vehicle, unless that person is directly associated with the FRMG
13. Commit traffic violations of any kind including without limitation, speeding, or illegal lane changes
14. Perform any act that provides an unfair competitive advantage to any private tow service

15. Use the vehicle's yellow warning lights other than as authorized by law. The yellow warning lights will be activated only when the vehicle is operating on the roadway to eliminate hazards to other traffic, as required by Colorado Revised Statutes 42-4-214.
16. Complete services as a private tow service when services were initiated as Courtesy Patrol Service. This includes staying at the scene of an Incident until the end of patrol hours in a FRMG assigned shift, removing Courtesy Patrol Service signs, and then performing services as a private tow service for a fee. Courtesy Patrol Service signs will be put in place before entering, and removed and upon leaving, the freeway.

FRMG will notify the Department of any of its operators/employees who perform such actions and FRMG will take immediate action to remove such operators/employees from further performance of program services.

D. Patrolling - FRMG will dispatch the appropriate number of Courtesy Patrol Service vehicles to patrol the Project and to meet the response timeline as set out in PA Requirements. The operators/drivers of the Courtesy Patrol vehicles will be sufficiently spaced to adequately provide continuous coverage. The Courtesy Patrol Service vehicle(s) will patrol the designated highway segment for disabled vehicles in need of assistance and, upon finding such vehicles, remove such vehicles from the traveled portion of the highway segment and/or providing assistance to such vehicles as quickly as possible.

When a disabled vehicle Incident/accident is discovered, the patrol vehicle will respond as follows:

1. **Arriving at a Disabled Vehicle on the Shoulder:** When a FRMG operator finds a disabled vehicle on the shoulder of a highway segment, the operator will pull directly behind the vehicle. However, the operator will not turn on the towing vehicle's yellow warning lights unless the disabled vehicle or the towing vehicle poses a hazard to other motorists.

   The operator will communicate data collection requirements to the CTMC dispatch for detection (if the operator is the first to identify the Incident) and verification (location of the Incident based on the initial radio report).

   The operator will then exit the patrol vehicle, distribute Department's program brochure, and offer the program services to the motorist. Following directives provided by the Department, the operator will explain to the motorist:

   a. The Courtesy Patrol is a Department program
   b. The program is publicly funded
   c. The services are free of charge to the motorist
   d. Quick clearance Benefits
   e. The motorist has the option to refuse or accept the service
   f. Only particular services may be provided to the motorist (as defined below)

g. The nature of the Drop Site(s) available
h. The motorist has the option to leave his/her vehicle on the shoulder of the freeway or to be taken to a Drop Site
i. Law enforcement may provide authorization to override a motorist's refusal to move the vehicle.

FRMG's operator will then request the motorist's consent, to such service, and must obtain such consent, in writing, before providing service.

The FRMG's operator will offer to allow the motorist to use the mobile telephone equipment in the Courtesy Patrol Service vehicle, and the motorist will be allowed up to five minutes of local calls at no charge to the motorist.

If the motorist refuses the service, FRMG's operator will contact the CTMC dispatch to determine if the operator should leave the scene to continue patrolling or protect the vehicle until law enforcement arrives.

If the motorist consents to service and if the operator can make the vehicle operational by providing the limited assistance available to the FRMGs operator, then the operator will proceed as follows:

a. If the motorist does not consent to have the vehicle moved, and the operator can render service on the shoulder with minimal hazards created, then the operator will render such service on the shoulder for a period not to exceed 10 minutes. If the operator cannot make the vehicle operational within 10 minutes then, with the motorist's consent, the operator will move the disabled vehicle and motorist to the Drop Site nearest the location of the vehicle. If the motorist does not consent to moving the disabled vehicle and the operator has offered all available options of the Courtesy Program to the motorist, the operator will notify his/her supervisor and the appropriate law enforcement agency then leave the scene immediately and continue patrolling, unless dispatch and/or law enforcement direct them to stay on scene.
b. If the motorist does consent to have the vehicle moved, it is recommended that the vehicle be moved to the nearest Drop Site to provide assistance.

After the vehicle is moved to the shoulder or if the operator provides assistance on the shoulder the operator will notify CTMC dispatch that the lane is clear. When the disabled vehicle and the motorist are moved safely to the Drop Site and/or assistance provided at the Drop Site, the operator will notify the CTMC dispatch that the Incident has been removed from the roadway and shoulder. The operator will immediately return to patrolling.

2. **Arriving at a Disabled Vehicle in Traffic:** When FRMG's operator finds a disabled vehicle in traffic, the operator will pull directly behind the vehicle as soon as possible, and turn on the tow vehicle's yellow warning lights.

   FRMG's operator will communicate data collection requirements to the CTMC dispatch for detection (if the operator is the first to identify the Incident) and

verification (location of the Incident based on the initial radio report).

FRMG's operator will then ask for the motorist's consent to move the disabled vehicle, and the motorist, to a Drop Site (first choice), or to the shoulder of the highway segment (second choice). If the motorist consents, the operator will take appropriate action and inform the CTMC dispatcher of the Incident's status, when the blocked lane has been cleared, and when the Incident has been removed from the roadway and shoulder. FRMG's operator will then exit the vehicle and explain the Department's program to the motorist, and the services available.

If the motorist refuses, the operator will immediately contact local law enforcement to report the disabled vehicle in traffic, and the operator will stay directly behind the disabled vehicle with yellow warning lights activated until the vehicle is moved from traffic or until a local law enforcement officer arrives. The operator will follow the instructions of the local law enforcement officer and inform the CTMC dispatcher of the Incident's status.

3. Arriving at an Accident: When the operator finds an accident on the highway, the operator will pull directly behind the vehicle(s) as soon as possible and turn on the yellow warning lights. The operator should then carefully exit the patrol vehicle and discuss the situation with the motorist(s).

   The operator will communicate data collection requirements to the CTMC dispatch for detection (if the operator is the first to identify the Incident) and verification (location of the Incident based on the initial radio report).

   If there are injuries, the operator will not attempt to move the vehicle(s), but rather immediately call 911 and discuss further action with local law enforcement. The operator will follow all instructions made by local law enforcement and inform the CTMC dispatcher of the Incident's status.

   If there are no injuries (accident involves only property damage) but the vehicle(s) cannot be safely driven, the operator will explain the program to the motorists and ask the motorist's consent to move the vehicles from the traveled portion, median, or ramp of the highway and inform the CTMC dispatcher of the Incident's status.

   If the motorist does not consent, then the operator will stay immediately behind the vehicles until local law enforcement arrives, will assist law enforcement as requested, and inform the CTMC dispatcher of the Incident's status.

   If the motorist consents, the operator will request additional Courtesy Patrol assistance before taking further action. (The operator should not move one of the vehicles if that means the other disabled vehicle will remain alone in traffic, but instead protect the accident scene by staying directly behind both vehicles until assistance arrives). If the motorists have already fulfilled the requirements of Colorado Revised Statutes 42-4-1603, concerning exchanging identification/information, then when assistance arrives, the operator(s) should move the disabled vehicles to the nearest Drop Site if damages appear to total less than $1,000.00 (indexed). If the motorist(s) have not exchanged such information, then

the operator(s) will move the vehicles to the nearest suitable location for that purpose in accordance with C.R.S. 42-4-1602(2).

Under no circumstances will an operator attempt to repair an accident vehicle in an attempt to make it mobile.

The operator will communicate data collection requirement to the CTMC dispatch when the Incident has been moved from the travel lanes and when the Incident has been removed from the roadway and shoulder.

1.3 Specific Equipment Requirements

The Courtesy Patrol Service roving fleet will contain at a minimum 50% towing vehicles, the remainder of the fleet (maximum of 50%) will be motorist assistance vehicles.

A. The Courtesy Patrol Service vehicles will be equipped, at a minimum, with the following:

Towing vehicles:

1. Wheel lift towing equipment, including safety straps with a minimum lift rating of 3,000 pounds
2. Hydraulic boom lift capability with a static rating of 5,000 pounds
3. Winch cable with an 8,000 pound rating on the first layer of cable
4. Towing slings rated at 3,000 pounds
5. Tow chains of 5/16" alloy or OEM specs, and J.T. hook assembly
6. Yellow/amber warning lights with front to rear (360 degree) directional flashing, with on/off switch in cab
7. Power outlets ("hot boxes"), front mounted, with outlets compatible with 12-volt booster cables
8. Heavy duty, 60+-amp battery
9. Two-way radio communications with base office
10. Cellular telephone
11. Cab Lighting
12. Rear work lights
13. Safety D-ring on rear of truck;
14. Floor jack on rollers with a 2-ton rating
15. All equipment necessary to operate the towing vehicles during winter driving conditions (i.e. chains, studded snow tires, etc.)
16. Wrap around push bumper
17. AVL

Motorist assistance vehicles:

1. Winch cable with a 12,000 pound rating on the first layer of cable
2. Tow chains of 5/16-inch alloy or OEM specs, and J.T. hook assembly
3. Two (2) tow straps rated at 53,000 pounds, minimum
4. Yellow/amber warning lights with front to rear (360 degree) directional flashing, with on/off switch in cab
5. Power outlets ("hot boxes"), front mounted, with outlets compatible with 12-volt booster cables

6. Heavy duty, 60+-amp battery
7. Two-way radio communications with base office
8. Cellular telephone
9. Cab Lighting
10. Rear work lights
11. Safety D-ring on rear of truck
12. Floor jack on rollers with a 2-ton rating
13. All equipment necessary to operate the motorist assistance vehicles during winter driving conditions (i.e. chains, studded snow tires, etc.)
14. Wrap around push bumpers
15. Automated Vehicle Location (AVL)
16. Child restraints in accordance with C.R.S. 42-4-236

B. In addition to the specific vehicle equipment described above, at the start of a shift, the Courtesy Patrol Service vehicles will contain each of the following items in order to ensure adequate service to disabled vehicles. These items will be promptly replenished prior to the next shift, and as needed:

Towing vehicle:

1. Unleaded gasoline (5 gallons) available in an easy access gas transfer system
2. Safety chains measuring a minimum of 5 ft. (1 each)
3. Radiator water (5 gallons); anti-freeze will be added to the water when needed to keep the water in a liquid form
4. Four-way lug wrench (metric) (1 each)
5. Four-way lug wrench (standard) (1 each)
6. Rechargeable air bottle (100 psi capacity), hoses and fittings to fit tire valve stems (1 each)
7. Flashlight and spare batteries (1 each)
8. Booster cables, 25 ft. long minimum, 3-gauge copper wire with heavy duty clamps with one end adapted to truck's power outlets (1 set)
9. Funnel, multipurpose, flexible spout (1 each)
10. 36-inch highly visual orange traffic cones with reflectorized bands (5 each)
11. Reflector vest for the operator (1 each) (Type III night and day time)
12. First aid kit, 16 units (1 kit)
13. Fire extinguisher, 1OABC (1 each)
14. Hand broom (1 each)
15. Snow shovel (1 each)
16. Traction sand (20lbs)
17. Flares, 30 minute (3 each)
18. Reflective Triangular Warning devices (3 each)
19. Dry floor
20. Personal protective equipment such as gloves, glasses, etc.

Motorist assistance vehicle:

1. Unleaded gasoline (5 gallons) available in an easy access gas transfer system
2. Safety chains measuring a minimum of 5 feet (1 each)

3. Radiator water (5 gallons); anti-freeze will be added to the water when needed to keep the water in a liquid form
4. Four way lug wrench (metric) (1 each)
5. Four way lug wrench (standard) (1 each)
6. Toolbox containing:
   - Screwdrivers: Standard 1/8, 3/16, ¼, 5/16, (1 each), Phillips head #1 and #2 (1 each)
   - Star Driver (1 set)
   - Needle nose pliers (1 pair)
   - Adjustable rib joint pliers—2 inch minimum capacity (1 pair)
   - Adjustable wrenches, 8 inch (1 each) and 12 inch (1 each)
   - 5 pound hammer (1 each)
   - Rubber mallet (1 each)
   - Electrical tape (20 yards)
   - Duct Tape (20 yards)
   - Tire pressure gauge (1 each)
   - Mechanic's wire (25 foot roll)
   - Bolt cutter—24 inch or larger (1 pair)
   - Complete set of box wrenches, metric and standard (1 set each)
7. Rechargeable air bottle (100 psi capacity), hoses and fittings to fit tire valve stems (1 each)
8. Flashlight and spare batteries (1 each)
9. Booster cables, 25 ft. long minimum, 3-gauge copper wire with heavy duty clamps with one end adapted to truck's power outlets (1 set)
10. Funnel, multipurpose, flexible spout (1 each)
11. 36-inch highly visual orange traffic cones with reflectorized bands (5 each)
12. Reflector vest for the operator (1 each) (Type III night and day time)
13. First aid kit, 16 units (1 kit)
14. Drinking water, individually sealed bottles, minimum 16 oz. (12 each)
15. Fire extinguisher, 1OABC (1 each)
16. Hand broom (1 each)
17. Snow shovel (1 each)
18. Traction sand (20lbs)
19. Flares, 30 minute (3 each)
20. Reflective Triangular Warning devices (3 each)
21. Dry floor
22. Personal protective equipment such as gloves, glasses, etc.

A. FRMG's operators will wear Department approved uniforms. Uniforms will include, at a minimum, shirts covering the chest and armpits, full length pants, and protective footwear. FRMG will submit uniform samples for review and Acceptance of the Department prior to beginning work and in the event changes are proposed. The FRMGs operators will wear high visibility safety apparel. These items will be provided and maintained by FRMG. FRMG's operators will wear hats with FRMG logos at all times while patrolling.

B. FRMG's operators will not smoke during patrol operations and/or while assisting motorists.

C. FRMG's operators will not use, be under the influence of, or have in their possession any alcohol, marijuana, or illegal substances during patrol operations. Operators will not carry firearms, or any device whose primary function is as a weapon, either on their person or in the towing vehicle.

D. FRMG's operators will express a positive, helpful, cooperative attitude when dealing with motorists.

E. Any new operator assigned by FRMG to the program, will be properly trained in the Courtesy Patrol program and field operations. The new operator will accompany a current operator, experienced with the Mile-High Courtesy Patrol, for at least five shifts prior to patrolling a highway.

F. Any new operator assigned by the FRMG to the Courtesy Patrol program will complete required FRMG training, which will be consistent with training on the Mile High Courtesy Patrol program, prior to patrolling a highway segment.

1.4 General Equipment and Operator Requirements

FRMG will comply with the general equipment and operator requirements described in this section.

FRMG will provide the Courtesy Patrol Service vehicles needed to meet the performance requirements in Schedule 11. The Courtesy Patrol Service vehicle(s) will meet the following requirements at all times during the Construction and Operating Periods.

A. Tow trucks: Tow trucks will be Colorado licensed, including Public Utility Commission licenses, and be an insured Class A tow truck with a minimum gross vehicle rating of 10,000 pounds, dual wheel chassis and four (4) ton recovery equipment rating. Flatbed "roll back" service trucks may be used in-lieu-of boom type wrecker trucks. Flatbed trucks must be equivalent in capacity to specified boom type trucks (excluding vertical lift) to safely handle the scope of work.

B. Motorist assistance vehicles: Motorist assistance vehicles will be at minimum, a full size, one ton crew cab four-door, long bed pickup truck with a minimum gross vehicle rating of 10,000 pounds, insured, equipped with and capable of carrying the equipment specified.

C. All Courtesy Patrol Service vehicles will be completely operational, in sound mechanical condition, and in full compliance with applicable legal requirements at all times, for the performance of the program services.

D. The Courtesy Patrol Service vehicle's exterior will be reasonably clean at the beginning of each shift, free of road grime, grease, and articles/equipment not needed for the program. No body damage and/or broken glass will be permitted on the vehicle at the start of a shift.

E. The inside of the vehicle will be kept clean. The seat and floor will be free of dirt, grease and any other substance that may transfer to someone's clothing by contact. The seat will not be torn. Exposed springs, seat stuffing or damaged upholstery will not be

permitted. Torn dashboards, missing screws, hanging hoses or wire, or any other unsightly items inside the cab will not be permitted.

F. FRMG will maintain a backup Courtesy Patrol Service vehicle at all times and will use the backup to replace any disabled or otherwise unavailable Courtesy Patrol Service vehicle.

G. The towing vehicles and motorist assistance vehicles must be a single color, as accepted by the Department.

H. The vehicle will display a 15 inch by 26 inch (minimum) Courtesy Patrol logo sign on each door at all times during performance of program services. FRMG will have signs accepted by the Department to verify logo and branding consistency with the Department's Mile High Courtesy Patrol program. FRMG name, phone number, and/or logo will not be permitted anywhere on the vehicle, unless completely covered with the Courtesy Patrol Service signs during performance of program services. All private information including, but not limited to logos, contact information, etc. will be completely covered at all times while a vehicle is in service.

I. The Courtesy Patrol Service signs will be removed from the vehicle at all times when the vehicle is used for purposes other than the Courtesy Patrol Service program. FRMG will cover or remove future branding/sponsorship information when vehicles are not in service for Courtesy Patrol Service activities.

J. FRMG will only be required to perform services up to the capacities of their equipment. If situations are encountered outside of their capacities, the operators will:

1. If on shoulder, offer use of cellular phone
2. If in roadway, alert motorists by activating yellow warning lights and contacting the responsible law enforcement agency
3. When a police officer is at the scene, return to patrolling, unless otherwise ordered
4. When cellular phones are provided, their usage must be reasonable to the situation. FRMG will have the right to control unreasonable requests (such as calls outside the 303, 720, or 719 area codes). FRMG will provide the cellular phone numbers to the Department upon request.

1.5 Safety and Vehicle Occupants

FRMG will make provisions to transport all occupants of a disabled vehicle to the shoulder of the road or to the Drop Site. Under no circumstances are any occupants or pets to be left unprotected in the disabled vehicle while the vehicle and operator are transported to the shoulder of the road or a Drop Site

1.6 Radio Procedures

The Department has developed and will provide radio procedures for use by the FRMG's operators, unless FRMG has developed radio procedures that are otherwise approved by the Department. The Department may periodically update procedures, where such updated procedures will be provided to FRMG in writing. A schedule for implementation of the updated procedures will be provided by the Department for FRMG to follow, unless alternate

arrangements are approved by the Department. FRMG will provide all the radios required for the Courtesy Patrol Services program within the Project.

1.7 Mail-in Cards

FRMG will give every assisted motorist a mail-in card, and a program brochure. The card will aid the Department in tracking those services provided to the motorist and the public's reaction to the program. The Department will provide FRMG with the mail-in cards and program brochures. If mail-in cards and/or brochures are updated, FRMG will distribute the most recent version.

1.8 Paperwork

FRMG will be required to complete an electronic log of each motorist assist and a log of total miles driven each shift for each operator. Motorist assist logs will also include data collection points of detection, verification, lane clearance, and roadway clearance times. FRMG's vehicles that are required to use express toll lanes will also complete a toll log. The logs will be accurate and completed at the end of each shift. FRMG will submit these logs electronically through the AVL system in chronological order for each operator.

1.9 Training and Operational Meetings

All operators will receive orientation training provided by the FRMG and accepted by the Department, prior to the operator performing Courtesy Patrol Services duties. FRMG will not allow operators not having this training to perform any duties of the Courtesy Patrol Services program.

Front Range
Mobility Group

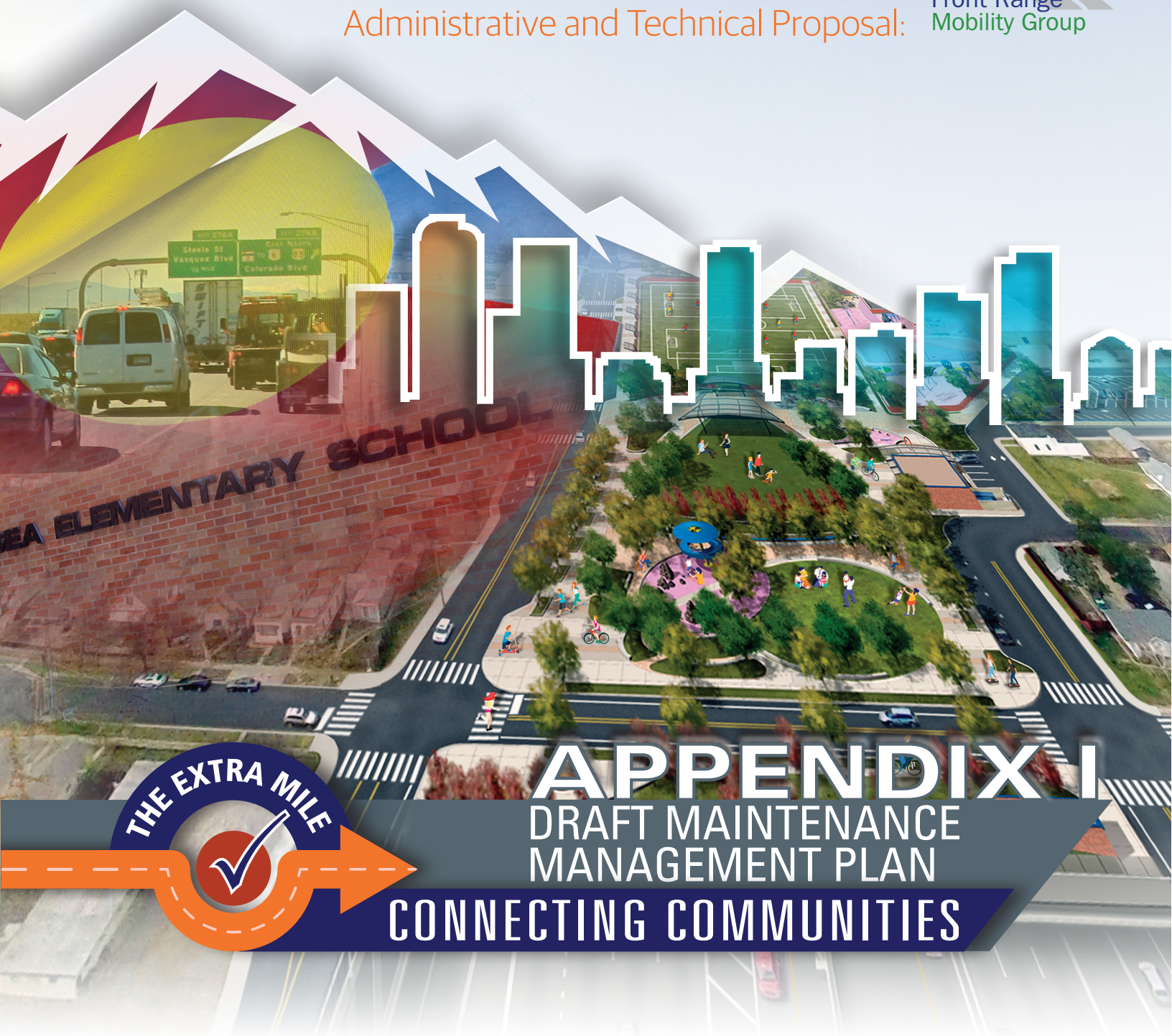
APPENDIX H
DRAFT OPERATIONS MANAGEMENT PLAN

VOLUME 2 – TECHNICAL SUBMISSIONS
Binder 13 of 18

CENTRAL 70 PROJECT

PUBLIC DISCLOSURE
Administrative and Technical Proposal:

Front Range Mobility Group



THE EXTRA MILE

APPENDIX I

DRAFT MAINTENANCE MANAGEMENT PLAN

CONNECTING COMMUNITIES

Draft

Maintenance Management Plan

For

Central 70 Project

Prepared By:
Front Range Mobility Group

Table of Contents

Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
BACR	Baseline Asset Condition Report
BMP	Best Management Practices
Cat	Category
CCTV	Closed Circuit Television
CDOT	Colorado Department of Transportation
CDPS-SCP	Colorado Discharge Permit System - Stormwater Construction Permit
CTMC	Colorado Transportation Management Center
Department	Colorado Department of Transportation
FHWA	Federal Highway Administration
FRMG	Front Range Mobility Group
HPTE	High Performance Transportation Enterprise
ID	Identification
IQC	Independent Quality Control
IRI	International Roughness Index
ITS	Intelligent Transportation System
KP	Key Personnel
LCC	Life cycle costing
MMIS	Maintenance Management Information System
MMP	Maintenance Management Plan
MUTCD	Manual of Uniform Traffic Control Devices
(NBI)	National Bridge Inventory
NDRD	New Development Redevelopment Program
NFPA	National Fire Protection Association
NTIS	National Tunnel Inspection Standards
NTP	Notice to Proceed
O&M	Operation and Maintenance
PA	Project Agreement
PCC	Portland Cement Concrete
PCM	Project Communication Manager

PIM	Public Information Management
Project	Central 70 Project
QA	Quality Assurance
QC	Quality Control
QMP	Quality Management Plan
RTD	Regional Transportation District
SNTI	Specifications for the National Tunnel Inventory
SWMP	Stormwater Management Plan
TMC	Traffic Management Center
TOMIE	Tunnel Operations, Maintenance, Inspection, Evaluation Manual
TRB	Transportation Research Board

Front Range Mobility Group	Central 70 Project Draft Maintenance Management Plan	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Introduction

Front Range Mobility Group's (FRMG) overarching objective for the Central 70 Project (Project) is to effectively maintain the asset infrastructure, ensuring safe and effective conditions throughout the duration of the Term and to ensure the performance of the Project, meeting the requirements of the Project Agreement and protecting the infrastructure investment.

FRMG has developed a Maintenance Management Plan (MMP) consistent with the foregoing objective and the maintenance obligations found in Schedule 11 (including its Appendices A-1 and A-2) and the Handback Requirements in Schedule 12 of the Project Agreement (PA) for the Colorado Department of Transportation (CDOT or Department). To establish the plan, we first considered the Project performance criteria, analyzing all unique highway characteristics and all asset features.

In order to facilitate the evaluation of bid deliverables this Draft MMP was structured following the required contents listed under Section 9.2.1 and 9.2.2 of Schedule 11. We anticipate the MMP for issuance prior to Notice to Proceed 2 (NTP2) to reflect an updated structure that will be consistent with typical industry practices and that will (with the prior approval of the Department) be restructured to consolidate activities within operations, safety, and quality categorically.

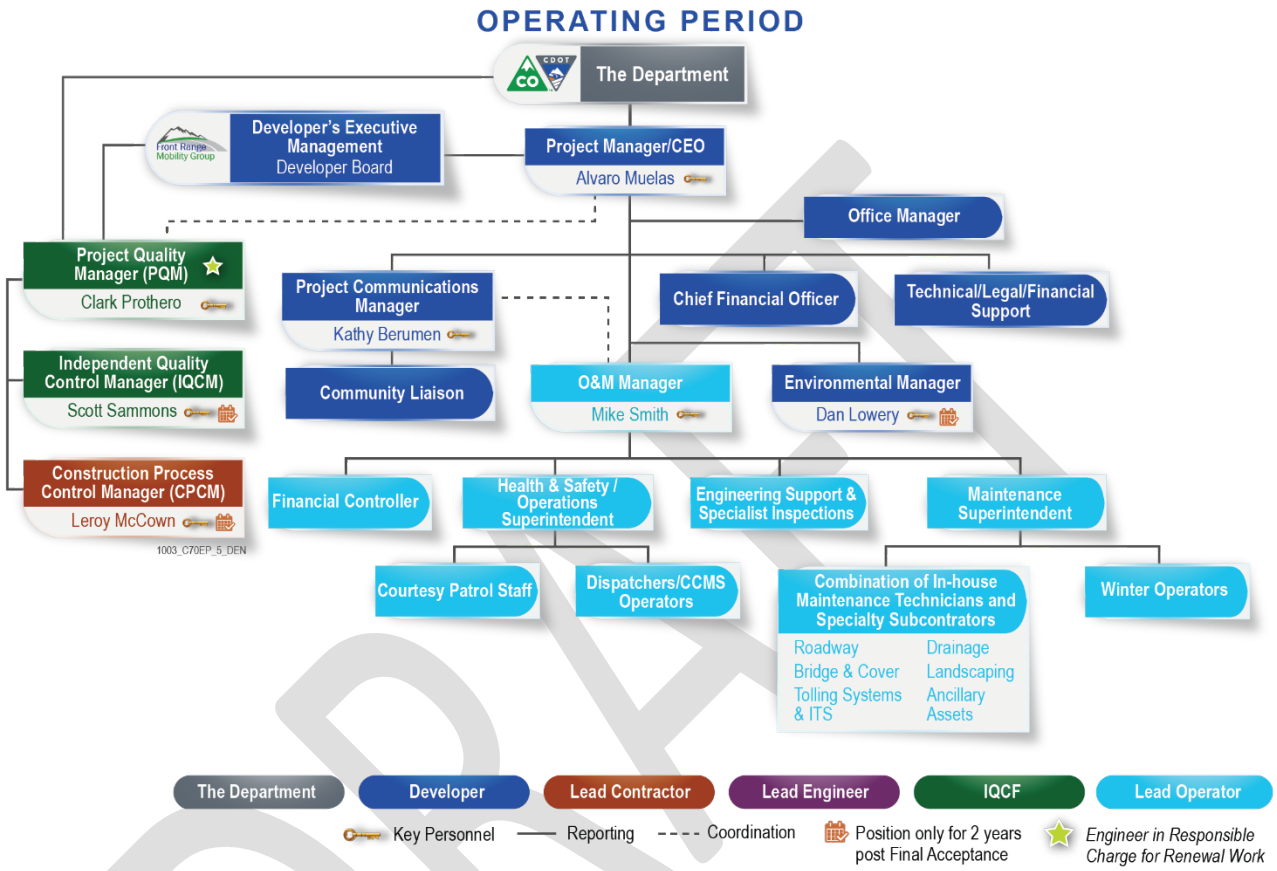
Per the Schedule 11 requirements, we will submit our final MMP for Acceptance prior to the issuance of NTP2 and will submit an updated version to the Department for Acceptance prior to substantial completion. In addition, we will update and submit the plan for Acceptance annually, no later than 60 calendar days before the end of each Contract Year.

FRMG will update the MMP more frequently as required during the Construction Period and Operating Period to indicate changes to relevant protocols, agreements, and other interactions and to indicate requirements for equipment and systems that have been revised, upgraded, or replaced. We will comply with the latest Accepted MMP at all times.

a. Overall Team Organizational Chart

The organizational charts depicted in **Figure 1** (Operating Period) and **Figure 2** (Construction Period) indicate the personnel required for O&M Work and related activities, emergencies, inspections and management as described in the following paragraphs. FRMG will provide management, supervision, professional and technical services, quality control, labor, materials, utilities and equipment to perform all of the duties and obligations to perform the O&M Work for the Project within the O&M Limits during the Operating and Construction Periods by utilizing internal expertise and/or qualified Subcontractors, to satisfy all requirements of the Project Agreement largely detailed in Schedule 11, Operations and Maintenance Requirements and Schedule 12, Handback Requirements.

Figure 1. Operating Period Organizational Chart.



* *During the Operating Period the role of Monitoring Technician will be performed by the Maintenance Superintendent. The role of Civil Rights Program Manager will be performed by the O&M Manager.*

During the Operating Period, the Developer will provide oversight of all O&M Work performed by the Lead Operator and will also retain the obligation for major Renewal Work activities such as pavement renewals. These Renewal Works will be subcontracted to contractors qualified to perform such work for the Department. Oversight of this work including engagement of appropriate engineering and quality support will be performed by the Project Manager/CEO with coordination and assistance from the O&M Manager and specialist inspectors responsible for providing condition assessments. In addition, the PQM and IQCM will continue to play an important role in the quality process overseeing the Quality Management Program and liaising with the O&M Manager and Project Manager to implement strategic Project quality goals.

Routine maintenance and minor rehabilitation items will be performed by the Lead Operator under the direction and oversight of the O&M Manager. The Maintenance Superintendent will assist the O&M Manager and perform field oversight, direction, and inspection of repairs performed by in-house maintenance technicians and Subcontractors working on the Project.

The O&M Manager will oversee the specialist inspection firms performing required inspections and condition assessments which require qualifications beyond those of in-house staff, including onboard pavement testing and structures inspections. The O&M Manager will provide all specialist inspection results to the Project Manager/CEO for purposes of oversight as well as to provide needed information related to Renewal Work.

Emergency response activities are more thoroughly covered in the draft Operations Management Plan (Appendix H) however, the Health & Safety/Operations Superintendent will oversee the FRMG Courtesy Patrol drivers (Courtesy Patrol) or company if subcontracted, as well as the dispatch staff. All relevant staff, including maintenance technicians, Courtesy Patrol and winter maintenance operators will participate in an on-call program whereby additional off-hours resources are available for any major incidents and Emergency repairs 24 hours a day, seven days a week. Training as indicated in the table below will ensure that all such staff has adequate preparation for the performance of Emergency work on an open high-speed facility. The management and organization of inspection work is more thoroughly detailed in **Section b. *(Inspection Work).***

During the Construction Period, the same strategies will be employed using the Lead Contractor's management and staff, which will be similarly structured as illustrated in **Figure 2**. There is always a critical need for a coordinated and synchronized application of O&M and construction operations during the Construction Period in order to provide safe and efficient delivery of both and to avoid interface related disruptions. This need is amplified on the Project's corridor due to the high-volume traffic conditions and the complexity of traffic management required for construction of the Cover and demolition of the viaduct. For this reason, O&M During Construction will be performed by the Lead Contractor under the oversight of the Design-Build Manager, who will report to the Project Manager/CEO, with additional support and oversight provided by the Developer and the O&M Manager.

Figure 2. Construction Period Organizational Chart.

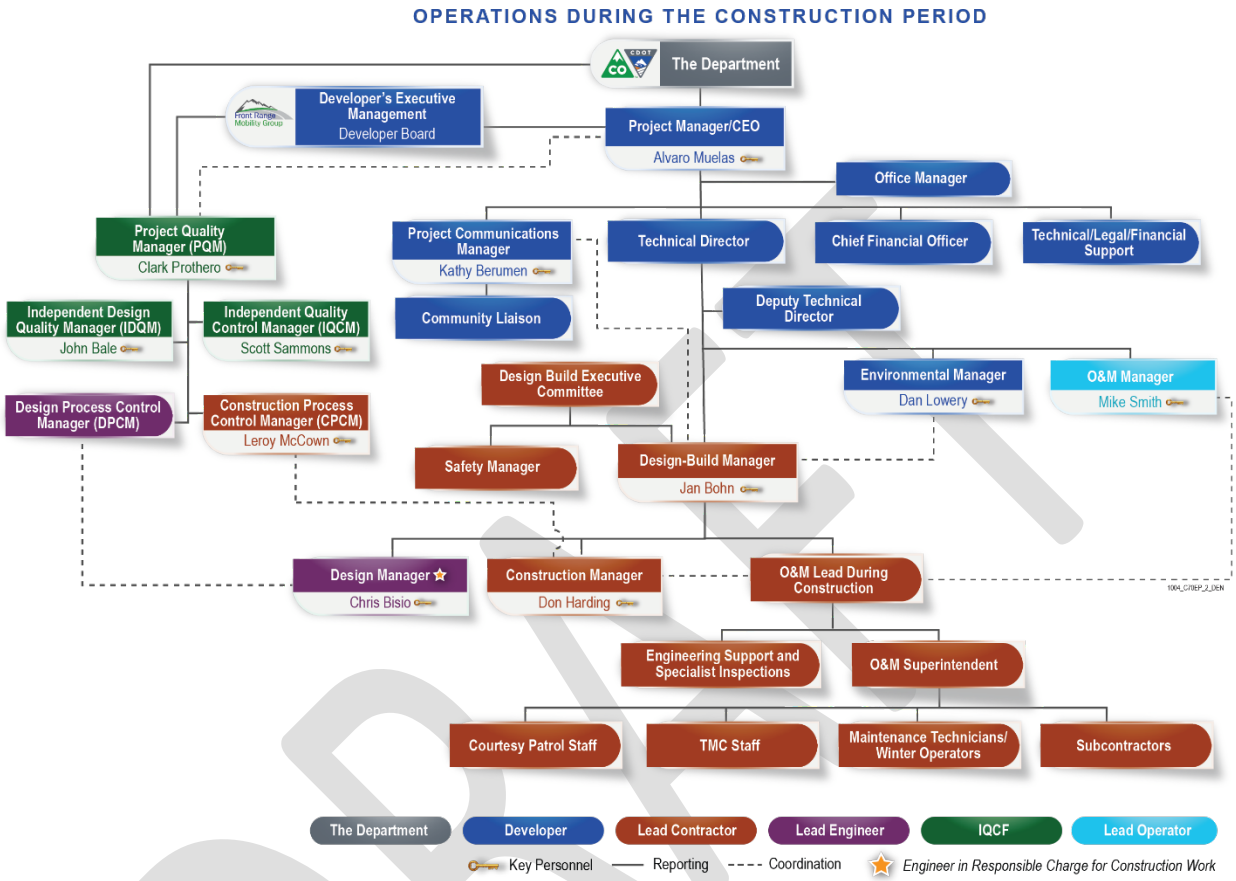


Table 1 details FRMG's Maintenance Management and support personnel qualifications and training. The required work hours for all positions shown are full-time with seasonality for winter maintenance operators. Key personnel based on Schedule 27 are show with a (**KP**).

Table 1. Maintenance Management and Support Personnel Qualifications and Training

Title	Qualifications	Required Training
Project Manager Alvaro Muelas (KP)	Demonstrated experience and expertise on a similar role in the delivery of projects similar in scope, value, nature, and complexity to the Project (per Key Personnel Schedule 27)	In addition to training and qualifications outlined in the Project Management Plan and resume, relative to his role as a member of the Operations team, training will include: • Incident response: National Incident Management System (NIMS) Incident Command System (ICS)-100 Introduction to ICS NIMS IS-700 National Incident Management System Intro • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
Design-Build Manager Jan Bahn (KP) *(During the Construction Period)*	A minimum of 20 years of experience including a minimum of 15 years' design-build experience in construction and management of design and construction on highway projects similar in scope, value, nature, and complexity to the Project (per Key Personnel Schedule 27)	In addition to training and qualifications outlined in the Project Management Plan and resume, relative to his role as a member of the Operations team during the Construction Period, training will include: • Incident Response: NIMS ICS-100 Introduction to Incident Command System; NIMS IS-700 National Incident Management System Intro; • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
O&M Manager Michael Smith (KP) *(During the Operating Period)* *dual role as Civil Rights Program Manager during the Operating Period	Demonstrated experience and expertise in a similar role on managing the operations, maintenance and rehabilitation work on highway projects of similar scope, value, nature, and to the Project complexity (per Key Personnel Schedule 27).	In addition to training and qualifications outlined in the Project Management Plan and resume, relative to his role as a member of the Operations team, training will include: • Incident Response: NIMS ICS-100 Introduction to Incident Command System; NIMS IS-700 National Incident Management System Intro; • In-house orientation training in operational procedures and highway safety; • FRMG's Incident Management Plan; • OSHA 10 course; and • Basic First Aid and Cardiopulmonary Resuscitation (CPR)
Environmental Manager (KP) Dan Lowery	A minimum of seven years of progressive experience working on projects of similar scope, value, nature, and complexity to the Project. The Environmental Manager will also demonstrate the ability to work effectively with both design and construction staff. (per Key Personnel Schedule 27)	In addition to training and qualifications outlined in the Project Management Plan and resume, relative to his role as a member of the Operations team training will include: • Erosion and Sediment Control CDOT Certification; • Best Management Practices Selection and Design; • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.

Title	Qualifications	Required Training
Health & Safety/ Operations Superintendent	Demonstrated experience and expertise in Highway operations	In addition to training and qualifications outlined in the Project Management Plan, relative to his role as a member of the Operations team, training will include: • Incident Response: NIMS ICS-100 Introduction to Incident Command System; IS-700 National Incident Management System Intro; • Traffic Control: Traffic Control Technician and Supervisor Course; • Erosion and Sediment Control CDOT Certification; • Safety: OSHA 10/30; Basic First Aid and CPR; OSHA 40-hour Hazardous Waste Operations (HAZWOPER) Training, • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
Maintenance Superintendent * dual role as Monitoring Technician during the Operating Period)	Demonstrated experience and expertise in Highway maintenance and Monitoring Technician training	In addition to training and qualifications outlined in the Project Management Plan, relative to his role as a member of the Operations team, training will include: • Incident Response: NIMS ICS-100 Introduction to Incident Command System; IS-700 National Incident Management System Intro; • Traffic Control: Traffic Control Technician & Supervisor Course; Erosion and Sediment Control CDOT Certification; • Safety: OSHA 10/30; Basic First Aid and CPR; OSHA 8 hour supervisory, 40-hour HAZWOPER. • In-house orientation training in operational procedures and highway safety; and • FRMG's Incident Management Plan.
Courtesy Patrol Operators	Successful criminal and driving record background check. Training consistent with Mile High Courtesy Patrol Program. Meets all requirements for operations of tow vehicles. Must be 18 years of age and have at least 1 year towing experience.	• In-house orientation training in operational procedures and highway safety. • OSHA 10 Course: Traffic Control Technician. Towing/Recovery specific safety and operational training. • In house training in correct identification and categorization of Defects.
Winter Maintenance Operators	Class A Commercial Driver's License (CDL), successful criminal and driving record background check	• In-house orientation training in operational procedures and highway safety. • Annual Training: Plowing/Spreading and snow and ice control Plan
Maintenance Technicians	Successful criminal and driving record background check	• In-house orientation training in operational procedures and highway safety. • NIMS ICS-100 Introduction to Incident Command System; • OSHA 10 Course; OSHA 8-hour HAZWOPER. Traffic Control Technician • In-house training in correct identification and categorization of Defects. • Vendor training as appropriate in proprietary systems.

Title	Qualifications	Required Training
Traffic Management Center Staff	Demonstrated ability to follow operational protocols, manage and control equipment and record data	• In-house orientation training in Operational Procedures and Project Specific Incident Management Plan. • NIMS ICS-100 Introduction to Incident Command System; • G-775 Emergency Operations Center Management & Operations; • Annual training in Tunnel Control Room Operations

** This table shows positions after Substantial Completion. Positions before Substantial Completion will differ in that full-time employees may be engaged in both O&M Work During Construction and Construction Work, with staffing levels sufficient to ensure compliance with performance requirements. The Maintenance Superintendent and the Health & Safety/Operations Superintendent will be combined to a single position during the Construction Period.*

As full O&M staffing for the Operating Period begins, an emphasis on utilization of existing construction staff or existing construction O&M staff (as included in the transition process described in Section t of the MMP) will allow for a smoother transition to full operations. The role of Monitoring Technician will be performed by the Maintenance Superintendent. The role of Civil Rights Program Manager will be performed by the O&M Manager.

In addition to the position-specific training indicated above, FRMG will provide Project orientation and train all employees in workplace safety and to recognize unsafe conditions or behaviors and take immediate action in such cases. Examples of our employee safety training include:

- New-hire safety orientation to train employees on our safety program and communicate safety expectations, responsibilities, resources, and training
- Weekly toolbox safety training and task training
- Quality training
- Job hazard analysis and daily risk assessments to define activities, sequences, specific potential hazards, site conditions, equipment and materials needed, and control measures
- Work zone traffic control and flaggers in work zones training
- Confined space, crane and rigging, excavation, tunneling, or other task-specific training
- Monthly Project-wide safety meetings to review safety performance and goals. Foremen, supervisors, and managers receive additional safety training to assist in managing a proactive safety culture.

Work locations will be considered to be the maintenance yard/office and O&M limits (as shown in the drawings) for all staff with the exception of TMC Dispatchers/Tunnel Control Monitors, who will work at the CTMC facility and/or the Cover Control location with ongoing internal training performed at the Cover.

A complete contact list of maintenance personnel including Emergency numbers will be provided in the final MMP.

b. Inspection Work

Conformance with requirements and rectification of Defects is accomplished first and foremost through ensuring correct qualifications and training of staff along with outsourced specialist engineering support. Specialist inspections will be performed by firms qualified by the Department

to perform such work and will be trained in accordance with the Department and statutory requirements.

FRMG management, superintendents, Courtesy Patrol, and technicians will be trained to identify safety related deficiencies, category Defects, damage, and just as importantly, to understand and recognize desired levels of service. This allows management to commit dedicated, trained resources to ensure safety goals and required performance levels are met or exceeded.

FRMG will perform routine inspections in accordance with the MMP in order to identify all O&M Defects. Operations and maintenance records in respect of general inspections will include details of the means of the inspections, required lane closure information if any, the weather and other conditions at the time. The Developer will perform routine inspections such that Category 1 and Category 2 Defects are identified and repaired within the applicable Defect remedy period.

FRMG staff and management will be trained to consider all inspections to be performed as a potential safety inspection pending correct classification of Category 1 or Category 2 Defects.

FRMG will carry out inspections and continuous monitoring of all infrastructure Elements in accordance with the MMP and use the results of inspections to develop and update the MMP, including the Renewal Work Plan, and to develop programs of maintenance and Renewal Work to minimize the occurrence of O&M Defects and impacts to users and to ensure compliance with the applicable general requirements and meeting or exceeding the applicable targets. FRMG will cause trained and competent personnel to plan and implement a program of inspections of all infrastructure Elements that:

a) Verifies the continuing safety of the infrastructure Elements for users
b) Prioritizes Category 1 Defects
c) Identifies Category 2 Defects to be included for repair either within Developer's annually recurring highway maintenance and repair program, as Developer's Renewal Work
d) Is responsive to reports or complaints received
e) Takes account of Incidents and Emergencies affecting the infrastructure Elements
f) Monitors the effects of extreme weather conditions and precipitation events
g) Collects data to monitor performance of infrastructure Elements and to establish priorities for future maintenance operations and Renewal Work

Table 2 details the qualifications and training for specialist, routine, and safety related inspections, as well as the required or anticipated frequency of inspection.

Table 2. Inspections

Inspection *Type*	Inspection Detail	Training and Qualification
Roadway Pavement *Specialist*	Annual survey of pavement condition for the Central 70 Mainline, CDOT Roadways and Local Agency Roadways within the O&M Limits at the time of the survey and all infrastructure Elements undertaken using automated condition survey equipment to measure all necessary criteria including: ruts, cracking, faulting, skid resistance and ride quality (International Roughness Index [IRI]) according to the inspection/ measurement methods set forth in Appendix A-1 and A-2. FRMG uses procedures, techniques, and the measuring equipment for measurement criteria of pavement related Performance Requirements consistent with the CDOT Distress Manual for HMA and PCC Pavements by National Center for Pavement Preservation, Appendix B of the Development of a Pavement Preventative Maintenance Program for the Colorado Department of Transportation, Report No. CDOT-DTD-R- 2004-17 Final Report. The Department will also conduct a routine annual roadway condition survey as part of the Department statewide annual pavement condition data collection services. Data collected will include International Roughness Index, rutting, maximum faulting and average faulting and cracking distress.	Firm pre-qualified to conduct on board automated pavement inspections work for CDOT
Bridges and Other Structures (Including the Cover and Retaining Walls) *Specialist*	Inspections and load rating calculations at the frequency specified in Appendix A-1 and A-2. In addition, inspections as per Federal Highway Administration (FHWA) regulations and at the frequency specified in FHWA regulations, American Association of State Highway and Transportation Officials (AASHTO) Bridge Management, and AASHTO Manual for Condition Evaluation of Bridges. Inspection for the structures and the Cover will be conducted by certified individuals required by NTIS, as applicable. Inspection data will be updated annually as a minimum.	Firm pre-qualified to conduct bridge inspection work CDOT and meet the requirements of the NTIS. Inspection for the structures and the Cover will be conducted by certified individuals required by NTIS, as applicable.
Sign Structures *Specialist*	Inspection and assessment in accordance with the requirements of CDOT Recording and Coding Guide for the Inventory and Inspection of Colorado's Overhead Signs, Signals and High Mast Lights and CDOT M&S Standard Plans.	Sign reflectivity and damage inspections completed by in-house staff, structural sign component inspections by qualified structural inspectors.
Electrical Lighting, Signs, Traffic Signals and Communications Equipment *Specialist*	Inspections as required by FHWA, electrical regulations, as well as all current CDOT M&S Standard Plans	In-house staff and licensed electrician as required. In-house staff to complete inspections as part of patrols looking for functionality, Specialized certified Electrical Inspector to complete detailed inspections
Mechanical, Electrical, or Plumbing Equipment, Including Those Associated with the Cover *Specialist*	Inspections as required by the MMP, the equipment manufacturer, and this Project Agreement	In-house staff and licensed mechanic, plumber, or electrician as required. In- house staff to complete inspections as part of patrols looking for functionality, Specialized certified Mechanical and Electrical Inspectors to complete detailed inspections.
Equipment Inspections Including Crane/Hoist, Man Lift, and Tow Bodies. *Specialist*	FRMG best practice and in compliance with Colorado and OSHA requirements	In-house staff and local repair facilities licensed and authorized to perform certifications as required
Pavement Visual Inspections *Safety*	Identify obstructions or debris and localized pavement failures or standing water	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Noise *Routine*	Where required pavement noise as measured by on board sound intensity and speed requirements (measurements taken on a contiguous 1/10th mile basis)	Qualified firm in accordance with AASHTO TP 76
Surfaces *Safety, Routine, and Specialist*	Various based on ASTM and AASHTO requirements	Qualified firm
Curbs and Hard Capped Surfaces *Safety and Routine*	Identify O&M Defects and properly categorize	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Drainage Systems *Safety and Routine*	Identify O&M Defects and properly categorize	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Drainage Systems and MS4 Permit *Safety and Routine*	Inspection and rating as per CDOT Level of Service Manual as well as the Erosion Control and Stormwater Management Guide	Maintenance Superintendent or Health & Safety/Operations Superintendent or other management staff. Training in Erosion and Sediment Control CDOT Certification
Bridges and Retaining Walls Surfaces *Safety and Routine*	Identify O&M Defects and properly categorize.	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2; and as applicable firm pre-qualified to conduct bridge inspection work for the State of Colorado, Department of Transportation and meet the requirements of the NTIS.

Inspection *Type*	Inspection Detail	Training and Qualification
Reflectivity *Safety and Routine*	Identify O&M Defects and properly categorize.	Maintenance Superintendent or Health & Safety/Operations Superintendent or other management staff. Applicable manufacturer's instruction or training.
Signs, Reflective Pavement Markers (RPMs), and Delineators *Safety and Routine*	Identify O&M Defects and properly categorize	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Guardrail and Barrier Walls *Safety and Routine*	Identify O&M Defects and properly categorize	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Attenuators *Safety and Routine*	Identify O&M Defects and properly categorize.	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2. Proprietary training as available.
Obsolete, Illegal or Obscene Signs, Banners, Flags, or Posters *Routine*	Identify O&M Defects and properly categorize	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Traffic Signals *Safety*	Identify O&M Defects and properly categorize and report to City and County of Denver and the Department	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Roadway Lighting (Xcel Maintained) *Safety*	Identify O&M Defects and properly categorize and reporting to Xcel Energy and the Department	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2. Note Cover Lighting detailed separately
Fences and Walls *Safety and Routine*	Identify O&M Defects and properly categorizes with Structural Assessment if visual warrants	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Vegetated Areas *Routine*	Identify O&M Defects and properly categorizes	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Landscaping and Trees *Safety and Routine*	Identify O&M Defects and properly categorizes	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Wetlands and Water Quality Ponds *Routine and Specialist*	Identify O&M Defects and properly categorizes	Environmental Manager and FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2

Inspection *Type*	Inspection Detail	Training and Qualification
Slopes *Safety and Routine*	Identify O&M Defects and properly categorize	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Offensive Graffiti *Routine*	Identify O&M Defects and properly categorizes	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Hazardous Materials *Safety and Specialist*	If suspected by, referred to Fire Department, Police and the Department	Where required, assessment by qualified Environmental Contractor after release of scene by Fire Department/Hazmat
Damaged Structural Elements; Result of Incident *Safety*	Identify O&M Defects and properly categorizes	Where structural damage is suspected, Qualified Bridge Inspection firm
Maintenance Yard Grounds *Safety and Routine*	Identify O&M Defects and properly categorizes	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Equipment Including Snow and Ice Equipment and Calibrations *Safety*	Identify O&M Defects and properly categorizes	FRMG Maintenance Technicians, Winter Operators, and Courtesy Patrol Operators for daily safety checks Qualified repair facility for other. In-house training
Winter Drainage *Safety*	Identify O&M Defects and properly categorizes	FRMG Maintenance Technicians, Winter Operators, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Courtesy Patrol Fleet *Safety*	Identify O&M Defects and properly categorizes	FRMG Courtesy Patrol Operators for daily safety and equipment check. Oversight and additional checks by Health & Safety/Operations Superintendent. In-house training. Qualified repair facility for other
Sweeping and Cleaning *Routine*	Identify O&M Defects and properly categorizes	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
ITS and ETC Devices (First 2 Years of Operations) *Safety and Routine*	Identify O&M Defects and properly categorizes	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2

Inspection *Type*	**Inspection Detail**	**Training and Qualification**
ITS and ETC Civil Infrastructure *Safety and Routine*	Identify O&M Defects and properly categorizes See Sign Structures for Gantry	FRMG Maintenance Technicians, Management, and Courtesy Patrol Operators. In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2
Baseline Asset Condition Report (Construction Period Only**)** *Safety and Routine*	Inspections and tests to determine the existing condition of each element of the Developer O&M segments	Construction management or supervisory staff having completed In-house training in the detection of O&M Defects and proper categorization of Cat1/Cat2

Inspections detailed above address the identification of O&M Defects. Inspections post repair for confirmation of compliance are detailed in **Section a. (*Overall Team Organizational Chart*).**

Routine, non-specialized inspections to be performed continuously will be self-performed by FRMG resources and trained personnel. Training for operations personnel will be carried out in two phases. The initial Phase will be wherever practical before the beginning of O&M Work during the Construction Period and within the first six months of O&M Work during construction and will continue on for a set period after substantial completion into the Operating Period and until steady-state operations are achieved.

The second Phase of training will consist of refreshers, updates, and new employee training throughout the Operating Period. This Phase will include scheduled retraining on basic operations practices and specially focused retraining whenever management determines that the level of safety, effectiveness, or efficiency has fallen below acceptable standards. Second Phase training will also involve training of current staff in revised operational procedures that have been put in place to improve operations.

- **Company Project Orientation** – All inspection and maintenance personnel, either internal or external, engaged to work within the O&M limits Project are required to attend and pass the company's induction course prior to commencing any work. Topics include Project organization, scope and basic objectives and characteristics of the Central 70 Project and its operations. Overall Project policies and procedures will be described and communications protocols and reporting requirements will be outlined. Requirements and restriction of the Project Agreement will be reviewed and summarized.
- **New Employee Training** – Training for new employees of the O&M team will focus on company administrative policies and procedures as well as special Project requirements such as work-time reporting, dress codes, and use of Project resources.
- **General Safety and Health** – All O&M employees will be given an initial training program covering general safety and health items as described in the Safety Plan. Topics from this plan will be reviewed at weekly toolbox meetings held at the O&M office.
- **Inspection Training** – All O&M field employees will be trained in the identification of Category 1 and 2 Defects and Safety Inspections

The processes described in this section are relevant to both the Operating and the Construction Period except as they relate to certain specialist inspection obligations that do not apply during construction such as operational testing for pavement based on IRI and the implantation of Baseline Asset Condition Report (BACR) scoring as detailed in Appendix A.

c. O&M Safety Plan

Included as Appendix C to this MMP behind the tab titled "Appendix C- O&M Safety Plan

d. O&M Quality Management Plan

Included as Appendix D to this MMP behind the tab titled "Appendix D – Quality Management Plan."

e. O&M Limits

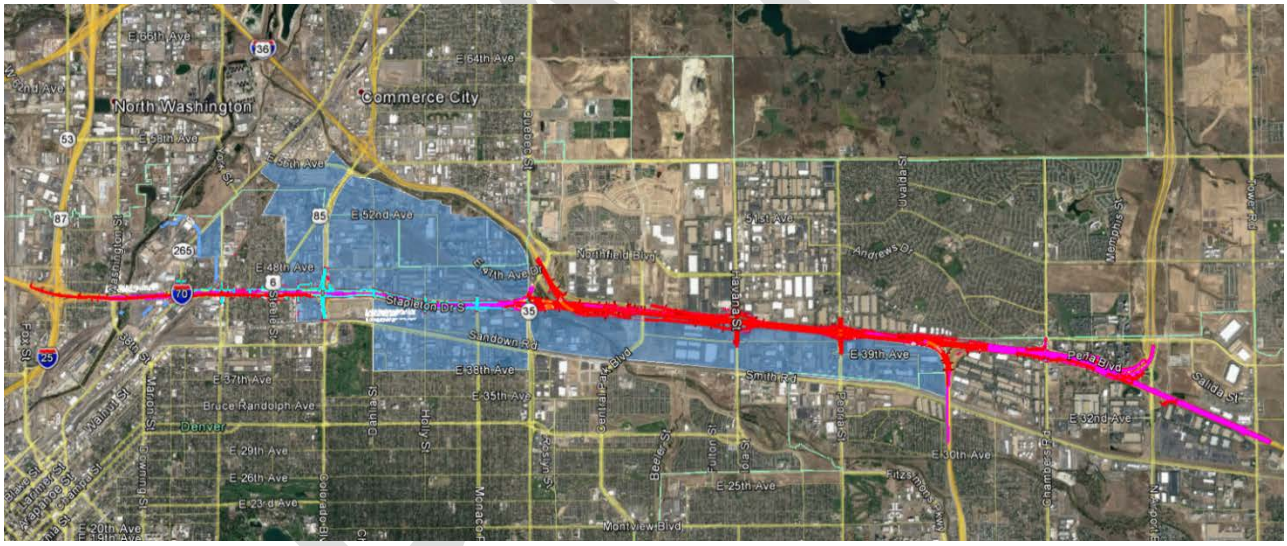
Included as Appendix E to this MMP behind the tab titled “Appendix E- O&M Limits.”

f. Maintenance and Storage Facilities

After Financial Close, contingent upon the availability of the Maintenance Yard, FRMG will acquire or rent an industrial yard space near the highway from which to stage our operations. The location will be selected to ensure all response time performance requirements can be met and to allow for minimal response times in general to the site. A rent-or-buy decision for the permanent facility location will be made closer to the start of the Operating Period depending on market conditions. Based on current availability FRMG has identified numerous properties that could serve as potential sites and is therefore confident in the ability to secure a facility well in advance of the Operating Period for the permanent home. During the Construction Period FRMG will use the current Department maintenance facility identified in the Project Agreement to serve the Project.

Figure 3 illustrates areas (highlighted in blue) that would prove to be suitable locations for maintenance and storage facilitates.

Figure 3.



Location and Layout of Maintenance and Storage Facilities:

The facilities will need to accommodate space for FRMG’s O&M staff and have adequate warehouse and yard space to support the operations and maintenance activities. The general requirements for the facility are:

- Office space for up to five management and administrative personnel
- Large training room to accommodate up to 20 people
- Common areas, restrooms, and showers

- Approximately 2,000 to 3,000 square feet of warehouse space with high ceilings, dual access bays, concrete floors, and proper lighting for minor servicing of vehicles
- Approximately 4,000 to 8,000 square feet of lay down yard with high chain link fence and access for vehicles
- Garage with vehicle storage, refueling and de-icing materials storage facilities
- Additional yard space for winter maintenance material storage and equipment (spreaders/plows)
- Additional chemical storage and winter equipment staging areas may be housed both at the main office/facility and at a sub yard site for multiple points of access, logistics and a built-in redundancy
- Storage facility for materials which are required on-site for short response time repairs and Emergency servicing (e.g., signage, cones)
- Security protocols and procedures to prevent unauthorized access
- Controlled contaminated water system to manage impacted runoff due to salt operations
- Adequate staff parking to prevent staff from parking on adjacent streets and causing congestion

FRMG's O&M Manager, other management staff, maintenance crews and other support staff and maintenance technicians will work out of this facility. The building will contain both office and warehouse space for the storage and maintenance of FRMG's equipment, materials inventory, and traffic control equipment. Additional open yard space is needed to store vehicles, traffic control equipment, and temporary storage of material stockpiles. The maintenance facility will provide a base of operations to allow our crews ready access to the O&M Limits within minutes of notification.

Other sites from which FRMG will carry out operations include the tunnel operations facilities, which will be located on-site at the tunnel. These facilities will be designed and built to accommodate office-based staff responsible for monitoring and controlling tunnel operations. The design of this space will allow for operators to view multiple computer screens to monitor tunnel conditions.

In addition, the layout will ensure that tunnel controls are easily accessible. The site will feature restrooms to allow for breaks without leaving the site. In addition, FRMG will run traffic monitoring operations out of the joint traffic management center currently home to Department CTMC staff. Staff at this location will monitor cameras and be the first point of contact for calls from the general public providing a resource that eyes and ears on the road.

Procedures for Ensuring All Necessary Maintenance Equipment and Materials Are Readily Available

The O&M Work is an essential service when considering the potential impacts failure to provide these services has on the public, Emergency service providers, and numerous additional stakeholders. FRMG will provide sufficient equipment to undertake the Project maintenance activities anticipated during the Operating Period. Equipment that is required on a regular basis or would be challenged to procure on short notice will be purchased to ensure it is available to meet the needs of the Project. Equipment that is not required on a regular basis will be leased or rented as required by the needs of the Project and specific maintenance and rehabilitation activities for

example machine laid paving. Critical items will have redundant suppliers on hand to ensure availability.

FRMG will undertake an equipment maintenance program to make sure that the equipment maintains a high level of serviceability to undertake the work. Subcontractor relationships will be established with local companies who can respond quickly to vehicle maintenance and repair issues, as well as develop expertise working with specialized maintenance equipment. We will also develop Subcontractor relationships with local contractors who can provide supplementary equipment to undertake maintenance work when the need exceeds normal requirements. On-call Subcontracts will also be established for critical failure activities. Minor servicing and repairs will be completed on-site while major maintenance will be undertaken through contractual relationships with mobile or yard based service providers. All of the equipment and vehicles will be subject to a vehicle replacement program to make sure that the equipment does not deteriorate to a state where maintenance issues are affecting serviceability beyond reasonable routine life cycle maintenance. The vehicle maintenance program begins with pre and post trip inspections which feed information into potential irregular service's needs. These inspections are supplemented by routine hour or usage based inspections to identify current or potential items which will either need immediate repair or should be monitored more closely for accelerated deterioration.

Initial material supplies will be based on historic knowledge of annual use. The majority of materials will be stored at the maintenance yard and based on protection requirements be stored either in sheds, simple covers, or indoor heated storage. In addition, certain materials will be kept on hand if lengthy procurement times could potentially inhibit meeting performance requirement response times. See Section 1.18 Maintaining Spare Parts and Inventory for a list of planned materials to be kept on-site.

The Maintenance Superintendent's duties include that of inventory management. FRMG's Maintenance Management Information System (MMIS) system will include the ability to identify on hand quantities and provide notification when specific defined threshold for minimum stock levels are reached in order to reorder supplies. Inventory updates will be performed periodically to ensure availability of material resources.

g. Communications and Coordination for Scheduling Repairs and Closures for Maintenance

FRMG will be responsible for development and implementation of a communication strategy in collaboration with the Department and in accordance with the requirements of Schedule 14 of the Project Agreement.

The Department and the CTMC will be advised of all planned activities within the lanes 48 hours in advance. FRMG will notify the CTMC one-half hour before a planned lane Closure is installed and notify the CTMC within one-half hour after the planned lane Closure is removed. FRMG will monitor traffic and advise CTMC if any modifications to traffic control are needed or if activities extend beyond the planned time frame. This notification will take place via a phone call or radio communication from FRMG staff to the CTMC.

Responsibility for coordinating this communication will be the role of the Health & Safety/Operations or Maintenance Superintendents or an individual they designate. Unplanned

closures will similarly be the responsibility of either the Health & Safety/Operations or Maintenance Superintendent or designate. During off shift hours, an individual on shift will be designated by the Operations or Maintenance Supervisor as the individual responsible for communicating unplanned closures to the CTMC. This will ensure that at all times there is a single point of contact that can provide up-to-date information to the CTMC. If the Department requires additional information on a specific closure, the Health & Safety/Operations or Maintenance Superintendent will provide this information. If the Department requires additional information on a repair or Closure the on shift designate will be responsible for providing this information.

Additionally, the Health & Safety/Operations or Maintenance Superintendents are available after-hours at the request of the Department to support designated staff. FRMG will respond to the Department via the method of communications initiated by the Department (e.g. if FRMG is contacted via e-mail, FRMG will respond via e-mail unless specifically requested to receive a call back or circumstances dictate an e-mail is not feasible or appropriate).

In general FRMG will coordinate with the Department, Regional Transportation District (RTD), Local Agencies, and adjacent projects to coordinate construction traffic and detour impacts and minimize simultaneous lane Closures or impacts to adjacent or alternate routes.

For planned Closures FRMG will schedule, prepare an agenda, and facilitate monthly meetings, or as needed, with the Department representatives to discuss the O&M Work and to review O&M Work status including the reports required in PA Schedule 11. The items to be discussed will include, but not be limited to: O&M Work in the previous month, planned O&M Work for the following month, public information and user issues, future Closures, Incidents and Emergencies, Incident management coordination, accrual of Noncompliance Points, Construction Closure Deductions and Operating Period Closure Deductions, and any other pertinent information related to the O&M Work. The Department may wish to hold separate meetings for general management/operations and maintenance as required. The Department may request a meeting at any time to discuss O&M Work-related issues and accidents. In addition, FRMG will coordinate meetings to be held at least one week prior to planned Closures

Throughout the duration of the Term, FRMG will hold weekly Strategic Communication meetings, to include the Department's Communications Team, at the Project office. At these meetings FRMG and the Department will discuss weekly communications issues and provide details for upcoming media advisories/press releases, community meetings, Lane Closure Reports, website updates and information line recordings. The agenda for each meeting will be the responsibility of the Project Communication Manager (PCM) and will be submitted to the Department in advance of each meeting.

FRMG will throughout the Term submit a Lane Closure Report each Thursday as required by Schedule 10, Section 2 (Maintenance of Traffic) of the Project Agreement for the following week (Saturday through Friday) for Information. This report will be provided to the list of contacts as provided by the Department.

FRMG will throughout the Term submit a weekly traveler alert each Thursday for distribution on **GovDelivery** the Department's preferred e-mail system and **CoTrip** weekly. The alert will include Central 70 Mainline, CDOT Roadways, and Local Agency Roadways and any activity that may

impact the traveling public. Upcoming alerts will be reviewed and discussed during the weekly Strategic Communications meetings.

The Annual Renewal Work Schedule and the Five-year Renewal Work Schedule will also include by Element, a schedule of anticipated planned maintenance needed to perform the Renewal Work including the nature, timing and relevant to this section the duration of any associated Closures. This schedule is submitted not later than 60 calendar days before the end of each Contract Year.

Lane Closures will be tracked using FRMG's MMIS system, which will include a Closure log that details lane Closures by time and location. The Department will have remote read-only access to FRMG's MMIS to view this Closure information.

FRMG's Monthly Routine Maintenance Schedule and Annual Routine Maintenance Schedule will also include a summary of Non- permitted Closures including details of each Non-permitted Closure. This annual report will be submitted no later than 30 calendar days after the end of each Contract Year to the Department for Acceptance.

h. Coordination of Maintenance Activities with Other Entities

FRMG is aware of the need to establish and maintain favorable relationships with relevant stakeholders and users along the corridor that may be impacted by maintenance activities and associated lane Closures.

After coordinating with the Department and prior to implementing a lane Closure or a temporary diversion of traffic required for the implementation of heavy repairs, renewals or replacement work, FRMG will liaise with the relevant stakeholders including Emergency services, Local Agencies, Governmental Authorities, Utility Owners and Railroads to define and agree traffic management and temporary signing measures for the duration of the Closure and/or diversion.

For planned projects this outreach consists of providing regular and continuous Project Information services throughout the duration of the Operating Period and must adhere to the specifications outlined in the High Performance Transportation Enterprise (HPTE) Strategic Communications and Transparency Plan. The Developer will coordinate with the Department to determine which level of Public Information Management (PIM) activities are warranted prior to commencement of planned O&M Work (including Renewal Work) projects. Two tiers of planned projects require FRMG PIM activities.

- Tier II PIM projects of medium to high impact which typically involve:
  - Moderate/High visibility from media/ public
  - Moderate/High stakeholder involvement
- Moderate/High impact to traveling public/ stakeholder
- Tier II PIM requirements apply under the following conditions:
  - The planned Project is being conducted on a high volume road with possibly a significant number of direct access points/driveways
  - The planned Project is in or adjacent to a community's business center with high commuter/pedestrian/cycling traffic; changing work zones; variety of stakeholders (e.g., businesses, transit providers, commuters, tourists, etc.)

  - The Department identifies a need for more consistent public information activities
- Tier II PIM requirements FRMG's PCM will ensure the following activities are performed in relation to Tier II PIM projects:
  - Host a public meeting prior to commencement of, as well as (if warranted) during, the Project
  - Gather and manage a planned Project-specific stakeholder distribution List
  - Establish a Project Information hotline number for posting on static construction signs
  - Complete a Lane Closure Report each week
  - Deliver Project flyers to those residences/businesses with direct access to highway and e-mail to specific users
  - Meet with affected property owners as necessary
  - Provide content for Project web page, if warranted
  - Answer and log calls/e-mails to the Project Information hotline/e-mail address, tracking inquiries using Dialog
  - Assist with media relations, including providing information for or writing press release
- Tier III projects are of medium impact which typically involve:
  - Moderate visibility from media/public
  - Moderate stakeholder involvement
  - Moderate impact to traveling public/ stakeholders
- Tier III PIM requirements apply under the following conditions:
  - The planned Project is being conducted on a mid-volume road with possibly a significant number direct access points/driveways
  - The planned Project is in a location with relatively high commuter/tourist traffic, and changing work zones
  - The Department identifies a need for consistent public information
- Tier III PIM requirements FRMG's PCM will ensure the following activities are performed in relation to Tier III PIM projects:
  - Establish a Project number for construction signs
  - Complete a Lane Closure Report each week
  - Deliver Project flyers to those residences/businesses with direct access to highway and e-mail to specific users
  - Meet with affected property owners as necessary
  - Provide content for Project web page, if warranted
  - Answer and log calls/e-mails to the Project Information hotline/e-mail address, tracking inquiries using Dialog
- Assist with media relations, including providing information for or writing press releases

With respect to Closures required for Renewal Work performed by FRMG on Local Agency infrastructure to be maintained by the Developer, and where the relevant Local Agency is responsible for providing Incident response, sweeping and snow and ice control services such as cross street structures, the Maintenance Superintendent liaises with the relevant Local Agency to coordinate the provision of such services and traffic management for the duration of the work.

Coordination of the maintenance activities, temporary easements, and communication are handled in compliance with applicable Third-Party Agreements including the Denver Intergovernmental Agreement, the E-470 related agreements, the Railroad agreements, and the Cover maintenance

agreement. Planned maintenance events by FRMG and other entities should be grouped together as far as possible in order to handle them in one single extended zone.

In addition to the following procedures for planned closures, this information is also applicable to unplanned closures. FRMG keeps open lines of communication with other entities. The Maintenance Superintendent reviews notifications received by the Enterprises, the Department, the CCD, Railroads, and Utility Owners for works to be undertaken in the vicinity and the adjacent road network that may impact traffic within the O&M Limits.

FRMG recognizes there is a need for effective coordination with numerous public agencies and other entities to ensure the safety, security and convenience of the motoring public and others. Coordination procedures and specified lines of communication will be established and maintained throughout the Term and will include the following stakeholders.

- City and County of Denver
  - Mayor's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/rescue
  - Police department
- City of Aurora
  - City Manager's Office
  - Public Works
  - PI Office
  - Chamber of Commerce
  - Fire/rescue
  - Police department
- City of Commerce City
  - City Manager's Office
  - Public Works
  - Public Information Office
  - Chamber of Commerce
  - Fire/Rescue
  - Police Department
- Local State Patrol Office
- Local hospitals
- Key stakeholders: to be provided by the Department, including but not limited to the following:
  - Local schools and school districts

In order to facilitate communication, FRMG will assemble contact lists to show detailed contact information. All official contact lists will be developed from the start of the Construction Period and updated throughout the Term of the Project. Any foreseeable impact on traffic related to maintenance activities will result in information updates on the Project website and through third-party traffic reporting providers. In addition, announcements will be made via temporary signage indicating the duration and type of work. In regards to unforeseeable events, upon observation of

an Emergency, an Incident, an O&M Defect or any other hazard, FRMG will immediately implement a Closure or other action necessary to mitigate the hazard and inform users and other relevant authorities impacted by the event and resulting lane Closures.

i. Identifying and Recording O&M Defects

FRMG will maintain clear knowledge of the condition of highway, structures, and other assets and how they are performing. All management decisions regarding maintenance, rehabilitation, and renewal revolve around these two knowledge sets.

Identification

FRMG will perform regular condition and performance monitoring inspections, which is inclusive of safety inspections in order to monitor both operating condition and remaining life of its assets. Daily observations of asset condition are made by maintenance crews, Courtesy Patrol Drivers, and by FRMG management. See **Section b. (*Inspection Work*)** for a detailed list of procedures and scheduled frequency of inspections.

Conformance with requirements and identification of Category (Cat) 1 and Category 2 O&M Defects is accomplished first and foremost through training of staff. The Maintenance Superintendent, crew supervisors, field technicians and Courtesy Patrol will be trained to identify damage and deficiencies and just as importantly to understand and recognize desired levels of service. FRMG management will commit resources to ensure required performance levels are met or exceeded. During the O&M mobilization, and as new employees are hired, FRMG will conduct training that is attended by key technical, supervisor and management team members.

Specifically, this training focuses on the performance of all Work in accordance with the referenced documents including identification of Cat 1/Cat 2 assignments. All personnel will be provided training materials on inspection identification and performance criteria. Furthermore, we will conduct periodic refresher training seminars as part of the internal Quality Management Plan (QMP) Program.

All of the operations and maintenance employees engaged by FRMG are required to attend the Company's orientation course prior to commencing any work. This includes Cat 1/Cat 2 assignment criteria. Topics include Project organization, scope and basic objectives of the Project. Project policies and procedures will be described and communications protocols and reporting requirements will be outlined. Requirements of the O&M Agreement and, where appropriate, the Project Agreement will be reviewed and summarized.

Training for new employees will focus on company administrative policies and procedures as well as special Project requirements such as work-time reporting, Cat 1/Cat 2 assignment, and use of Project resources. Other training requirements and programs that focus on specific functional areas within O&M, safety, environmental policy, and environmental BMP.

The Maintenance Superintendent and/or the O&M Manager will conduct routine audits to ascertain that correct assignment of Cat 1 and Cat 2 status is being made by staff. Procedures and scheduled frequency of safety inspections are detailed in **Section b. (*Inspection Work*)**.

Recording

A formal process of recording asset condition is further integrated within the MMIS via the service request function. The service request function is the initial input field for staff identifying and recording O&M Defects. The service request function will also receive input from FRMG, TMC operators, notifications from the Department, stakeholders, Users or others outside the agency.

These service requests are reported and input into MMIS by FRMG staff. FRMG will maintain a Project website available on the Internet. Through this site, the public will be directed to the appropriate contacts for service requests.

Service requests by the Department, or law enforcement agencies will be immediately placed into the MMIS. Requests from Users, neighboring properties, or other third parties will be investigated promptly and upon confirmation of type, location, and severity of the O&M Defect will be input into the MMIS.

Additional initial and ongoing training will be provided to employees charged with entry of O&M Defects into the MMIS. The members of FRMG O&M team know well that this function and its performance by trained and diligent staff is among the most effective means of ensuring correct assignment. Reports from field staff will be scrutinized at this critical juncture and requests for additional or follow-up detail will be made directly to the field employee reporting an O&M Defect to ensure the correct allocation has been made.

Procedures and Scheduled Frequency of Safety Inspections

Safety Inspection will be completed by a Maintenance Technician formally on a weekly basis. In addition, FRMG Courtesy Patrol drivers will complete informal Safety Inspection during each patrol. The formal Safety Inspection will include a prescriptive list of Elements and potentially unsafe conditions associated with those Elements that the Maintenance Technician will be observing and documenting. The informal Safety Inspections completed by the Courtesy Patrol drivers will involve observation while driving. Both the informal and formal Safety Inspections will be documented. The Informal Safety Inspection will involve documentation only if an unsafe condition is observed, the Formal Safety Inspection will include full documentation in a checklist format for long term record keeping. Both the informal and formal Safety Inspections may lead to the categorization of an O&M Defect which will be recorded in FRMG's MMIS.

j. Responding to O&M Defects

Based on inspections performed by FRMG personnel and Subcontractors and following the identification of O&M Defects, the Health & Safety/Operations or Maintenance Superintendent's responsibilities are as follows:

- To determine the magnitude and qualities of repair/maintenance work needed in order to implement rectification in a timely and efficient manner
- To develop work needs and quantities
- If applicable when the work cannot be assigned to in-house maintenance crews, manage subcontracts
- To inspect self-performed work and Subcontractor performance

Category 1 Defects receive immediate attention and at all times require communication to in-house crews for response. FRMG utilizes multi-purpose crews working from a crew cab/flatbed equipment platform for immediate response to multiple activities. Depending on the allowable response time, these crews can be dispatched immediately for one hour items. Crew Foreman are assigned a separate pickup truck to quickly assess the O&M Defect and coordinate appropriate equipment to the scene.

Where a Category 1 Defect is reported, and cannot be rectified immediately by field staff on-site, in addition to entry into MMIS, the Health & Safety/Operations Superintendent, Maintenance Superintendent, other senior manager or if after-hours, current Emergency on-call staff will be notified immediately (as further described in the previous section Identifying and Recording O&M Defects). Appropriate staff will mobilize immediately, or on a priority basis depending on the type and rectification time for Category 1 Defects. Courtesy Patrol communications with O&M responders will be instrumental in allowing correct mobilization of manpower and equipment resources for urgent response. This may include specialized Emergency subcontract support where needed.

For Category 1 Defects, if the O&M Defect cannot be immediately remedied (such as debris on the shoulder) the procedure to ensure timely response begins with the item being reported for input into the MMIS and to management (or after-hours' hot phone to on-call management representative). O&M Defects will also be reported to FRMG TMC operators where traffic is impacted. The Health & Safety/Operations Superintendent is responsible for coordinating response and the Maintenance Superintendent is responsible for coordinating mitigation efforts of Category 1 Defects and scheduling corrective action in the work plan. All O&M Defects are reviewed by O&M Manager daily for quality control of the correct classification. For Category 2 Defects, the O&M Defect is assessed and confirmed or reclassified and scheduled or corrective action.

Using the MMIS, the Health & Safety/Operations Superintendent and the Maintenance Superintendent will administer work orders, inspect work quality, verify material Acceptance, document Subcontractor activities, record work progress, and generally ensure adherence to standards and specifications in the rectification process. While Category 1 Defects will be programmed for immediate or as soon as practical response, it is the "ticking clock" component of MMIS work orders provide an invaluable tool for responding to Category 2 O&M Defects in a timely manner. This is provided by a time sorted report indicating open items and time remaining for each allow the prioritization of resources to ensure that all O&M Defects are responded to within the time allotted. In this way, repair can be scheduled for an appropriate time that both satisfies the Category 2 rectification requirement, but also allows efficient grouping of like tasks and assignment to specific maintenance crews. Category 2 Defects with long completion times will be cross referenced for permanent repair in the annual work plan and may be expedited for repair based on safety and serviceability.

Management and staff will be trained not only in proper identification of Category 1 and Category 2 Defects, but also in the appropriate repairs for mitigation and rectification of these O&M Defects. FRMG crews or in some cases specialized Subcontractors will be mobilized for specific O&M Defects (most often in the case of Category 1 Defects) or for multiple locations of like O&M Defects (in the case of Category 2 Defects) selected to allow crew or Subcontractor efficiencies.

Appropriate resources to meet the Defect Remedy Period outlined in Schedule 11, Appendix A-1 and A-2 and to meet the Target Performance Requirements in the form of materials and equipment, will be managed by the Maintenance Superintendent for in-house crews and via Subcontractor management for specialty or subcontracted repairs. Repairs will be completed in compliance with the safety procedures detailed in Appendix 1 to this MMP and in compliance with the Department and manufacturers requirements. Upon completion of repairs both in-house staff and subcontract staff will report the completion for input into the MMIS. Quality Assurance and Quality Control of completed repairs will occur as detailed in the O&M Quality Management plan attached as Appendix D to this MMP.

k. Monitoring and Maintaining

Effective maintenance begins with a complete and continually updated detailed understanding of the condition of assets relative to all Project requirements. Through the Monitoring and Maintaining Procedures detailed in this document, FRMG will ensure timely satisfaction of General Requirements and Performance Requirements and Defect Remedy Periods. Updates to the Performance and Measurements Tables (Appendix A-1 and A-2) whether requested by FRMG 90 days prior to Substantial Completion, or 60 days prior to each Contract Year (each where Approved by the Department) as well as amendments directed by the Department will be implemented into the Maintenance Management System. There are two types of General Requirements envisioned in Schedule 11 (the overarching general requirements detailed in Section 1 of Schedule 11, and those included in Appendices A-1 and A-2 column 3).

The first set of General Requirements detailed in Section 1 of Schedule 11 forms the foundation of training for management and field staff alike in order to perform the O&M Work in accordance with the requirements of Schedule 11, and will ensure that the Project is operated, maintained and managed in a safe, effective, and reliable level of operation and condition for the duration of the O&M Period during construction and the Operating Period.

Staff will be trained to fully understand the correct application of all requirements in the context of their application FRMG will immediately implement a Closure or other action necessary to mitigate the hazard. FRMG staff will be trained to immediately inform the Department of the circumstances of any such Closure and coordinate with the Department, and other authorities that may be impacted by such Closure.

All staff will be trained to be aware that where FRMG becomes aware of an Emergency, an Incident, an O&M Defect, or any other hazard in which the safety of users, is compromised, FRMG will immediately implement a Closure or other action necessary to mitigate the hazard. FRMG staff will be trained to immediately inform the Department of the circumstances of any such Closure and coordinate with the Department, and other authorities that may be impacted by such Closure.

Table 3 addresses monitoring and maintaining the Elements detailed in Appendices A-1 and A-2 of Schedule 11 and provides for each Element the following:

- A performance checklist
- Indications regarding monitoring frequency
- Indications regarding maintenance processes including equipment and tools
- Indications whereby more frequent or more rapid monitoring would be needed

Table 3 applies to both the Operating and the Construction Periods, with certain obligations excluded relative to the Construction Period such as annual testing for roughness (IRI). Procedures for maintaining assets is further described in Sections i. Identifying and Recording O&M Defects, j. Responding to O&M Defects, and y. Anticipated Repairs. Frequencies will be adjusted to ensure optimal allocation of resources and full compliance with Project Agreement requirements.

Table 3. Monitoring and Maintaining

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
1.1	Mainline, Roadways, connecting structures.	Free from obstructions and debris.	No Obstructions or Debris	Courtesy Patrols//Dispatchers ongoing and Maintenance Staff Ongoing. Crew will remove debris when found or dispatched if practical	Crew and work vehicle. On-call personnel for after-hours calls. Skid Steer, or loader where needed for transport loss of load etc.	NA, ongoing
1.2	Pavement - All roadways, including ramps, detours, and shoulders, (mainline including the bridge deck, covers, gratings, frames, expansion joints and boxes)	Smooth and quiet surface course with adequate skid resistance	80% roadway has ruts <0.40" and none >o.55"; 80% roadway IRI< 95 & 100% <160.	Annual Specialist Inspection (See Section 1.2 Inspections)	Subcontract Renewal Work	Not anticipated
		Free from defects.	No failures, delamination, potholes, blow ups, faulting>0.12". Long crack <200ft/0.1 mile No unsealed low or moderate cracking, no high cracking Unsealed D cracks <2 slabs/0.1 mile Corner Breaks <5/0.1 mile Scaling <70sf/0.1 mile Spalling <2sf/0.1 mile No slabs broken 3 pieces Max 2 broken slabs/0.1mile	Courtesy Patrols, Maintenance Technician, ongoing will notify management and take mitigating action where possible for localized damage to pavement by repairing with cold mix/hot mix material as available. FRMG uses procedures, techniques and the measuring equipment, for measurement criteria of pavement related performance requirements consistent with the CDOT Distress Manual for HMA and PCC Pavements by the National Center for Pavement Preservation, Appendix B of the Development of a Pavement Preventative Maintenance Program for the Colorado Department of Transportation, Report No. CDOT-DTD-R- 2004-17 Final Report.	In-house crews for minor repairs; Qualified subcontractors for areas > 3ftx 3ft. Preventive maintenance will actually be from overlays and crack seal program.	NA, ongoing
		Drop Offs. Edge Breaks	No drop offs over 2." Max 50 feet edge break >4" wide	Courtesy Patrols ongoing and Maintenance Technician ongoing will notify management. Annual review of Project edge of pavement by maintenance staff.	In-house crews for localized repairs. Dump bodies and crew trucks, skid steer. Subcontractors for motor grader work and large scale work.	Follow on inspections for areas rehabilitate d bi-weekly until established where sod/seeding occurs.
		Perform skid resistance site investigation	Avg 25 or higher in 0.5 mile section for mainline (excludes shoulders < 12 ft) Signs Posted within allowable times	Staff will monitor areas of incidents in wet weather and investigate the skid resistance in problem areas. Annual Specialist inspection	Subcontracted asphalt testing and/or rehabilitation company	If Annual Inspection indicated potential that work might be needed before the next Annual then interim inspection(s) will be scheduled
		Remove debris & repair pavement.	Removal of spilled liquids within time limits.	Where observed by Courtesy Patrol and Staff or where reported by CDOT or other agencies.	In-house staff and/or Courtesy Patrol subcontractors to apply absorbency materials or socks where deemed safe to achieve localized containment, and to support first responders. Environmental subcontractor for post incident mitigation and monitoring.	As prescribed for soil remediation monitoring.
		Noise measurement if complaint	<105dB	When complaints warrant: Management staff will commence with testing from an outside source to check noise levels	Subcontracted testing company	NA, performed upon complaint
1.3	Crossovers & access roads	Free of defects	No potholes or base failures	Courtesy Patrols and Maintenance Technician ongoing; Crew will remove debris when found or dispatched if practical	Crew will remove debris when found or dispatched if practical. Crew and work vehicle. On- call personnel for after-hours calls. Skid Steer, or loader where needed for transport loss of load etc.	NA, ongoing

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
1.4	Curbs	Free of defects	95% free of defects and separation >1/4", no more than 1" out of alignment over 10'. No exposed rebar	Courtesy Patrols, Maintenance Technician, Management Ongoing;	Crew will remove debris when found or dispatched if practical. Crew and work vehicle. On- call personnel for after-hours calls. Localized concrete repair materials. Deck saw, chipping hammer. Subcontract for large scale repairs.	NA, ongoing
1.5	Hard Capped Surface	Free of defects and removal of deleterious material	No tracking of gravel/sand or weeds present	Courtesy Patrols, Maintenance Technician, Management Ongoing;	Daily crew will sweep up any material tracked onto roadways. Pre-emergent or post-emergent herbicide	NA, ongoing
2.1	Storm Sewer Systems	Correctly functions clogging	No ratings of Service B or worse. no clogging greater than 10% of hydraulic capacity adjacent to pavement, or 25% in ditches No damaged, insecure, rusted, or missing grates, end sections, metal structure or hardware Settlement, spalling, cracks, no separated joints or missing joint material. No cracks in concrete>1/8" and no spalls >3/4" No separated or missing joint material	In-house inspections in accordance with CDOT Level of Service Manual (Drainage Inlets and Structures). Maintenance inspections, which will focus on user safety and drainage infrastructure functionality; Annual inspections, which will focus on general condition assessments which in turn will inform the development of our rehabilitation strategies; and Detailed inspections, which will focus on comprehensive condition assessment and physical non-destructive testing, where required, to further inform our rehabilitation program. Our drainage condition inspections for culverts will use the format and details consistent with those specified in the CDOT level of service manual for drainage systems.	In-house crews, hand tools, skid steer, loader, dump bodies. Subcontracted concrete work	Where erosion identified, accelerated inspection until corrective action completed.
2.2	Open Water Carriers (standard roadside ditches, median ditches, relocated channels, channel linings)	Each Element of the drainage system is maintained to ensure it functions correctly.	Maintain or exceed condition as identified in the BACR. No instances of: Undermining, undercutting, erosion, or obstructions impeding the flow of water	In-house inspections in accordance with CDOT Level of Service Manual (Drainage Inlets and Structures).	In-house crews, hand tools, skid steer, loader, dump bodies. Subcontracted concrete work	Where erosion identified, accelerated inspection until corrective action completed.
2.3	Pavement drains, catch basins	Functions correctly	No standing water in mainline or 1"elsewhere	Ongoing observations by Courtesy Patrols, Maintenance Technicians, Management Ongoing; scheduled inspections in accordance with CDOT Level of Service Manual (Drainage Inlets and Structures) Maintenance inspections, which will focus on user safety and drainage infrastructure functionality; Annual inspections, which will focus on general condition assessments which in turn will inform the development of our rehabilitation strategies; and Detailed inspections, which will focus on comprehensive condition assessment and physical non-destructive testing, where required, to further inform our rehabilitation program. Our drainage condition inspections for culverts will use the format and details consistent with those specified in the CDOT level of service manual for drainage systems.	In-house crews will respond to plugged drains during rain events. Sweeping & constant debris removal to help keep drains clean. Sub contracted vac/jet pipes and inlets as needed.	Where significant erosion identified, accelerated inspection until corrective action completed.

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
2.4	Culverts	Functions correctly	Good condition and full functionality. Joints remain soil tight, erosion controlled	as above and Scaling, which typically results from freeze-thaw cycles Disintegration, which can result from continued and untreated scaling Erosion, which may result from ice flows or other waterborne agents (e.g. gravel, sand, etc.) Delamination of the surface concrete Spalling, which can result from continued and unattended delamination as well as overloading Cracking Other defects, including, general wear, pop-outs, stratification, deposits, etc. Inspection by Maintenance Technician biannually in the spring and fall and after sever precipitation events	as above	Where significant erosion identified, accelerated inspection until corrective action completed.
2.5	End Treatments	Functions correctly	No damage, undercutting, spalled broken concrete	Ongoing observations by Courtesy Patrols, Maintenance Technicians, Management Ongoing; scheduled inspections by Maintenance Technicians in accordance with CDOT Level of Service Manual (Drainage Inlets and Structures).	In-house crews will respond to plugged drains during rain events. Sweeping & constant debris removal to help keep drains clean. Subcontracted vac/jet pipes and inlets as needed.	Where significant erosion identified, accelerated inspection until corrective action completed.
2.6	Stormwater systems	Stormwater Systems installed as permanent features maintained, functioning correctly, and operating as designed.	See CDOT Erosion Control and Storm Water Quality Guide (ECSCG). See manufacturers manuals Compliance with regulations and standards and in accordance with CDOT's Erosion Control and Storm Water Quality Guide (ECSCG). Manufactured Systems: Compliance with manufacturers manuals Vegetated Bio filters/Filter Strips: Inspection of slopes and ditch bottom; vegetation management; debris and litter management. Detention Ponds: Inspected and checked for compliance with management plan. Bio retention Cell, Infiltration: Inspected for excessive ponding; overgrown vegetation, litter/debris; erosion and deposition; and outlet structure clogging Infiltration Basin/Trenches: Inspected for debris, overgrown vegetation, level of sedimentation; and condition of observation wells; Constructed Wetlands: Effectiveness of vegetation management; absence of erosion, clogging; litter/debris and sediment.	Ongoing; inspections by Maintenance Technicians in accordance with CDOT Level of Service Manual (Drainage Inlets and Structures). • Maintenance inspections, which will focus on user safety and drainage infrastructure functionality; Annual inspections, which will focus on general condition assessments which in turn will inform the development of our rehabilitation strategies; and Detailed inspections, which will focus on comprehensive condition assessment and physical non-destructive testing, where required, to further inform our rehabilitation program. Our drainage condition inspections for culverts will use the format and details consistent with those specified in the CDOT level of service manual for drainage systems.	In-house crews, hand tools, skid steer, loader, dump bodies. Subcontracted concrete work	Where significant erosion identified, accelerated inspection until corrective action completed.

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
2.7	Discharge Systems	Proper function; complies with all regulations	No instances of noncompliance	Ongoing observations by Courtesy Patrols, Maintenance Technicians, Management Ongoing; inspections by Maintenance Technicians in accordance with CDOT Level of Service Manual (Drainage Inlets and Structures). Maintenance inspections, which will focus on user safety and drainage infrastructure functionality; Annual inspections, which will focus on general condition assessments which in turn will inform the development of our rehabilitation strategies; and Detailed inspections, which will focus on comprehensive condition assessment and physical non-destructive testing, where required, to further inform our rehabilitation program. Our drainage condition inspections for culverts will use the format and details consistent with those specified in the CDOT level of service manual for drainage systems.	In-house crews, hand tools, skid steer, loader, dump bodies. Subcontracted concrete work	Where significant erosion identified, accelerated inspection until corrective action completed.
3.1	Structures having an opening measured along the center of the roadway of more than 20 feet (Includes the Cover's structural component)	Substructures and superstructures are free of: undesirable vegetation debris and bird droppings blocked drains, weep pipes manholes and chambers blocked drainage holes in structural components Defects in joint sealants Defects in pedestrian protection measure scour damage corrosion of rebar paint system failures impact damage	No element below condition rating "7" for new or widened bridges; "6" for existing or rehabbed bridge. Pontis conditions states 1 or 2 for all elements.	Ongoing visual safety observations by Courtesy Patrol, Maintenance Technicians and Management. Perform biennial inspections by certified Bridge Inspection Firm in accordance with the Code of Federal Regulations, 23 Highways – Part 650, the current version of the CDOT Pontis Bridge Inspection Coding Guide and AASHTO Manual for Bridge Evaluation of Bridges, the FHWA Bridge Inspector Reference Manual, AASHTO Manual for Bridge element Inspection, and Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges.	In-house crews or subcontracted for concrete repairs, repainting or joint replacements. Crew trucks, compressor, hand tools, deck saws, chipping hammer, pressure washer. Subcontracted for specialized or major rehabilitation works. In-house crews will clean debris and bird droppings, clean drains. Periodic sweeping and removal of noncompressibles will help keep joints intact. Review of inspection reports will drive repair plan.	At the indicated frequency acceleration where determined necessary by the qualified Bridge Inspection firms engineer.
		Minimum vertical clearance of 16.5 feet over traveled lanes.				

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
3.2	Structure component (Includes the Cover's structural component)	Expansion joints are free of: dirt debris and vegetation, Defects in drainage systems, loose nuts and bolts, Defects in gaskets, leaking The deck drainage System operates as intended. Barriers are free of: loose nuts or bolts, blockages of hollow section drain holes, vegetation, accident damage Bearings and bearing shelves are clean. Maintain Settlement within specified Requirement Sliding and roller surfaces are clean and greased to ensure satisfactory performance. Special finishes are clean and perform to the appropriate standards vii). All non- structural items such as hoists and electrical fixings, operate correctly, are clean and lubricated as appropriate, in accordance with manufacturer's recommendation and certification of lifting devices are maintained. viii) Maintain structures to specified condition rating.	Compliance with General for Elements without NBI condition rating. NBIS rating of "7"; 100% compliance for elements not noted in NBIS/Pontis	As above 3.1	In-house crews or subcontracted for concrete repairs, repainting or joint replacements. Crew trucks, compressor, hand tools, deck saws, chipping hammer, pressure washer. Subcontracted for specialized or major rehabilitation works. In-house crews will clean, remove debris and bird droppings, clean drains. Periodic sweeping and removal of noncompressibles will help keep joints intact. Review of inspection reports will drive repair plan.	At the indicated frequency acceleration where determined necessary by the qualified Bridge Inspection firms engineer.
3.3	Structures – General (Includes the Cover's structural component)	Safe operation of structures, maintained to prevent safety issues arising	No delaminated concrete above roadway	As above 3.1. Additional inspections as may be required, for example in response to a vehicle collision with a structure. NBIS inspections as per FHWA regulations at the frequency specified in FHWA regulations, AAHSTO Bridge Management and AAHSTO Manual for Condition Evaluation of Bridges (and Cover/other structures as per NBIS and NTIS)	In-house crews or subcontracted for removal of loose or spalling material and concrete repairs. G84 deck saws, chipping hammer. Subcontracted for specialized or major rehabilitation works.	As above
3.4	Structures – Bridge girders/beams (Includes the Cover's structural component)	Design stress is not exceeded in bridge girders/ beams (particularly in skew bridge decks)	Records as required in the current version of the CDOT Pontis Bridge Inspection Coding Guide and AASHTO Manual for Bridge Evaluation.	As per original design calculations or where subsequent load rating analysis is required,	n/a	As required.
3.5	Non-bridge class culverts.	Non-bridge- class culverts are free of: vegetation and debris and silt Defects in sealant to movement joints scour damage	Comply with General. No NBI < 7 No CS < 3	Ongoing observations by Courtesy Patrols, Maintenance Technicians, Management As stated in 3.1 where required.	In-house crews or subcontracted for removal of vegetation or sediment.. Crew trucks, compressor, hand tools, deck saws, chipping hammer. Subcontracted for specialized or major rehabilitation works.	Where erosion identified or as above 3.1 where required.

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
3.6	Retaining Walls (other than MSE walls).	Maintain retaining walls to be structurally sound, and free of vertical, lateral or rotational movement with no material Defects compromising the intended performance.	<5% wall area showing cracking with leaking, efflorescence, delamination, spalls or rust staining, <5%cracks >1/8" No spalls >1" deep; No settlement over 1.5" or .5" in 5 year period; No rotational movement over 1/2 over 10ft vertical. Free of vegetation and overgrowth At least 90% of drain holes are free of build up (for any walls).	Ongoing observations by Courtesy Patrols, Bi-Annually by Maintenance Technicians As stated in 3.1 where required.	In-house crews or subcontracted for removal of vegetation or sediment. Crew trucks, compressor, hand tools, deck saws, chipping hammer. Subcontracted for specialized or major rehabilitation works with appropriate heavy equipment.	Where undermine identified or as above in 3.1 where required.
3.7	MSE Retaining Walls	Maintain retaining walls to be structurally sound, and free of vertical, lateral or rotational movement with no material Defects compromising the intended performance.	<5% showing cracking, delamination, spalls or scaling per panel or total wall. No cracks >1/4", or spalls over 1” No exposed fabric, No vegetation from joints. No panel offsets > 0.75” No erosion >1ft, no rotation > 3/4" over 10 ft.	As above	As above	As above
3.8	Sign Structures	Sign gantries and foundations are structurally sound and free of loose nuts and bolts	All condition states 1 or 2 for structural members. No loose assemblies; no defects in surface protection.	Ongoing visual safety observations by Courtesy Patrol, Maintenance Technicians and Management. Perform CDOT required inspections in accordance with CDOT Recording and Coding Guide for the Inventory and Inspection of Colorado’s Overhead Signs, Signals and High Mast Lights and CDOT M&S Standard Plans.	In-house crews or subcontracted for removal of graffiti. Field crews will tighten bolts and touch up cold galvanizing or protective coatings. Bucket truck, crew trucks, compressor, hand tools. Subcontracted for specialized or major rehabilitation works with appropriate heavy equipment.	Where structural integrity in question and as above 3.1 where required.
3.9	Load Ratings (Including Cover)	All structures will have: adequate capacity for the design load, legal loads (including Specialized Hauling Vehicles and Notional Rating Load, as referenced in AASHTO Manual for Bridge Evaluation, and Colorado Permit Vehicle, as referenced in CDOT Bridge Rating Manual)	Meet design loads	With initial inspection and as required by CDOT or Indicated by Qualified Bridge Inspection firm. load rating and load restriction calcs in accordance with AASHTO Manual for Bridge Evaluation, CDOT Pontis Bridge Inspection Coding and Bridge Rating Manuals.	Subcontracted engineer	NA
4.1	Pavement markings	Pavement markings are: clean and visible during the day and at night whole and complete and of the correct color, type, width and length Correctly placed to meet the MUTCD and the Colorado Supplement to MUTCD and CDOT M&S Standard Plans. Non-applicable pavement markings are removed.	100% meet Manual of Uniform Traffic Control Devices (MUTCD); mcd reading: white 150, yellow 100 80% present for long line, 85% for auxiliary	Visual alternating Day and Night inspection by Maintenance Technicians biannually. Reflectivity tests and each day pavement markings are installed In accordance with ASTM E 1710 or AASHTO TP111	In-house staff for localized repairs. Subcontracted pavement striping.	Wherever indicated by visual inspections or striping applications accelerated .

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
4.2	Reflective markers	RPM's, are: clean and clearly visible of the correct color and type reflective or retroreflective correctly located, aligned and at the correct level	<10% missing, no more than two in a row missing, 100% secured and uniform	Visual alternating Day and Night inspection by Maintenance Technicians annually.	In-house staff for localized repairs. Crew trucks, compressor, hand tools, epoxy or hot application tools. Renewals by subcontract.	Wherever localized losses become repetitive in specific areas.
4.3	Delineators & Markers	Object markers and delineators are: clean and visible of the correct color and type legible and reflective straight and vertical placement per MUTCD, and CDOT M&S	<10% missing or not visible in 1 mile, 100% reflective;	Daily ongoing observations via Courtesy Patrols, O&M staff and management. Visual alternating Day and Night inspection by Maintenance Technicians annually.	In-house staff for repairs and replacements. .	NA
5.1	Guard rails and barrier walls.	All guardrails, traffic barriers and other concrete barriers are maintained free of Defects. They are placed per MUTCD, CDOT's M&S Standards and Roadway Design Manual and FHWA Roadside Design Guide.	No loose hardware. 90% of surface free from defect in 12.5 ft No defect > 1sf No exceedance of 3" vertical tolerance No misalignment > 4" Vegetation controlled No missing posts, rail, blocks. No posts or 2 adjacent posts over 25% section loss No blocks section loss>25%	Daily ongoing observations via Courtesy Patrols, O&M staff and management.	In-house staff for immediate response and some repairs.; Crew trucks, compressor, post driver, Skid steer and attachments, concrete saw, chipping hammer and hand tools. Subcontractor for guardrail repairs and concrete barrier wall repairs.	NA
5.2	Impact attenuators, anchor assembly, and end assembly	All impact attenuators, anchor assemblies, and end assemblies are appropriately placed and correctly installed	100% in place and functioning and cell replace after impact.	Courtesy Patrols ongoing and Maintenance Technicians Ongoing will find areas needing attention with emphasis on Category 1 damage. Police dispatch and FRMG incident responders report in case of accident damage	In-house staff for immediate response and some repairs.; Crew trucks, compressor, post driver, Skid steer and attachments, concrete saw, chipping hammer and hand tools. Subcontractor for guardrail repairs and concrete barrier wall repairs	NA
6.1	General – all sign panels	Signs are clean, correctly located, clearly visible, legible, reflective, at the correct height and free from structural and electrical Defects Identification markers are provided, correctly located, visible, clean and legible Sign mounting posts are vertical, structurally sound and rust free; meets required visibility distances	None missing, All meet MUTCD; Retro reflectivity no less than MUTCD and Colorado Supplement No face damage > 5% and no text damage, 100% plumb None blocked by vegetation. All correct size, location, type, and wording	Courtesy Patrols ongoing and Maintenance Technicians Ongoing will find areas needing attention with emphasis on Category 1 damage. Police dispatch and FRMG incident responders report in case of accident damage	In-house or outsource crews, small sign materials, posts, etc. Crew trucks, compressor, post driver, Subcontractor with bucket truck/crane for larger signs. Common signs will be kept in inventory	NA
6.2	Safety critical signs	Requirements as 6.1, Plus: "Stop," "Yield," "Do Not Enter," "One Way" and "Wrong Way" and all Turn-Prohibition signs are clean, legible and undamaged.	100% present, legible, not twisted or leaning All connections shall be free from Defects and free from debris or material that would impede function	Courtesy Patrols ongoing and Maintenance Technicians Ongoing will find areas needing attention with emphasis on Category 1 damage. Police dispatch and FRMG incident responders report in case of accident damage.	In-house crew will keep a supply of these signs on hand and will repair immediately upon notification; may use temporary stand mount or roll- up signs for quick hazard mitigation. Crew trucks, compressor, post driver, hand tools. As well as subcontractor emergency response and renewal replacements.	NA
6.3	Obsolete or obscene signs, banners, flags or posters	Removed from the Project	100% compliance	Courtesy Patrols ongoing and Maintenance Technicians Ongoing will find areas needing attention	In-house crews will remove if found or dispatched	NA

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
7.1	Traffic Signals - General	Traffic Signals will meet the following: Be clean and visible, heads and buttons correctly aligned and operational elements including cabinets, foundations, signing, vehicle detection (cameras or loops), electrical power and boxes: are aligned correctly, structurally sound, full operational and free from damage caused by accident or vandalism	Provide written notification to CCD and Department, 100% of the time	Courtesy Patrols ongoing and Maintenance Technicians Ongoing will find areas needing attention with emphasis on operational status. 6 month detailed inspection by Maintenance staff for cabinets, foundations, alignment etc.	NA. Maintenance by others. Reporting log kept where issues found	Follow-up inspections where issues reported
8.1	Roadway Lights	All lighting is free from Defects and provides Acceptable uniform lighting quality. Lanterns are clean and correctly positioned.	Provide written notification to Xcel Energy and Department, 100% of the time	Courtesy Patrols ongoing and Maintenance Technicians Each Work night will find areas needing attention with emphasis on operational status. Monthly detailed inspection by maintenance staff.	NA. Maintenance by others. Reporting log kept where issues found	Follow-up inspections where issues reported
8.2	Lighting Structures	columns are upright and correctly founded and structurally sound	Provide written notification to Xcel Energy and Department, 100% of the time	As 8.1	As 8.1	As 8.1
8.3	Lighting Fixtures	All luminaries functioning on each pole	Provide written notification to Xcel Energy and Department, 100% of the time	As 8.1	As 8.1	As 8.1
9.1	Fences and Walls	act as designed and no openings	100% compliance	Courtesy Patrols ongoing and Maintenance Technicians will find areas needing attention with emphasis on openings in limited access. Annual system inspection by Maintenance Staff	In-house staff for immediate response and some repairs.; Crew trucks, compressor, post driver, Skid steer and attachments, concrete saw, chipping hammer and hand tools. Subcontractor supplemented particularly for larger repairs	Where structural behavior is questioned and repaired monitor weekly for additional movement
9.2	Fences and Walls - Construction	Integrity and structural condition of the fence is maintained	100% compliance	as 9.1	as 9.1	as 9.1
10.1	Vegetated Areas Except landscaped areas - General	Vegetation is maintained so: height of grass is kept at standards, spot mowing is done for sight distance, no growth into shoulders, sidewalks, etc. Herbicide program for noxious weed control	95% of grass Between 8-10", not less than 6". No vegetation encroachment or impaired site lines. CDOT Roadside Vegetation Manual compliance for Wildflowers	Weekly inspection by Maintenance Technicians Courtesy Patrols ongoing and Maintenance Staff Ongoing observe for sight distance.	In-house or outsourced crew, weed eaters, small tractor with 5 ft. wide bush hog OR subcontractor. In- house crews will cut brush or weeds for site distance as needed for quick mitigation. May provide weed control depending on areas as well.	N/A
		Development and implementation of noxious weed management program to control noxious weeds and to eliminate grass in pavement or concrete	No more than 15% of 1 mile roadway contains noxious weeds No more than 15% of 0.1 mile ramp contains noxious weeds	monthly inspection by Maintenance Technicians	In-house crew l OR subcontracted. Certified herbicide applicator as required.	N/A
10.2	Landscaped Areas	i. All landscaped areas are maintained Landscaped areas are as designated in the plans.	90% of landscaped areas meet general requirements	as 10.1	In-house or outsourced crew, weed eaters, small tractor with 5 ft. wide bush hog OR subcontractor. In- house crews will cut brush or weeds for site distance as needed. Subcontract work where appropriate	N/A
		ii. Mowing, litter pickup, irrigation system maintenance and operation, plant Maintenance, pruning, insect, disease and pest control, fertilization, mulching, bed maintenance, watering is undertaken as per MMP.				

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
		iii. The height of grass and weeds is kept between 8" to 10", and not shorter than 6". Mowing begins before vegetation reaches a hazardous condition, such as sight distance, blocking reflectors, hiding animals or causing drifting snow. Damaged or dead vegetation is replaced				
10.3	Fire hazards	Fire hazards are controlled	100% compliance			
10.4	Trees, Brush, Ornamentals (Other than landscaped areas on top of the Cover, where REF 10.2 would apply)	Trimmed in acc. With CDOT standards; do not interfere with sight distance; dead vegetation removed; dangerous trees removed by licensed persons; undesirable vegetation removed; diseased removed by licensed personnel	100% compliance	as 10.1	In-house or outsourced crew, weed eaters, small tractor with 5 ft. wide bush hog OR subcontractor. In- house crews will cut brush or weeds for site distance as needed. Subcontract work where appropriate	NA
10.5	Wetlands	properly managed in acc. w/ permits	100% meet permit requirements	Ongoing and Specific Inspection Yearly in conjunction with MS4 reviews	In-house and Subcontracted specialist	Where no compliance is observed.
10.6	Water Quality Ponds	Maintenance of all vegetation within the pond area	Maintained as required per design	Ongoing and Specific Inspection Yearly in conjunction with MS4 reviews	In-house and Subcontracted specialist	Where no compliance is observed.
11.1	Slope - Stability	All structural or natural failures of the embankment, cut slopes, and slope and ditch pavement Defects on the site are repaired	No slope failures; no unsealed cracks or joints on paved slopes. No vegetation on paved slopes. No rut, washout etc. greater than 6 inch deep or 2 feet wide	Ongoing and Specific Inspection Yearly by Maintenance Technicians. Failures by geotechnical specialist	In-house staff for immediate response and localized repairs.; Crew trucks, dump body, skid steer and other excavation equipment as needed, concrete saw, chipping hammer and hand tools. Subcontractor supplement or for larger repairs	As recommended by geotechnical l specialist
11.2	Slopes-General	maintained in conformance to original cross sections	No slope failures; proper removal and disposal of eroded material	As 9.1 and as part of NBIS inspections for slopes associated with structures	In-house staff for immediate response and localized repairs.; Crew trucks, dump body, skid steer and other excavation equipment as needed, concrete saw, chipping hammer and hand tools. Subcontractor for larger repairs	As recommended by geotechnical specialist or bridge inspector
12.1	Graffiti	Removal on all elements	Graffiti removed - 100%	Daily ongoing observations via Courtesy Patrols, O&M staff and management.	In-house or outsourced crew will power wash or paint over graffiti. On-call crews may need a bucket truck to reach areas	NA
12.2	Offensive Graffiti					
13.1	General	Respond to Incidents in accordance with the Incident Response Plan.	98% of responses within time limit	Daily ongoing observations via Courtesy Patrols, O&M staff and management as well as reporting by police or other authorities	In-house crew and Courtesy Patrol with supplement by subcontractor	NA
13.2	Spillage of Hazardous Materials	For any hazardous materials spills, comply with the requirements of Schedule 17.	Records show compliance	As occurs	Courtesy Patrol and O&M Staff for initial support of HazMat authorities and HazMat contractor as required	Remediation monitoring as required
13.3	Elements damaged as a result of Incident - Structural Assessment	Evaluate damage to structures and liaise with emergency services to ensure safe working in clearing the Incident.	Records show compliance	As occurs	O&M staff for initial response, Bridge Inspection firm for assessment where structural damage suspected, CDOT bridge office notified immediately.	As recommended by Bridge Inspector
13.4	Elements damaged as a result of Incident - Temporary and permanent remedy	Propose and implement temporary measures or permanent repairs to Defects arising from the Incident Ensure the structural safety of any structures affected by the Incident.	Records show compliance	As 13.3	In-house staff for immediate response and localized repairs.; Crew trucks, dump body, skid steer bucket truck as needed, concrete saw, chipping hammer and hand tools. Subcontractor for specialized repairs	As recommended by Bridge Inspector
14.1	Developer Identification Signs	Signs installed at the entrance(s)/exit(s) to/from the maintenance yard	100% compliance	Ongoing Maintenance Technicians	In-house crew, signing tools	NA

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
14.2	Environmental contamination	No increase in contamination.	No increase during Operating Period	As needed	NA	NA
14.3	Maintenance of grounds and buildings	Kept in a neat and tidy order Kept structurally safe.	100% Compliance	Daily Maintenance Technicians	In-house Maintenance Staff	NA

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
SNOW REMOVAL						
15.1	Response Time, material application vehicle.	The manning and loading of material application vehicles for a Precipitation Event.	30 minutes to leave the yard on precipitation. Start; one hour for round-trip of plows/spreaders; continuous operation till bare pavement is maintained; one hour after event or 24 hours on shoulder for total bare pavement.	Compliance monitored each event by O&M management. See OMP Appendix A Snow and Ice Plan	In-house and as needed availability staff, potential subcontract support or performance. Tandem Plows, Tow Plows, Spreaders Front end Loader and/or blower, patrol trucks.	NA
15.2	Response Time - plow	Manning				
15.3	Plowing and material application	continuous plowing and material application				
15.4	Circuit time	complete entire route within 1 hour				
15.5	All lanes, ramps, paved shoulders	Bare and wet pavement during event				
15.6	Hazards	Address snow and ice hazards immediately upon notification or detection				
15.7	Isolated slippery conditions	address slippery conditions				
15.8	Materials storage	materials in tanks or covered				
15.9	Reporting	All Schedule 11 Reporting requirements timely accurate complete				
15.1	AVL	All vehicles with AVL at all times				
15.11	Spreader calibration	Spreader controller calibration is operational				
15.12	Winter Drainage	melted snow/ice causing flooding				
16.2	Courtesy Patrol	Respond to any calls on the General Purpose Lanes or Tolled Express Lanes 15min after being dispatched.	Response times met for 95% of dispatches measured on a 1 year rolling basis.	Compliance monitored by O&M Mgmt.	In-house or outsourced courtesy patrol crew and outsourced, tow vehicles meeting requirements of Appendix B	NA
17.1	Sweeping	i) Keep all channels, lanes, hard shoulders, gore areas, ramps, intersections, islands and frontage roads and curb and gutter swept clean.	Inspection records showing 100% compliance	After scheduled sweepings	likely Subcontracted sweeping service	as needed for poor subcontract or perf.
		ii) Clear and remove debris from all paved areas other than as required in Section 1.1 of this Appendix A- 2.				
		iii) Remove all sweepings without stockpiling in the right-of-way and dispose of at approved site.				
17.2	Litter	i) Keep the site in a neat condition, remove litter regularly	100% compliance	Courtesy Patrol ongoing for debris, O&M staff ongoing for debris and litter	In-house or outsourced courtesy patrol crew and outsourced, tow vehicles meeting requirements of Appendix B	as needed for poor subcontract or perf.
		ii) Pick up large litter items before mowing operations.				
		iii) Dispose of all litter and debris collected at an approved solid waste iv) Remove dead animals from the Site.				
17.3	Sweeping	Clear and remove granular and sand material used as deicer or tractive material at the end of Precipitation Event	100%	After scheduled sweepings	likely Subcontracted sweeping service	as needed for poor subcontract or perf.

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
			COVER			
18.1	Cover: Snow and ice removal	Snow and ice removal in the Cover section and at access and egress points	No snow on structure wall or soffit or right shoulder at access/egress points	During event. Courtesy Patrol and Maintenance Technicians will review during events	remove by hand or small truck with plow	NA
18.2	Cover: Subsurface structures	All subsurface structures, including passive fire protection, will be free of Defects	Elements free of defects	Maintenance Technicians will review the facility daily	Maintenance Technicians for minor technical repairs and subcontractors supplement	Where any component or system exhibits failure
18.3	Cover: Structural supports and Connections for all miscellaneous structural attachments or supports.	Structural Supports & Connections for all miscellaneous structural attachments or supports will be free of Defects.	All elements with full capacity connections; no loss of connection material Free of deterioration or damage of base structure material. Free of movement of supported item. Free of excessive vibration of supported item.	Required NBIS inspections and monitoring ongoing by staff.	Specialized subcontractor	as suggested by Bridge Inspection firm
18.4	Cover Retaining Walls	As a minimum free of the Defects as noted in Section 3 above	Free of defects in accordance with Section 3 of this table.	Required NBIS inspections and monitoring ongoing by staff	In-house staff for immediate response and repairs.; Crew trucks, dump body, skid steer and other excavation equipment as needed, concrete saw, chipping hammer and hand tools. Subcontractor supplement or for larger repairs	as suggested by Bridge Inspection firm
18.5	Monolithic waterproofing membrane, reinforcing, flashing, protection course / root barrier protection – at landscape areas, protection course – at vehicular and pedestrian traffic areas	Free of Leaks in subsurface structures. Elements shall be free of Defects and function as designed	The subsurface structures will be free of leaks.	Required NBIS inspections and monitoring ongoing by staff.	Specialized subcontractor	as suggested by Bridge Inspection firm
18.6	Cover Finishes	All finishes free of defects and clean brightness consistent with lighting level criteria, free of loose or damaged finish materials with fully functional emergency equipment such as exit signage, lights, emergency panels, fire alarm boxes, signage and communications equipment and maintain colors and design characteristics consistent with aesthetic requirements.	Maintain level of reflectivity, free of damaged finish materials; fully functioning emergency equipment	Ongoing by Maintenance Technicians	In-house or outsourced staff for repairs; Crew trucks, and hand tools.	where reflectivity is in question
18.7	Drainage	Subsurface drainage and pumping systems fully operational and clear of debris.	Free from blockages, all pumping components and systems Fully functional pumping components and systems, screeds, and control and monitoring equipment.	Ongoing and upon rain events by Maintenance Technicians, quarterly preventive maintenance (PM) and assessment	In-house or outsourced staff for repairs. Crew trucks, and hand tools.	where drainage issues are observed
18.8	Fire Protection	Fire protection systems such as but not limited to fire detection, alarm, notification and suppression systems fully functional and operational	Functioning correctly 100% of time	Ongoing by Maintenance Technicians, and statutory PM and assessments	In-house or outsourced staff for repairs. Crew trucks, and hand tools	Where system issues are observed
18.9	Electrical Systems, regular & Emergency Lighting	Lighting system fixtures, lamps and control functioning to provide the intended illumination level, light output, lighting quality, duration and energy efficiency, for the location	Functioning correctly 100% and in full compliance with MMP	Ongoing by Maintenance Technicians, quarterly PM and assessment	In-house or outsourced staff for repairs. Crew trucks, and hand tools	Where system issues are observed

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
18.10	Electrical Systems, Fire / vehicle Detection and Alarm and emergency way- finding signage	Fire / vehicle detection and alarm Systems provide the intended detection and notification functions including emergency way- finding signage.	Fire alarm system performs as designed; all detectors operating; all inspections performed; all PM performed and documented	Ongoing by Maintenance Technicians quarterly PM and assessment	In-house Maintenance Technicians for minor technical repairs qualified subcontractors where required	Where system issues are observed
18.11	Electrical Systems, Communication s including Radio Rebroadcast, 2- way Radio, public emergency message rebroadcast, voice alarm and public address, Telephone and CCTV	Communication s systems serving their intended functions	Operating in accordance with manufacturer's recommendations for actual conditions of use. 2-way radio system see up-to-date Department specifications. Public emergency message rebroadcast performance conforming with relevant standards. Voice alarm and public address performance conforming with relevant standards. CCTV system complying with all requirements required to function as second means of fire detection. All inspections conducted and documented. All preventative maintenance performed and documented in accordance with the referenced standards and MMP. Free from database and communication system security breaches. Electronic retention of database files, back-ups and other stored media.	Ongoing by Maintenance Technicians, quarterly PM and assessment, continuous monitoring through self-diagnostics. Operational test to outside agencies weekly. Test grounding systems every 5 years and continuity if replace equipment or any major system reconfiguration. Testing per NFPA 110 & 111, Monthly load testing of backup generators and UPS as required and emergency sources, Semi-annual exercising of ATS switches. Annual testing of individual battery cell condition	In-house Maintenance Technicians for minor technical repairs qualified subcontractors where required	Where system issues are observed
18.12	Electrical Systems, Distribution – Normal, Essential. & Emergency	Electrical system serving connected loads with intended capacity, voltage regulation, protection, control and monitoring.	All elements of electrical systems distribution normal, essential and emergency functioning as designed 100% of the time.			
18.13	Command, Control and Monitoring System.	Command, Control and Monitoring System provides intended function of control, monitoring, communication and visual display of all connected systems including integration with other systems.	All elements of Command, Control and Monitoring System functioning as designed 100% of the time.			
18.14	Electrical Systems, Grounding & LP.	Grounding and lightning protection systems provide intended function and level of protection for equipment, structure and personnel protection.	All elements of Grounding and lightning protection systems functioning as designed 100% of the time.			
18.15	Ventilation System	Ventilation system fully maintained, functional and operational.	All elements of the ventilation system functioning as designed 100% of the time.	as 18.11 and Life Safety PM bi-annually, Test Life Safety of tunnel ventilation annually, Verification of life safety response annually.	as 18.1	as 18.1
18.16	Cover electrical Supplies	Electricity supplies, feeder panels, transformers, cabinets, switches and fittings are electrically, mechanically and structurally sound and functioning	A continuous availability level of 100% from metered source to all O&M equipment and facilities Securely in place and free from damages or exposed wiring.	as 18.1	as 18.1	as 18.1

Ref	Element	General	Performance Checklist	Inspection Routines and Frequency *	Maintaining and Equipment **	Inspection Acceleration
18.17	Cover firefighting water supplies	Water supplies, plumbing, pipe, valves mechanically and structurally sound	continuous availability of 100% of all firefighting equipment and facilities	Monthly Inspections; And PM assessments	In-house Maintenance Technicians for minor technical repairs qualified subcontractors where required	Where system issues are observed
18.18	Plant Rooms	Electricity supplies, panels, cabinets, switches, heating/cooling/ air conditioning and fittings are electrically, mechanically and structurally sound	A continuous availability level of 100% to all O&M equipment and facilities. Secure and free from damages or exposed wiring.			
19.1 *	ITS Equipment installed by Developer	Fully functional and operational without damages	No instances of malfunction or damages to devices or equipment other than planned outages	System status reporting; and PM assessments. Ongoing Courtesy Patrols and Maintenance Technicians observations of civil infrastructure	ITS maintenance subcontractor during first 2 years of Operating Period. In-house staff or outsourced crews for civil infrastructure	As recommended by structures inspector
19.2 *	Backbone communication and VTMS	Fully functional and operational without damages	No instances of communication or VTMS failures other than approved planned outages			
19.3	ITS and ETC Equipment installed by the Developer and Backbone communication and VTMS	Developer to provide reporting on inefficiencies or malfunction of ITS and ETC equipment, including ramp meters, an d backbone	100% reporting and follow-up reporting on equipment corrections, repairs and connections to communication lines to ETC System Integrator and CTMC	Formal inspections of overhead sign structures	trucks, compressor, skid steer bucket truck and other excavation equipment as needed, concrete saw, chipping hammer and hand tools. Subcontractor supplement or for larger repairs.	
19.4	ITS and ETC civil infrastructure, such as pullboxes, manholes, cabinets, foundations, ITS sign structures	Fully functional and operational without damages.	Fully functional			

l. Traffic Control and Management

For traffic control and management during periods of Closures during the Construction Period, FRMG will follow the procedures of the Transportation Management Plan (Appendix F of this Technical Submission) established in compliance with the maintenance of traffic requirements in Section 2 (Maintenance of Traffic) of Schedule 10 (Design and Construction Requirements).

FRMG's Draft Transportation Management Plan (TMP) identifies the Maintenance of Traffic Program requirements, obligations, and goals for the Construction and Operating Periods of the Project as set out in Schedule 10, Section 2 and describes corresponding means and methods to ensure that the Work activities, deliverables and final outcomes meet or exceed the goals and requirements defined by the Project Agreement

Prior to substantial completion the Traffic Management Plan will be updated to reflect the final configuration of the Project and the requirements applicable during the Operating Period. In particular, the Traffic Management Plan will reflect the Closure regime allowed under the Permitted Operating Period Closure definition, including any Closure permitted by Sections 2.5.3, 2.6, 2.7, 2.9, 2.11.5, 2.11.9, 2.11.10, 2.11.11, or 2.11.12 of Schedule 10.

FRMG's traffic control strategies are the basis for this Project's method of handling traffic. Major features include identification of roadway, ramp and lane Closures; proposed detour routes; provision of Emergency services; maintenance of access to local businesses and residences; and coordination with the Colorado Transportation Management Center (CTMC) for the effective use of Project area and regional Intelligent Transportation System (ITS) devices.

FRMG's planned traffic control will be developed through collaboration between FRMG, the Department, and any applicable stakeholders. FRMG's traffic control will conform to the requirements in Section 2.11.1 of Schedule 10 and the CDOT Standard Specifications. In general the approach is to provide a safe roadway for the workers and traveling public, maximize the Work scope within a phase, reduce temporary Work and minimize the number of major traffic switches.

m. Investigation and Response to Complaints or Reports

FRMG will conduct prompt investigations of reports or complaints by implementing the following systems:

- Hierarchical call-out tree
- Identification of on-call FRMG representatives at all times
- Training on Identification of appropriate FRMG personal to receive communication depending on source
- Training on Identification of severity of communication
- Training on performance requirement response times

FRMG will use a call-out tree to ensure timely and appropriate availability of personnel to investigate complaints. The call-out tree provides the individual receiving the call at the call center clear direction on the names for all individuals within FRMG as well as importantly identifying areas of responsibility. Any current out of office is noted as well as alternate contacts

should out of office be required. The contact information for the FRMG personnel will include call signs, work phone contact information, e-mail and for management personnel home phone contact information. Call center personnel will be trained to evaluate the nature of the complaint to categorize the response into two response categories. **Table 4** provides the investigation and response procedures for complaints and the reporting process.

Table 4. Investigation and Response Procedures for Complaints.

Immediate

Type of Complaint	1. Complainant indicates an existing or imminent threat to road users 2. Complainant identifies O&M Defect which requires immediate response
Procedure	1. If available call recipient views complaint on camera 2. Call recipient identifies senior on shift individual as per Call-Out tree and makes notification providing all pertinent information. • If confirmed via camera this information is communicated to individual to immediately action response. • If not viewable on camera as much detail as possible from complainant is provided to responder 3. Call recipient notes if a call back is requested or not 4. Call center representative logs call and actioned individual may start work order 5. Actioned individual notified by call center call recipient investigates complaint based on information provided from complainant or if viewable on camera actions O&M Defect repair procedures. Individual notified by call center may in their evaluation escalate awareness of the complaint to management based on training in identification of severity of complaint. 6. On completion work log is updated, call log is updated and if requested complainant receives return call explaining actions taken
Additional Considerations	1. FRMG will employ a Community Liaison throughout the Term. Depending on the nature and origin of the complaint, the Community Liaison may receive the call from the complainant or be the point of contact for ongoing communications or responses to the complaint. 2. FRMG will employ a Project Communications Manager (PCM) throughout the Term. Depending on the nature and origin of the complaint, the PCM may receive the call from the complainant or be the point of contact for ongoing communications or responses to the complaint.

Intermediate

Type of Complaint	1. Complainant indicated no immediate threat to road users 2. Complainant indicates O&M Defect which call center recipient identifies as not requiring immediate response
Procedure	1. If available call recipient views complaint on camera 2. Call recipient identifies senior on shift individual as per Call-Out tree and notifies individual
Additional Considerations	1. FRMG will employ throughout the Term a Community Liaison. Depending on the nature and origin of the complaint, the Community Liaison may receive the call from the complainant or be the point of contact for ongoing communications or responses to the complaint. 2. FRMG will employ a PCM throughout the Term. Depending on the nature and origin of the complaint, the PCM may receive the call from the complainant or be the point of contact for ongoing communications or responses to the complaint.

FRMG uses several methods to receive and process User complaints. A toll-free number is advertised and displayed on all FRMG equipment, and all advertising provides a telephone number, address, and the name of a person to whom requests should be directed. FRMG will

install Developer identification signs depicting the name and contact information for FRMG, these signs will be displayed at either end of the corridor.

Through the Maintenance Management Information System (MMIS) service request module, the system documents and tracks all Project service requests from Users and clients. The documentation of all calls and requests for action on the system are entered into the computerized service request program at the call center. The MMIS system logs the time and date of the request and thereafter begins tracking FRMG's action. See section 1.19 for details on the MMIS.

Throughout the Term, FRMG will also track inquiries made by citizens and businesses, including names, addresses, phone numbers, and follow-up action taken in response to inquiries; such inquiries and any follow-up action will be entered into Dialog, a web-based contact and issue tracking database provided by the Department. FRMG will pay for the necessary Dialog license. The system will provide an automated report to the Department and FRMG each week. All inquiries and complaints will be followed up with a return phone call or e-mail from either FRMG and/or, when necessary (and as requested by FRMG or determined by the Department), the Department. **Table 5** provides the type of communication and timing of responses. This process is consistent from Construction to Operating Periods.

The following information will be recorded and will be provided in the report:

- The date and time of call
- Contact information (name, phone number, street address, and e-mail address)
- Location and description of complaint and/or request
- Response provided, including date and manner of response and whether request was relayed to the Department for response

Table 5. Type of Communication and Timing of Response.

Type of Communication	Timing of Response
Hotline calls	Check messages throughout day; respond same day (initial call) or within 24 hours (including weekends if work is occurring)
E-mail	Same day (within two Working Days for high volume situations)
Call from Department staff	As soon as possible (no later than 24 hours)
Webpage and social media inquiries	Same day (within two Working Days for high volume situations)
Public meeting inquires	Within one week of the meeting

n. Routine Maintenance and Renewal Work

FRMG's work plans and schedules for routine maintenance activities and Renewal Work are outlined below.

Prior to the start of construction, FRMG will carry out inspections and testing to determine the existing condition of each Element of the Project that will be maintained by the Developer as part of the O&M Work during the Construction Period.

FRMG will prepare the Baseline Asset Condition Report (BACR), which will list in detail all Elements that are required to be subject to the Baseline Inspections, and assess and describe the existing condition of all Elements. Based on the BACR, FRMG will develop work plans and schedules for routine maintenance activities and Renewal Work during the O&M Period. Further detail on the BACR is included in Appendix A (Baseline Asset Condition Report) of this MMP.

By thoroughly planning routine maintenance activities, we will perform activities under a controlled environment to improve asset conditions and delay or avoid deterioration due to normal use. These activities will be consistent across all infrastructures within the O&M limits, from the Cover, other structures, pavement, and other assets.

As part of the Preventative Maintenance (PM) work, FRMG will review work needs, deficiencies, and asset conditions to determine if existing root-cause issues can be remedied. Root-cause evaluation is a significant component in our total maintenance approach to asset management. Root-cause evaluations look at where and why problems occur and search for the underlying causes, allowing for fundamental fixes rather than just simple repairs to address the symptoms of a problem. One example is repairing an eroding slope rather than just cleaning dirt from a curb-line numerous times.

To ensure Project success and achieve the required performance standards, we have integrated redundancy into our MMP. Multiple sets of eyes review Project conditions on the structures; this includes the O&M Manager, field crews, and our quality assurance/quality control (QA/QC) staff.

Our team will regularly perform critical reviews of the structures and refine work plans to respond to changed conditions. We use additional field inspections to adjust work plans and reallocate resources, as needed, not only to maintain, but also to improve Project Elements.

Our team will perform surveys after completion of work to determine how well the MMP is achieving the desired results. The data collected in each round of surveys is entered into our team's MMIS described in further detail in **Section s.** ***(Maintenance Management Information System).*** This information is used to compute additional statistics and produce an array of reports beneficial to the overall management of the Project. Adjustments and refinements to the work plan based on these results will continue to ensure success. Our work activities ensure each asset item, asset group, and all Schedule 11 requirements are maintained throughout the contract Term. **Table 6** shows the FRMG basic work plan for short-term and long-term routine maintenance of major assets (based on Schedule 11, Performance and Measurement Criteria tables A-1 and A-2).

Table 6. Asset and Basic Work Plan.

Asset	Basic Work Plan
Pavement (Roadway, Ramps, Access Roads and Other Paved Areas)	• Manage pavement surfaces through both short-term inspections and repairs, and long-term local specialist inspections and handback plans • Review pavements informally during staff's daily patrols • For PCC pavements utilize high early strength cementation repair products for instances of pavement deterioration requiring short-Term remediation such as delamination or potholes/punch-outs; crews will perform this work during a night shift when possible to minimize impact on the traveling public • For flexible pavements utilize installation techniques to produce long term performance for potholes or spall repairs. Remove of all deteriorated material, and producing sound, clean faces on the repair area for bonding. An effective tack coat or bonding agent particularly around the edge facing will greatly enhance bonding. Patch material must be well compacted if it is to perform for more than a short period of time. Use cold patch materials developed specifically for use in inclement weather conditions. They often contain modified binders, and other additives, which may improve their performance. Their use will be limited to short term mitigation until weather or temperature restrictions allow the use of hot-mix. This repair strategy minimizes traffic disruption and lane closures and has proven to be a reliable method. • Perform joint/crack sealing routinely prior to major rehabilitation • Perform annual specialist inspections (pavement condition survey) to provide information on ride quality (using IRI) and skid resistance. As part of preventative and corrective maintenance strategy, short-term repairs, including profile milling and short length concrete full depth patches, will be performed if needed, based on the annual Pavement Condition Survey for preserving a good serviceability level. Isolated sections of the pavement can be strengthened by localized repair, making them perform consistently with the rest of pavement. A proactive preventative maintenance program approach treats the pavements when minimal problems exist and helps preserve a higher level of performance. • Perform long-Term rehabilitation strategies and intervention schedule based on life cycle that will consist of pavement overlays or full depth replacement; our pavement plan will conform to pavement interventions at required intervals and will include new pavement markings and reflectors • Perform life cycle modelling and cost analysis to develop repairs and Renewal Plans.
Drainage Systems	• Inspect pavement drains daily, especially after heavy rains where performance of drainage conveyance and structures can be monitored, identifying potential problems with a drain • Inspections/ratings in accordance with CDOT Level of Service Manual; Measurement of clogging and condition of pipes, conduits, catch basins, grates, inlets, or outfalls; measure and address discontinuities, settlement in conduits; measure and address cracking, spalling in concrete pipes, catch basins, inlets, culverts; measure and address joints; measure and address standing water; address culverts, end treatments, stormwater systems, and discharge systems • Utilize commercial specialty contractors with a high-volume vacuum truck to clean the inlets if blockage is found • Sweep roadway monthly to prevent major blockages; this, along with daily debris removal, should preclude any major blockages to the system and provide a high level of reliability • Review and include any issues in the work plan. Long-Term issues will be planned, such as joint sealing, in future years. Drainage treatment devices will be inspected annually as well
Structures (Openings Greater Than 20 Feet)	• Maintain bridges and qualifying culverts to provide excellent performance over the long-Term of the Project FRMG structure crews will utilize a one-ton enclosed utility bed crew cab as their primary operational unit. These units provide exceptional utility for maintenance operations. Materials, equipment and manpower can be delivered and removed from a worksite efficiently. Crew cabs will be equipped with highway safety equipment, traffic control equipment, arrow boards, mounted lift crane, welder, generator, air compressor, powered tools and hand tools. The combination of the crew cab utility bed body with the additional equipment and materials listed above creates an exceptional platform for maintenance activities. • Sweep shoulders monthly • Clean drains and remove debris and corrosive bird droppings on a routine basis • Perform biennial inspections that will help identify localized corrosion issues, which will be repaired as needed • Proactively complete preventative paint system replacement (for steel beams) before member deterioration • Repair any small deck failures or spalls that occur during nighttime lane Closures • Repair joints during night Closures when required • Perform annual maintenance that will include bridge bearing cleaning, greasing, and bolt tightening, as well as repairs to any non-structural components • Perform required rehabilitation of deck and substructure Elements when identified

Asset	Basic Work Plan
	• Utilize local Subcontractors for specialized works for the purpose of major maintenance and rehabilitation • Keep non-bridge culverts free of excessive vegetation and silt and inspect annually to identify any O&M Defects. Any scour will be noted and repaired. Joint damage or O&M Defects will be remedied • Inspect metal gantries, and sign structures on an annual basis • Repair any damage to galvanizing • Perform five-year specialist inspections on sign structures; any requiring repairs will be completed within required rectification times
Pavement Markings and Reflectors	• Maintain pavement markings and reflectors based on an annual nighttime review with a reflectometer • Put into effect a replacement program to replace the markings so as to meet reflectivity requirements • Replace all markings with scheduled overlays/replacements as well. If any major section is in poor condition, spot repairs will be made earlier with small equipment, if needed.
Guardrails, Barriers, Impact Attenuators	• Inspect visually during daily patrols and schedule for repairs as needed • Provide immediate notification by first responders to maintenance crews in the case of a major impact • Remove damaged materials, make the area safe, and provide warning until a permanent repair can be made • Schedule a local specialist Subcontractor to repair the damaged items, if needed
Signs	• Inspect signs visually during daily patrols and schedule for repairs as needed • Measure retro-reflectivity as required • Keep common small signs (Stop, Yield, etc.) in stock due to their critical nature • Install roll-up temporary signs to provide direction to motorists until a permanent sign can be installed • Install temporary signs within two hours of notification of such damage • Check electronic displays, like dynamic message signs, daily and keep critical spare parts in stock for repairs
Traffic Signals	• Inspect traffic signals visually during daily patrols • Report issues immediately to responsible agencies, Traffic signal issue reporting log and written notification to CCD & Department • Work with CDOT and or municipalities to adjust timing of the system, if needed
Lighting	• Review roadway lighting, sign lighting, and high mast lighting during routine patrols, and any outage, damage or malfunction will be noted (similar to traffic signals above) • Perform night inspections and report outages immediately to O&M supervisors and where applicable to responsible agencies • Reporting log with written notifications to Xcel Energy
Fences and Walls	• Monitor fences, retaining walls, and sound walls during daily patrols • Mitigate any major damage within 24 hours • Remedy openings in fences and repair other damage within timeframes specified in the Technical Provisions
Roadside	• Perform mowing regularly to keep the grass within the heights of the performance requirements • Perform mowing as well as litter removal in vegetated areas along the right-of-way concurrent with mowing cycle • Perform litter removal • Perform tree trimming and pruning • Perform water quality tests on drainage ponds • Schedule mowing as needed, with a cycle completed approximately every other month • Put in place an herbicide program to minimize weeds • Mow, clean, and maintain landscaped areas with in-house staff and Subcontractors
Earthworks and Embankments	• Document slopes on general drive-by inspections • Repair and stabilize any areas showing subsidence or damage • Review problems recurring in the same area and begin further long-Term repairs • Visual inspection by geotechnical specialist where required along with further tests if recommended; check areas of replacement fill, reseeding/vegetation, dispose of eroded materials
Graffiti	• Remove or paint over graffiti within 6 to 24 hours • Remove and restore the surface to be similar to adjoining. • Remove offensive graffiti within 6 hours
Incident Response	• Respond to incidents as required
Maintenance Yard	• Perform grounds maintenance
Snow and Ice Removal	• Perform snow and ice removal as described in the OMP

Asset	Basic Work Plan
Courtesy Patrol	• Respond to incidents within 15 minutes as required
Sweeping and Cleaning	• Perform sweeping regularly to keep areas clean
Cover (not Applicable During Construction)	• Utilize initial structural inspections to establish the baseline condition of the Cover • Utilize on going structural inspections to monitor deterioration due to normal use and exposure to the environment • Train bridge inspectors to identify early evidence of deterioration and the causes of deterioration • Test and inspection life and Emergency systems within the Cover section • Complete inspection reports that describe the deficiencies found, identify the likely causes of deterioration, and make recommendations for maintenance and rehabilitative repairs • Early detection of deficiencies and prompt corrective action greatly reduce the life cycle costs associated with advanced deterioration of all structures • Track and archive inspection reports, recommendations, and repairs within MMIS • Electro-Mechanical Assets of Cover structure; - Achieve the required levels of service and meeting the performance targets described in the Maintenance Management Plan developed based on Tunnel Operations, Maintenance, Inspection, Evaluation Manual (TOMIE), the Specifications for the National Tunnel Inventory (SNTI), applicable NFPA standards and manufacturer's recommendations - Establish industry best practices and standards of the electro-mechanical assets in order to achieve design life expectations - Implement self-diagnostic and failure detection systems
ITS and ETC Facilities	• Perform visual inspections of critical ITS Elements like cameras, message panels and weather stations • Keep spares of certain Elements in inventory to allow for quick repairs on items that affect safety • Perform regular preventative maintenance on all system components to address environmental conditions and minimize corrective measures • Give special attention to the communications/VTMS system, which will be continuously monitored in order to promptly respond to any disruption in service

Maintenance Schedule

The following tables represent anticipated timing of work related to Monthly and Annual Routine Maintenance as well as Annual Renewal anticipated for the first Five Year Renewal Plan. Actual timing will be adjusted to ensure all Project Agreement requirements are met and to facilitate efficient operations. Ongoing schedules will be provided with the Maintenance Management Plan updates.

Monthly and Annual Maintenance Schedule

Repair of third party damages and reactive maintenance will occur at all times as needed and will meet all required rectification times. Category 1 repairs shall be performed as soon as practical. Category 2 repairs will where possible be scheduled in accordance with timing below but in all cases shall meet the Category 2 Permanent Repair time requirements. A detailed explanation is provided in Sections 1.10, 1.11, 1.22 and 1.25 for all resources, timing, duration and frequency. Traffic Management and reporting requirements are detailed in Sections 1.12 and 2.11 of the Maintenance Management Plan.

Monthly/Annual Maintenance Schedule

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Category 1 Repairs													
	All Types Cat 1												
Category 2 Repairs													
	Asphalt Repair (Manual)												
	Asphalt Repair (Mechanical)												
	Asphalt surface crack seal												
	Concrete pavement joints sealing and crack repairs												
	Concrete pavement localized repairs												
	Slope and Shoulder Repair												
	Bridge/Cover spall repairs												
	Bridge/vocer other concrete repairs												
	Bridge/Cover railing and ancillarry components												
	Sign support repairs												
	Cover Systems maintenance and repairs												
	Cover MEP maintenance and repairs												
	Cover lighting maintenance and repairs												
	Pavement markings spot repairs												
	sign and reflective panel repairs												
	barrier repairs (walls and rails)												
	Drainage conveyance and structure repairs												
	Landscape maintenance												
	Fence maintenance and repairs												

Annual (Initial) 5 Year Renewal Schedule

Newly constructed and reconstructed assets within the Developer OM Work segments in most cases will not require the scheduling of Renewal Work in the first 5 Year Renewal Work Plan. The following Table represents anticipated timing of Rehabilitation work during this period. Detailed schedules will be provided with the Maintenance Management Plan updated annually as required.

	5 Year Renewal Work Plan (Years 1 through 5)					
		Year 1	Year 2	Year 3	Year 4	Year 5
	Attenuators					
	Barrier Wall					
	Fence					
	Guardrail					
	Pavement					
	Pavement Markings					
	Reflective Markers					
	Signage					
	Structural Rehabilitaion					
	Tunnel Lighting					
	Tunnel Systems					

o. Life Cycle Assumptions and Renewal Work

Approach to Life Cycle Assumptions and Asset Management Strategy

FRMG has the responsibility to ensure that the Department's infrastructure assets are managed strategically.

During the Construction Period FRMG's Life Cycle Assumptions and Renewal Work approach begins with the completion of the BACR. The BACR will dictate the approach taken by FRMG with regards to life cycle assumptions and asset management strategy, all actions taken by FRMG will be based on plans following completion of the BACR.

FRMG's Life Cycle Cost analysis (LCC) is based on a holistic asset management approach. FRMG uses asset management plans and systems to better manage asset renewals and replacement, and integrate broader long-Term objectives such as Handback Requirements. By definition, asset management is a systematic process of maintaining, upgrading, and operating physical assets cost-effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized, logical approach to decision making. Thus, asset management provides a framework for handling both short- and long-range planning.

Decisions made in the design process are critical to the LCC, which includes maintenance engineering input on material durability and cost-benefit analysis. Our process includes, our O&M team, under the direction of our O&M Manager, working closely with the design team to determine the most efficient LCC so that material and design selection reflect our standards for durability. This process as a team determines the best value overall.

The FRMG approach to LCC during operations will incorporate all of the following:

- Documentation of available asset data (e.g. inventory, condition data, estimated remaining life, replacement value etc.)
- Documentation of levels of service, performance, Useful Life baseline and Handback Requirements
- Demand forecasting: Specific information on future demand is forecast through traffic analysis, environmental impacts, and population growth, therefore the Renewal Work Plan is prepared based on sustaining contract service levels throughout the entire operations Term
- Risk analysis: Through a workshop involving key managers, a comprehensive risk assessment is conducted with the risks ranked accordingly
- LCC: Based on service levels, operation and maintenance cost information (available from accounts and finance system), a broad base LCC is developed
- Financial forecasting: A multi-year financial forecast for operations and maintenance, renewal and upgrades is prepared based on asset data, LCC, risk analysis, and price variation review e.g. potential super-escalation on raw materials, labor etc.
- FRMG's asset management strategy facilitates LCC throughout the duration of the Project and provides for efficient processes through the inclusion of:
  - Strategic goals and objectives
  - Performance requirements and Handback Requirements
  - Useful life baseline requirements
  - Inventory of assets
  - Valuation of assets
  - Quantitative condition and Performance Measures
  - Measures of how well strategic goals are being met
  - Usage information
  - Performance-prediction capabilities
  - Databases to integrate individual management systems
  - Consideration of qualitative issues
  - Links to the budget process
  - Engineering and economic analysis tools
  - Useful outputs, effectively presented
  - Continuous feedback procedures

FRMG maintains a clear knowledge of the condition of the highway, bridge, Cover structure, retaining walls, culverts and other drainage structures as well as other assets such as tunnel electro-mechanical systems and how they are performing. All management decisions regarding maintenance, rehabilitation and renewal revolve around these two aspects. Not knowing the current condition or performance level of an asset may lead to premature failure of the asset, which leads to only a single option: to replace the asset (generally the most expensive and disruptive option).

FRMG will perform regular condition and performance monitoring inspections in a sophisticated manner as detailed in **Section b. (*Inspection Work)*** that allows it to better understand both the operating condition and the remaining Useful Life of its assets. This understanding drives future

expenditure patterns which in turn drive routine and preventative maintenance and LCC. Condition monitoring tools and methods for road and bridge structure and other structural assets such as Cover structure, ITS and Electro-Mechanical assets, retaining walls, culverts and roadway furniture by implementing sophisticated pavement management and bridge structure management systems as components of the MMIS system are explained in Section 1.19 of this document and are available at FRMG.

The approach to inspection and testing of facility assets, and the identification, classification and rectification of O&M Defects and inspection failures will be proactive in correcting observed potential deficiencies on a daily basis before they become O&M Defects; therefore, we plan and budget for rare and infrequent failures across all Elements.

When the Construction Period is completed, it is FRMG policy to ensure proper documentation of as-built record drawings, shop drawings, manufacturer's literature, and maintenance manuals in both hard copy, PDF and database format and generally documented within the MMIS.

During construction FRMG will carry out inspections and tests to determine the existing condition of each Element of the Project to be maintained by FRMG and will subsequently prepare a BACR. This report by listing all Elements subject to Baseline inspections, assessing and describing the existing condition and updating Performance and Measurement Table Criteria given in Appendix A-1 to Schedule 11 will outline target minimum baseline asset conditions required for the O&M Work During Construction.

Approach to Renewal Work

Renewal Work consists of maintenance, repair, reconstruction, rehabilitation, restoration, renewal, or replacement of any Element of the highway that is not normally included as an annually recurring activity in highway/bridge/structures/drainage/ITS/electro-mechanical/minor assets maintenance and repair budgets. The majority of these activities will involve capital expenditures during the Operating Period with some non-capital expenditure for pure maintenance activities that occur only on a periodic basis.

The approach to developing this Renewal Work Plan is to make determinations of Useful Life projections asset by asset beginning with Schedule 12, Appendix B Useful Life Baseline Requirements. These projections are based on consideration of historical deterioration rates and where applicable, (e.g. pavement) deterioration curves considering operator and agency experience in similar conditions for all other assets. Based on this approach the estimate will then apply Project asset usage and realistic unit costs estimations across inventory quantities at rates of renewal and replacement that will:

- When performed in conjunction with routine maintenance activities maintain compliance with performance criteria throughout the entire O&M Term; and,
- Provide for preservation of asset conditions such that post-renewal the Useful Life Baseline Requirements and at the end of the Term Handback Requirements given in Schedule 12 will be met. The same condition projections are used to program routine maintenance activity rates for purposes of compliance and optimization of total LCCs.

The actual condition of each asset over time is, of course, dynamic. We will monitor asset condition on a continuous basis throughout the Term to assess actual progression of the life cycle deterioration of an asset. This also will help us to optimize routine activity levels and expenditures.

These assessments provide ongoing identification of correctable deteriorations (i.e. surface corrosion, spalling, cracking, surface roughness) that could shorten the actual Useful Life of an asset so that repairs can be promptly scheduled in order to lengthen the asset life at optimal costs. It is imperative to intervene at the appropriate time of the deterioration curve to maximize the available Useful Life.

FRMG will perform Annual Renewal Plan updates throughout the Term to continuously assess asset performance, preservation of asset condition, risk of future noncompliance, remaining Useful Life and relative Residual Life remaining in order to update and adjust the Renewal Plan throughout the Term to ensure compliance with the technical, minimum Useful Life after renewal and Handback Requirements at all time. The Renewal Plan updates will include updates to Useful Life Baseline Requirements Table given in Appendix B of Schedule 12 of Project Agreement. For each Element FRMG will provide evidence based upon actual performance and condition in service, together with appropriate operations and maintenance records, that the Useful Life as set forth in the Useful Life Baseline Requirements Table of Appendix B of Schedule 12 will be met.

FRMG staff will analyze as part of this annual review asset condition assessment data, general and specialized inspection data for pavement, bridge, ITS, electro-mechanical and structure assets including NBIS bridge inspections as explained in detail in Section 1.11 and 1.14, as well as perform field reviews of assets in order to determine optimization of asset specific renewal scheduling. Renewal schedule will be adjusted in order to optimize costs and minimize unavailability of traveling lanes. This optimization will evolve over the Term and benefit further from leveraging evolving new technologies and subsequent refined routine maintenance strategies in a continuous process of LCC analysis.

FRMG will select renewal strategies that are aligned with good industry practices keeping up-to-date with the latest techniques and research in life cycle maintenance.

p. Record Keeping

Record keeping will be handled through a documented procedure in the OMQMP and will include preservation and archiving as required by the PA. Records will be maintained and available in electronic and paper format for review, inspection and auditing. FRMG will use a document control software platform, to coordinate and manage Project documents and provide access to all stakeholders as required by the PA. The system will be an interactive software system, which allows both internal and external users to manage and monitor their activities. Each user will have customized permission settings, which will be managed through a tailored directory. This software will be highly secure, and has unlimited storage space. This platform can be managed from any web connected mobile device, tablet, laptop or desktop. There are many benefits to using this software including: users' ability to create, edit, and share Project information – which is tailored to the permissions granted by their level of access; and the

benefit of users being automatically updated as documents are added, closed, or changed. In addition, document control will maintain hard copies on-site.

All the relevant document records such as work orders, service requests, completions and inspection reports, compliance reports, and quality control program summaries are stored in MMIS and reviewed for compliance, further records that are stored include issue logs, correspondence with 3rd parties and complaints. Service requests and work order modules maintain permanent record for auditing of all activities and performance. Ad-hoc reporting will be generated to provide summary of performance, incidents, work plans and response times.

Using CDOT component and class code numbers, FRMG MMIS maintains and provides a record of labor hours, expended materials, quantity, and equipment types as well as the hours that the equipment was in operation, this information is logged via the equipment's AVL system. Further data stored includes estimates, cost records, work accomplished, and supporting documentation pursuant to applicable regulations, policies, or procedures, as reasonably needed to conduct business operations and comply with the PA. Records are maintained via on-site terminals and backed up daily using a secure private cloud backup data service.

NBIS inspection reports are stored electronically and entered within one week of completion into Pontis. This recording will follow FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (Report No. FHWA-PD-96-001); Data is further entered into FRMG's Bridge Management System, which is a component of FRMG's MMIS for preservation treatment analysis and life cycle projections.

Annual pavement survey data including video record is stored in FRMG's MMIS and backed up daily using a secure private cloud backup data service similarly to all FRMG's records. All pavement data is entered into the pavement management system which is a component of MMIS for treatment analysis. Post construction core sample data is stored on-site for future analysis. Keeping current is crucial to staying compliant.

FRMG continuously monitors the CDOT website to ensure that the latest versions of procedures, administrative rules, specifications, manuals and handbooks are being used. This is accomplished by comparing the effective date for a specific topic number against the effective dates of the same documents at the time the Project contract is executed.

q. Tracking

MMIS Tracking and Reporting

A key element of FRMG's Project strategy is rooted in its information management system as represented by the MMIS. FRMG's management system provides continuity of information collection, knowledge and management, improving raising decision and making decisions that support the Project's and FRMG's objectives. MMIS technology will be at the core of FRMG's success and its reputation for always meeting and exceeding the Department's quality requirements.

Daily activities of all FRMG crews and Subcontractors are entered into its database and measured against preplanned schedules and work plans. The system's user-friendly technology

allows managers and administrators to view a snapshot of a total daily output, the status of a single characteristic, or a portrait of accomplishments for an entire year.

MMIS quickly turns data into information and information into the knowledge needed for sound decision making and planning. MMIS produces meaningful data for the past (billing and evaluation), the present (scheduling and corrective action), and the future (prediction and process improvement).

Many organizations routinely collect data, FRMG's synergistic combination of data and information processing technologies inherent in MMIS will expand the creative and innovative capacities of its asset management staff of professionals on demand.

Further information on the MMIS, its functionalities, its intended use by FRMG, and the information accessible by CDOT for tracking, reporting, and other purposes are presented in **Section s. (*Maintenance Management Information System*)**

As soon as FRMG begins a component of O&M Work, the routine maintenance schedule is entered into MMIS along with other pertinent data – subcontracting agreements, benchmark dates, budgets, resource needs, etc.

The MMIS produces a master work plan describing the quantity of work scheduled for each maintenance activity and calculates the appropriate resources necessary to meet the Departments requirements and also to address potential problems or challenges. The master work plan also alerts the O&M Manager to any special needs like exceptional equipment requirements or materials not normally found in the FRMG's inventories.

MMIS aggregates these Elements and produces a proactive and preventative maintenance program along with monthly work plans projected over a multi-term cycle. Scheduled condition needs surveys are built into the system that account for needs expectations drawn from the master plan and completed activities entered as routine work activities and work orders.

O&M Defects are identified through FRMG's continuous-condition needs surveys and inspections. All staff will be trained in the techniques and knowledge required to identify O&M Defects. However, primary responsibility r for the identification of O&M Defects will be completed by a combination of patrols and formal inspections by supervisors and traffic control center operators. These staff members will then have access to FRMG's MMIS system, into which they will input information on any O&M Defects that are detected.

Required information on the O&M Defect will include the location, photos, and the work activity code (which is linked to response time and categorization).

Furthermore, these surveys may identify specific characteristic activities, repairs, or operational changes required to maintain the Project Elements at the desired level of service. MMIS analysis tools provide FRMG's professional staff with the information and knowledge needed to direct efforts toward O&M Defects with specific asset features and the flexibility to do the right thing at the right time with the right resource.

This comprehensive, integrated software system combines the modules of service request/work orders, inventory, condition assessments, budget management, contract management, and maintenance planning. Performance compliance is achieved through asset condition detection,

work planning, and work order scheduling. A central component of MMIS is the work order module that tracks work identification through to work completion. The modules of the MMIS are work order, service request, and contract management. Upon completion of a work order the system automatically identifies if the work completion met the response time requirements.

Corrective action (repairs and renewal) is both initiated and tracked to completion by virtue of the work order. This module assembles completed work order documents, providing the specific units of completed work along with the operational costs.

The information entered into the database then provides information for designing ongoing maintenance work plans and cycles. By integrating all the components of effective work scheduling, monitoring, and completion, MMIS allows FRMG to forecast maintenance needs based on audited-related asset conditions. The modified work plans based on the condition needs assessments allow managers to run various budget scenarios to simultaneously determine the most effective and efficient work plan from both a manpower and time-management perspective and generate reports for further analysis.

r. Maintaining Spare Parts and Inventory

Material and parts inventory are every maintenance organization's lifeline. Our maintenance facilities will store and manage inventory that includes items like guardrail, salt, sand, lighting appurtenances, and tools. Please see the table below for a preliminary list of spare parts.

FRMG will assemble a listing of all required minimum levels of inventory items and stock the inventory before operations begin. While purchasing items for construction FRMG will consider the spare inventory requirements, along with a detailed listing of any specialized parts and types/brands of materials utilized on the Project.

FRMG will conduct a critical-systems failure analysis for tunnel components to ensure critical items are readily available to minimize any tunnel-system component failure downtime.

FRMG's MMIS allows the team see how many items are in storage, how many were used in repairs, and when new ones need to be ordered. With MMIS, inventory control is automated and uses features such as minimum/maximum values, reorder points, alternate items, and material transfers.

The inventory feature allows our Superintendents to receive automatic e-mails or text messages when critical spares reach a minimum level and even auto-generate purchase orders to replenish the items. **Table 7** provides an initial list of materials to be kept on-site-based on work activity.

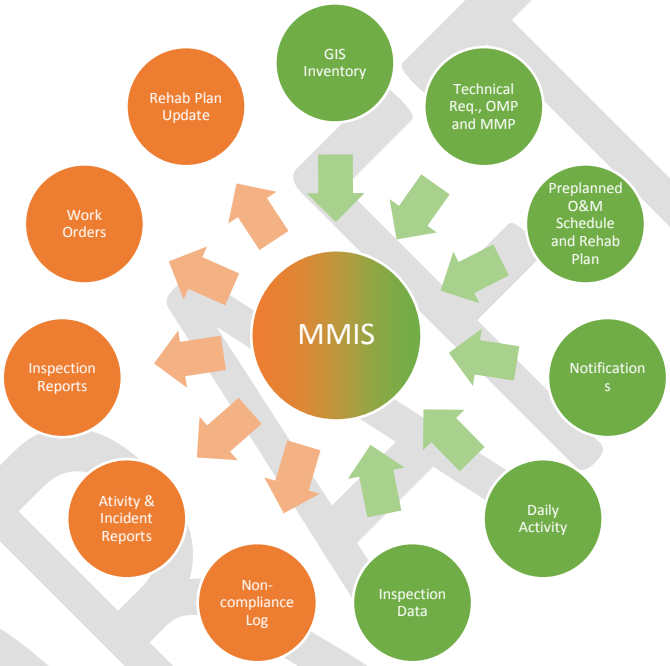
Table 7. Preliminary List of Materials.

Materials	Specifics
Drainage Systems	• Range of culvert ends based on diameter • Critical pump component replacement parts
Roadway Markings	• Temporary line-marking material
Guard Rails, Barriers, Impact Attenuators	• One of each unique impact attenuator anchor and end assemblies replacement • Ten concrete guardrail pieces of each unique size • Two lengths of each unique guardrail type
Signs	• Three of each unique safety sign
Lighting in the Cover	• Ten of each bulb type • One of each unit head
Fences and Walls	• Two of each unique panel type
Graffiti	• Five gallons of each unique paint color
Incident Response	• Traffic control devices • Temporary lane Closure signage
Snow and Ice Removal	• Salt • Sand • Liquid de-icer • Ice Slicer
ITS/Cover	• Critical fire suppression system components replacement parts - Sprinkler Head - Flow Tamper Switch - Siamese Connection - Zone Control Valve 12” – Mechanical - Zone Control Valve 12” – Electrical - Fire Pump Motor - Jockey Pump Motor - Fire Pump Controller - Backflow Preventer - Fire Smoke Damper - Fire Alarm Panel • Critical fan system component parts - Actuator - Ductwork - Exhaust Fan Motor - Unit Heater - Gas Sensor - Velocity/Pressure Sensor - Temperature Sensor - CMOS Interface & Photo Sensor - Exhaust Register • Uninterruptable Power Supply Units • ITS Cabinet and equipment

s. Maintenance Management Information System

A key element of FRMG's operational strategy is rooted in its Maintenance Management Information System (MMIS). FRMG's MMIS provides continuity to information collection, knowledge, analysis and management, raising decision making to a new level. FRMG relies on the MMIS to meet and measure its performance against the operations and maintenance Performance Requirements

Figure 3. Maintenance Management Information System.



The MMIS will be fully populated with a geographic information systems based inventory, the Performance and Measurement Criteria, preplanned inspection and work schedules, and the preplanned rehabilitation plan. The MMIS will be operational prior to the issuance of NTP2, Within 30 calendar days after the issuance of NTP2 FRMG will have fully populated the MMIS and updated as required for the duration of O&M During Construction and the Operating Period.

FRMG will include relevant information in the MMIS including, but not limited to, the following for each and every Element, as appropriate:

- Location, accurate to within one foot in 20 feet
- Equipment nomenclature
- Serial number
- Date of installation
- Technician identification
- Type of failure
- Date and time of failure

- Date and time of response to the site
- Date and time of return to service
- Preventative maintenance work
- Scheduled work
- Work repair code
- Failure and repair history
- Statistical data on mean time between failure and mean time to repair
- Closure log by time and location

When an infrastructure Element is constructed, installed, maintained, inspected, modified, replaced or removed, FRMG will update the MMIS within three calendar days of completion of such work. FRMG will record Category 1 Defects and Category 2 Defects on the MMIS within three calendar days of them coming to the attention of Developer. FRMG will record all other required information within 15 Calendar Days after completion or occurrence of the relevant activity.

FRMG will hand over the fully populated MMIS and everything required for its operation to the Department, or other entity as directed by the Department, at the Expiry Date (or, if earlier, the Termination Date).

Relevant information captured for each and every Element includes its identification and/or serial number, date of installation, failure and repair history and statistics, inspection data (National Bridge Inspection Standards sheets for bridges), and other relevant information as appropriate to measure performance and inform maintenance decision making.

All infrastructure Elements are entered into the MMIS during the Construction Period, and thereafter continuously updated each time an Element is maintained, inspected, modified, replaced or removed.

Based on such asset definition, inspections data, and benchmark resource needs and costs, the MMIS produces a live master work plan describing the hours and quantity of work to plan for each routine preventative maintenance activity and Renewal Work, using CDOT component numbers or class code numbers. The MMIS calculates the appropriate resources necessary to meet the Performance and Measurement Criteria and to address potential operational and safety problems or challenges. The MMIS also alerts the O&M Manager to any special needs like exceptional equipment requirements or materials not normally found or in insufficient quantity in FRMG's inventories.

Scheduled inspections and condition assessments are built into the system to identify specific characteristic activities, repairs, or operational changes required to maintain each Element at the desired level of service. The MMIS provides FRMG's professional staff with the information and knowledge needed to direct efforts toward deficiencies and challenges with specific asset features and the flexibility to do the right thing at the right time with the right resource.

Daily activities of all FRMG's staff and Subcontractors are entered into the system and measured against preplanned work schedules and work plans. The system's user-friendly technology allows managers, administrators, FRMG, and the Department staff to view, among other information, a snapshot of a total daily output, the status of a single characteristic, key

performance indicators aligned with the operations and maintenance requirements, or a portrait of accomplishments for an entire year or over any specific time period.

FRMG will provide equipment, facilities, and training necessary to permit remote, real-time, dedicated, read-only high-speed access to the MMIS for the Department's use. Data will be provided in exportable format to allow pertinent information to be included in the Department's maintenance system.

Work Order Module

The work order function is the heart of the MMIS. All work performed by or at the direction of FRMG is identified in a work order. Each work order includes at a minimum:

- Work order number (system generated)
- Office location, Project (FRMG contract)
- Maintenance staff assigned
- Date issued
- Date to be completed
- Date of actual completion
- Approval information
- Status (active, closed, etc.)
- Primary purpose/description of work to be accomplished
- Location accurate to one foot in 20 feet
- Special conditions and work activities to be accomplished

This information is in CDOT component numbers or class code numbers. The work activities (class code) to be accomplished identify the following:

- Work Activity
- Description
- Resource to complete the work
- Estimated quantities
- Locations

The MMIS work order configuration will report work by Department function code, infrastructure Element, reference marker, and crew and unit measurement. The information for bridges will include National Bridge Inventory (NBI) sheets. The work order function has the ability to:

- Track multiple labor resources (Lead Operator or Subcontractor)
- Track multiple locations per activity
- Identify work accomplished (in the Department function codes)
- Approve items electronically

The geographical interface displays pavement condition measurements, maintenance limits, work performed by roadway segment, type of work, crew/contractor, and any other information relevant to the operation, including maintenance and renewal of the infrastructure Elements.

Reporting

Based on all inspection, incident, work order and activity data logged continuously, the MMIS automatically generates key components of the monthly O&M Report and the annual O&M Report.

The reporting is further facilitated by a geographical interface capable of displaying performance on a geographical basis to demonstrate and monitor compliance with the Performance and Measurement Criteria. In particular, it is able to display pavement condition measurements, maintenance limits, lane Closures, and work currently being performed.

Service Request Module

FRMG processes and tracks requests received from the Department, other entities, and Users through phone calls, letters, e-mails, and the Project website's request form with the MMIS service request function This function acts as a problem identifier and generates work orders as necessary to address the requests. Multiple service requests can be combined into one work order.

The MMIS system logs the time and date of the request and thereafter begins tracking FRMG's action. The requestor receives a response from a FRMG representative notifying that the request has been received and is under investigation. All requests reviewed by FRMG are answered within 24 hours after receipt.

Upon thorough investigation, the requestor will be notified if and when corrective action will be taken. Follow-up phone conversations, if necessary, will be documented. The O&M Manager reviews service requests during routine meetings with his or her management team, allowing the team to analyze specific requests and establish a priority level on the request for work. The service request function can generate a service request log and reports over any specified time period.

Workload/Labor Tracking Module

The system includes a workload/labor function to track the annual roadway operation's actual work on a CDOT class codes basis. Using the workload function, FRMG determines projected workload requirements for each activity FRMG tracks or uses in the performance of a given maintenance activity.

This function will be used to record actual labor hours expended from an annual total to a monthly, quarterly and/or annual quantity and cost budget. Daily, weekly, monthly, or quarterly adjustments to the budget will be possible through this function.

Inventory Module

Asset inventory is entered by characteristic and Element into the MMIS with associated identifications (IDs) consistent with those descriptions and units of measure used by the Department. All information is recorded in a consistent manner that ensures all information is searchable by individual attribute. See the introduction to this section for a detailed list of relevant information that is collected.

With MMIS, parts and material inventory control is automated and uses features such as min/max values, reorder points, alternate items, material transfers. The inventory feature allows our Health & Safety/Operations Superintendent to receive automatic e-mails or text messages when critical spares reach a minimum level, and even auto-generate purchase orders to replenish the items.

Noncompliance and Closure Events Function

The MMIS includes a function to track Noncompliance and Closure events. The function records, tracks and calculates the number of Noncompliance Points and the amount of Closure deductions; provides relevant information related to associated events for auditing and review purposes; and automatically generates a report supporting the assessment of performance payment deductions on a monthly basis.

The Department is granted electronic access to the function at all times. The information contained in the MMIS will be provided in exportable format to allow pertinent information to be included in the Department's maintenance system.

t. Transition of Maintenance Activities

Through the procurement process FRMG has gained an intimate knowledge of the asset and is prepared to take on the responsibilities that are required on day one. A critical component of the NTP process is the completion of the BACR. The completion of the BACR will formalize FRMG's current interpretation of asset conditions and dictate the ongoing maintenance responsibilities throughout the Construction Period. The second critical component is the transition of FRMG taking on responsibility for snow and ice operations. The staggered start will allow FRMG adequate time to complete and outfit any purchase of equipment and materials required to complete this performance requirement.

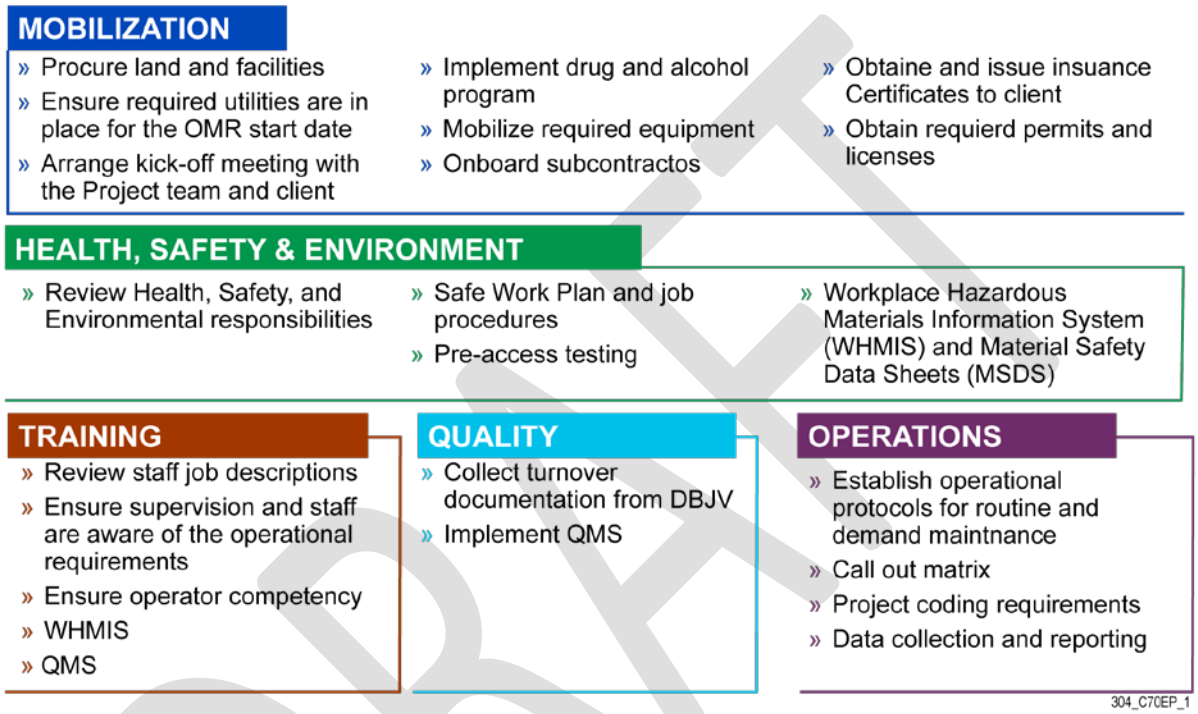
Furthermore, in advance of this transition FRMG will complete field observations of the Department operations and when and if available, meet with Department field staff to gain a better understanding of items which could impact performance of this function, for example this may include the identification of hot spots that may be of concern to FRMG operations.

Moving from the Construction Period to the Operating Period, an O&M Committee consisting of representatives from the Department, CCD, and FRMG will be formed no later than 90 days before Substantial Completion of the Project. Through their interface with the Lead Engineer and the Lead Contractor, the O&M Committee will develop a better understanding of the Project as well as the corresponding requirements and the conditions at the beginning of the Operating Period. Principle areas the O&M Committee will be involved in are highlighted in **Figure 4.**

FRMG will have representatives from the Lead Operator in the testing, commissioning, and acceptance processes of Elements and operating equipment in particular for familiarization purposes and provide the Lead Operator the opportunity to weigh in on long- term operability and maintainability aspects as necessary.

Both the Design and Construction Managers will be available and will participate in coordination meetings with the O&M Manager and other members of the Lead Operator team to facilitate an efficient turnover.

Figure 4. O&M Committee Responsibilities



An important part of the transitions process is a comprehensive transfer and thorough understanding of warranties. Formally, FRMG will keep a record of all applicable warranties for materials and products used during the Construction Period of the Project. This data will be passed to the individuals carrying out operations during the Operating Period for use and reference for the entirety of the Term.

The Lead Operator will have a clear understanding of all applicable warranties to ensure O&M Defective services and products are addressed at the source and without delay.

The following is a representative list of sample items FRMG will be aware of, with respect to warranties and extended warranties:

- Structural
- Waterproofing membrane – bridge deck
- Bearings – pot bearings
- Bearings – laminated elastomeric
- Modular expansion joints – all components excluding seal

- Strip seal expansion joints – all components excluding seal
- Protective coating system on steel Elements (paint system)
- Electrical systems to power mechanical devices Civil
- Crash attenuators
- MSE walls
- Line markings
- Concrete barriers
- Electrical
- Lamps
- Traffic controller units
- Generators
- Mechanical
- Pumps
- Air ventilation systems
- Fire suppression systems

FRMG's O&M Manager will guide the operations transition through this Phase. This process will exist for a few months before substantial completion and Phase out three to six months after the OMR start date. A final review will be conducted near the end of the warranty period to ensure any deficiencies are addressed.

Start-Up Team

FRMG will have a start-up team with individuals responsible for O&M Work, which will ensure a smooth transition from O&M Work during the Construction Period to O&M Work during the Operating Period. Members of FRMG are presently engaged in design activities to ensure an optimized design and a clear understanding of the O&M Work and schedule. The startup team will include personnel familiar with the Design and Construction of the Project together with personnel responsible for operating and maintaining the Project for the 30-year Operating Period. FRMG will offer positions in the Operating Period to personnel involved in the construction of the Project to carry forward the inherent knowledge gained during construction.

u. Maintenance and Service Manuals

FRMG will include maintenance and service manuals that will address detailed technical and servicing descriptions for all Elements assessed as well as software and equipment that is required for the O&M Work.

- All maintenance and service manuals will include:
- Preventative maintenance schedules
- Testing and diagnostic procedures
- Troubleshooting techniques
- Corrective measures for both temporary and permanent
- Location and availability of support services
- Point to point component wiring schematics and logic signal flows

- Assembly and Disassembly drawings, including exploded view drawings

FRMG's maintenance and service manual for the Cover MEP System will address all Elements related to the Cover MEP System and will comply with the requirements for the Operations and Maintenance Manual in accordance with Section 12 of Schedule 10 of the Project Agreement.

In addition, FRMG will utilize the Tunnel, Operations, Maintenance, Inspection, Evaluation (TOMIE) Manual. The goal of the TOMIE Manual is to provide uniform and consistent guidance on tunnel operations, maintenance, inspection and evaluation. The manual is intended to serve as a resource for management, stewardship and oversight of key infrastructure investments; and it promotes safe and efficient practices. The NTIS contains the regulatory requirements for the national tunnel inventory and inspection program; the TOMIE and the Specifications for the National Tunnel Inventory (SNTI) are incorporated into the NTIS and expand upon the requirements. The TOMIE discusses the collection of inspection data on highway tunnels, which can be incorporated into a risk-based tunnel management system administered by FRMG to make informed decisions.

FRMG will also develop a manual (the Cover Top O&M Manual) in collaboration with the Design and Construction team that outlines pertinent Cover Design and Construction information, recommended operations and maintenance requirements, procedures and protocols and recommended procedures and protocols for coordination between the Cover Maintainer and FRMG. The Cover Top O&M Manual will be submitted and be approved by the Department prior to substantial completion. The Cover Top O&M Manual will be developed in coordination with the Design and Construction team and will include details such as:

- Design and construction documentation and drawings
- Video recording of installation of key components on top of the Cover, including structural Elements, waterproofing membrane, drainage system, garden roof assembly, and other relevant components identified in consultation with the Department and the Cover Maintainer
- Recommended load restrictions on the Cover
- Waterproofing layer damage preventative measures, procedures, or protocols to be carried out during the performance of the Cover top O&M Work
- Snow removal and storage restrictions
- Elements requiring regular inspections and maintenance, and the frequency and procedures of such inspections and maintenance
- Record keeping of Cover top O&M Work and the frequency of provision of such records to the Department
- FRMG review timeline and requirement for any major modification by the Cover Maintainer on top of the Cover that would impact FRMG's carrying out of the Cover O&M Work
- Reference to the Landscape Maintenance Plan
- Other coordination and interface requirements with FRMG

Any other documentation, recommendations, requirements, restrictions, measures, procedures, protocols, coordination matters as deemed necessary by the Department (acting reasonably) that are pertinent to the Cover top O&M Work.

v. Elements Maintained by the Developer

Table 8 summarizes the Elements that will be maintained by FRMG during the Construction and Operating Periods, this table will be updated to reflect as-built quantities but is included here to be representative of format and Element categories.

Table 8. Elements Maintained by the Developer.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
1.1	Mainline, Roadways, connecting structures.	Free from obstructions and debris.	No Obstructions or Debris	Crew and work vehicle. On-call personnel for after-hours calls. Skid Steer, or loader where needed for transport loss of load etc.
1.2	Pavement - All roadways, including ramps, detours, and shoulders, (mainline including the bridge deck, covers, gratings, frames, expansion joints and boxes)	Smooth and quiet surface course with adequate skid resistance	80% roadway has ruts <0.40"; 80% roadway IRI< 95 & 100% <160.	Subcontract Renewal Work
		Free from Defects	No failures, delamination, potholes, etc.	In-house crews for minor repairs; Qualified Subcontractors for areas > 3 ft. x 3 ft. Preventive maintenance will actually be from overlays and crack seal program.
		Drop Offs	No drop offs over 2"	In-house crews for localized repairs. Dump bodies and crew trucks, skid steer. Subcontractors for motor grader work and large scale work.
		Perform skid resistance site investigation, Posting of slippery road signs on sections exceeding skid resistance threshold	Skid resistance ASTM E 274 Standard Test Method for Skid Resistance Testing of Paved Surfaces at 50 MPH using a full scale smooth tire meeting the requirements of ASTM E 524. LESS THAN 25	Subcontracted asphalt testing and/or rehabilitation company
		Remove debris and repair pavement	Removal of spilled liquids within time limits	In-house staff and/or Courtesy Patrol Subcontractors to apply absorbency materials or socks where deemed safe to achieve localized containment, and to support first responders. Environmental Subcontractor for post incident mitigation and monitoring.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
		Noise measurement if suspected or a complaint	<105dB	Subcontracted testing company
1.3	Crossovers and access roads	free of Defects For construction: Maintain or exceed the condition from BACR	No obstructions or debris	Crew will remove debris when found or dispatched if practical. Crew and work vehicle. On-call personnel for after-hours calls. Skid Steer, or loader where needed for transport loss of load etc.
1.4	Curbs	Free of Defects	95% free of Defects >1/4", no more than 1" out of alignment	Crew will remove debris when found or dispatched if practical. Crew and work vehicle. On-call personnel for after-hours calls. Localized concrete repair materials. Deck saw, chipping hammer. Subcontract for large scale repairs.
1.5	Hard Capped Surface	Free of Defects and removal of deleterious material	Gravel Shoulders: no tracking of gravel/sand or weeds present	Daily crew will sweep up any material tracked onto roadways. Pre-emergent or post-emergent herbicide
2.1	Storm Sewer Systems	Correctly functions	Pipes: no clogging, settlement, spalling, cracks, no separated joints or missing joint material.	In-house crews, hand tools, skid steer, loader, dump bodies. Subcontracted concrete work
2.2	Open ditches	Functions correctly	No undermining, erosion obstructions, no missing sections or out of alignment	In-house crews, hand tools, skid steer, loader, dump bodies. Subcontracted concrete work
2.3	Pavement drains, catch basins	Functions correctly	As above for storm sewer systems	In-house crews will respond to plugged drains during rain events. Sweeping & constant debris removal to help keep drains clean. Sub contracted vac/jet pipes and inlets as needed.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
2.4	Culverts	Functions correctly and joints remain soil tight and erosion controlled.	Good condition and full functionality	In-house crews will respond to plugged drains during rain events. Sweeping & constant debris removal to help keep drains clean. Sub contracted vac/jet pipes and inlets as needed.
2.5	End Treatments	Functions correctly	No damage, undercutting, broken concrete	In-house crews will respond to plugged drains during rain events. Sweeping & constant debris removal to help keep drains clean. Sub contracted vac/jet pipes and inlets as needed.
2.6	Stormwater systems	Stormwater Systems installed as permanent features maintained, functioning correctly, and operating as designed.	All various types of ponds & filters function as designed, including filtration. No erosion, overgrowth or clogging of outlets	In-house crews, hand tools, skid steer, loader, dump bodies. Subcontracted concrete work
2.7	Discharge Systems	Proper function; complies with all regulations	No instances of noncompliance	In-house crews, hand tools, skid steer, loader, dump bodies. Subcontracted concrete work

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
3.1	Structures having an opening measured along the center of the roadway of more than 20 feet (Includes the Cover's structural components)	Substructures and superstructures are free of: • undesirable vegetation • debris and bird droppings • blocked drains, weep pipes manholes and chambers • blocked drainage holes in structural components • Defects in joint sealants • Defects in pedestrian protection measure • scour damage • corrosion of rebar • paint system failures • impact damage Minimum vertical clearance of 16.5 feet over traveled lanes.	No Element below condition rating "7" for new or widened bridges; "6" for existing or rehabbed bridge. Pontis conditions states 1 or 2 for all Elements.	In-house crews or subcontracted for concrete repairs, repainting or joint replacements. Crew trucks, compressor, hand tools, deck saws, chipping hammer, pressure washer. Subcontracted for specialized or major rehabilitation works. In-house crews will clean debris and bird droppings, clean drains. Periodic sweeping and removal of noncompressibles will help keep joints intact. Review of inspection reports will drive repair plan.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
3.2	Structure component (Includes the Cover's structural components)	i) Expansion joints are free of: • dirt debris and vegetation • Defects in drainage systems • loose nuts and bolts • Defects in gaskets • leaking ii) The deck drainage System operates as intended. iii) Barriers are free of: • loose nuts or bolts • blockages of hollow section drain holes • vegetation • accident damage iv) Bearings and bearing shelves are clean. v) Sliding and roller surfaces are clean and greased to ensure satisfactory performance. Special finishes are clean and perform to the appropriate standards. vi) All non-structural items such as hoists and electrical fixings, operate correctly, are clean and lubricated as appropriate, in vii) Maintain structures to specified condition rating	NBIS rating of "7"; 100% compliance for Elements not noted in NBIS/Pontis	In-house crews or subcontracted for concrete repairs, repainting or joint replacements. Crew trucks, compressor, hand tools, deck saws, chipping hammer, pressure washer. Subcontracted for specialized or major rehabilitation works. In-house crews will clean, remove debris and bird droppings, clean drains. Periodic sweeping and removal of noncompressibles will help keep joints intact. Review of inspection reports will drive repair plan.
3.3	Structures – General (Includes the Cover's structural components)	Safe operation of structures, maintained to prevent safety issues arising	No delaminated concrete above roadway	In-house crews or subcontracted for removal of loose or spalling material and concrete repairs. G84 deck saws, chipping hammer. Subcontracted for specialized or major rehabilitation works.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
3.4	Structures – Bridge girders/beams (Includes the Cover's structural components)	Design stress is not exceeded in bridge girders/ beams (particularly in skew bridge decks)	No instances	n/a
3.5	Non-bridge class culverts	Non-bridge-class culverts are free of: • vegetation and debris and silt • Defects in sealant to movement joints • scour damage	Free of vertical, lateral or rotational movement with no material Defects compromising the intended performance.	In-house crews or subcontracted for removal of vegetation or sediment. Crew trucks, compressor, hand tools, deck saws, chipping hammer. Subcontracted for specialized or major rehabilitation works.
3.6	Retaining Walls (other than MSE walls)	Maintain retaining walls to be structurally sound, and free of vertical, lateral or rotational movement with no material Defects compromising the intended performance.	<5% wall area showing cracking with leaking, efflorescence, delamination, spalls or rust staining, cracks >1/8" No spalls >1" deep; no settlement over 1.5" or .5" in 5 year period; no rotational movement over 1/2 over 10ft vertical.(equals 1/4 degree angle). Free of vegetation and overgrowth	In-house crews or subcontracted for removal of vegetation or sediment. Crew trucks, compressor, hand tools, deck saws, chipping hammer. Subcontracted for specialized or major rehabilitation works with appropriate heavy equipment.
3.7	MSE Retaining Walls	Maintain retaining walls to be structurally sound, and free of vertical, lateral or rotational movement with no material Defects compromising the intended performance.	<5% showing cracking, delamination, spalls or scaling per panel or total wall. No cracks >1/4", no exposed fabric, no vegetation from joints. No erosion, no rotation > 3/4" over 10 ft. (0.35degree angle)	As above

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
3.8	Sign Structures	Sign gantries and foundations are structurally sound and free of: loose nuts and bolts, defects in surface protection systems	All condition states 1 or 2 for structural members. No loose assemblies; no Defects in surface protection.	In-house crews or subcontracted for removal of graffiti. Field crews will tighten bolts and touch up cold galvanizing or protective coatings. Bucket truck, crew trucks, compressor, hand tools, Subcontracted for specialized or major rehabilitation works with appropriate heavy equipment.
3.9	Load Ratings (Including Cover)	During Construction Period: All structures maintain the design load capacity During Operating Period: All structures will have adequate capacity for the design load, legal loads (including Specialized Hauling Vehicles and Notional Rating Load, as referenced in AASHTO Manual for Bridge Evaluation, and Colorado Permit Vehicle, as referenced in CDOT Bridge Rating Manual)	Meet design loads	Subcontracted engineer

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
4.1	Pavement markings – General	Pavement markings are: • Clean and visible during the day and at night • Whole and complete and of the correct color, type, width and length • Correctly placed to meet the MUTCD and the Colorado Supplement to MUTCD and CDOT M&S Standard Plans. Non-applicable pavement markings are removed.	100% meet MUTCD; mcd reading: white 150, yellow 100 aux marking white 200; 90% present for long line, 75% for auxiliary	In-house staff for localized repairs. Subcontracted pavement striping.
4.2	Reflective markers	RPM's, are: • Clean and clearly visible • Of the correct color and type • Reflective or retroreflective • Correctly located, aligned and at the correct level • Required in MUTCD and CDOT M&S Standards	<10% missing, no more than two in a row missing, 100% secured and uniform	In-house staff for localized repairs. Crew trucks, compressor, hand tools, epoxy or hot application tools. Renewals by subcontract.
4.3	Delineators and Markers	Object markers and delineators are: • Clean and visible • Of the correct color and type • Legible and reflective • Straight and vertical • Placement per MUTCD, and CDOT M&S	<10% missing, 100% reflective	In-house staff for repairs and replacements.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
5.1	Guard rails and traffic barriers	All guardrails, traffic barriers and other concrete barriers are maintained free of Defects. Placed per MUTCD, CDOT M&S Standards & CDOT Roadway Design Manual, FHWA Roadside Design Guide	No missing posts, rail, blocks. No damage to barrier walls > 1SF or 1 CF	In-house staff for immediate response and some repairs.; Crew trucks, compressor, post driver, Skid steer and attachments, concrete saw, chipping hammer and hand tools. Subcontractor for guardrail repairs and concrete barrier wall repairs.
5.2	Impact attenuators, anchor assembly, and end assembly	All impact attenuators, anchor assemblies, and end assemblies are appropriately placed and correctly installed	100% in place and functioning	In-house staff for immediate response and some repairs.; Crew trucks, compressor, post driver, Skid steer and attachments, concrete saw, chipping hammer and hand tools. Subcontractor for guardrail repairs and concrete barrier wall repairs.
6.1	General – all sign panels	Signs are clean, correctly located, clearly visible, legible, reflective, at the correct height and free from structural and electrical Defects Identification markers are provided, correctly located, visible, clean and legible Sign mounting posts are vertical, structurally sound and rust free; meets required visibility distances	None missing, all meet MUTCD; retro reflectivity no less than requirements; no face damage > 5%, 100% plumb	In-house or outsource crews, small sign materials, posts, etc. Crew trucks, compressor, post driver, Subcontractor with bucket truck/crane for larger signs. Common signs will be kept in inventory.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
6.2	Safety critical signs	Requirements as 6.1, Plus: "Stop," "Yield," "Do Not Enter," "One Way" and "Wrong Way" and all Turn- Prohibition signs are clean, legible and undamaged.	100% present, legible, not twisted or leaning	In-house crew will keep a supply of these signs on hand and will repair immediately upon notification; may use temporary stand mount or roll-up signs for quick hazard mitigation. Crew trucks, compressor, post driver, hand tools. As well as Subcontractor Emergency response and renewal replacements.
6.3	Obsolete or obscene signs, banners, flags or posters	Removed from the Project	100% compliance	In-house crews will remove if found or dispatched
7.1	Traffic Signals - General	Traffic Signals will meet the following: Be clean and visible, heads and buttons correctly aligned and operational Elements including cabinets, foundations, signing, vehicle detection (cameras or loops), electrical power and boxes: are aligned correctly, structurally sound, full operational and free from damage caused by accident or vandalism	Provide written notification to CCD and Department, 100% of the time	NA. Maintenance by others. Reporting log kept where issues found
7.2	Traffic Signal Operations – Construction Period Only	Compliance with Accepted Temporary TCP	Visual Inspection 100% of the time	100 % of the time per Section 2.11 of Schedule 10

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
7.3	Traffic Signals Contingency – Construction Period Only	Contingency plans are in place to rectify Category 1 O&M Defects not immediately repairable to assure alternative traffic control is provided during a period of failure.	Contingency Plan Record Reviews	Full contingency plans are in place 100% of the time
8.1	Roadway Lights	All lighting is free from Defects and provides Acceptable uniform lighting quality. Lanterns are clean and correctly positioned.	Provide written notification to Xcel Energy and Department, 100% of the time	NA. Maintenance by others. Reporting log kept where issues found
8.2	Lighting Structures	Columns are upright and correctly founded and structurally sound	Provide written notification to Xcel Energy and Department, 100% of the time	As 8.1
8.3	Lighting Fixtures	All luminaries functioning on each pole	Provide written notification to Xcel Energy and Department, 100% of the time	As 8.1
8.4	Temporary Lighting-General, including pedestrian lighting – Construction Period Only	All lighting is free from O&M Defects and provides acceptable uniform lighting quality. Lanterns are clean and correctly positioned.	Visual inspection and reporting log as per Ref.8.1 in Appendix A-1.	Level as per required in Section 2 of Schedule 10.
8.5	Temporary Lighting Structures, including pedestrian lighting – Construction Period Only	Columns are upright correctly founded and structurally sound	Visual inspection and reporting log as per Ref.8.1 in Appendix A-1. Structure is plumb.	Columns are plumb, bases are not damaged and no section loss. No hazard with wiring and loose assemblies to public

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
8.6	Temporary Lighting Fixtures, including pedestrian lighting – Construction Period Only	All luminaries functioning on each pole	Visual inspection and reporting log as per Ref.8.1 in Appendix A-1.	Lighting levels per Section 2 of Schedule 10. No instances of three consecutive lamps not working per circuit.
9.1	Fences and Walls	act as designed and no openings	100% compliance	In-house staff for immediate response and some repairs.; Crew trucks, compressor, post driver, Skid steer and attachments, concrete saw, chipping hammer and hand tools. Subcontractor supplemented particularly for larger repairs.
9.2	Fences and Walls - Construction	Integrity and structural condition of the fence is maintained	100% compliance	as 9.1
10.1	Vegetated Areas - Except landscaped areas - General	Vegetation is maintained so: height of grass is kept at standards, spot mowing is done for sight distance, no growth into shoulders, sidewalks, etc. Herbicide program for noxious weed control	95% of grass between 8-10", not less than 6". No vegetation encroachment or impaired site lines.	In-house or outsourced crew, weed eaters, small tractor with 5 ft wide bush hog OR Subcontractor. In-house crews will cut brush or weeds for site distance as needed for quick mitigation. May provide weed control depending on areas as well.
		Development and implementation of noxious weed management program to control noxious weeds and to eliminate grass in pavement or concrete.	No more than 15% of roadway or shoulder contains noxious weeds	Certified In-house crew OR subcontracted applicator

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
10.2	Landscaped Areas	i.All landscaped areas are maintained Landscaped areas are as designated in the plans. ii.Mowing, litter pickup, irrigation system maintenance and operation, plant maintenance, pruning, insect, disease and pest control, fertilization, mulching, bed maintenance, watering is undertaken as per MMP. The height of grass and weeds is kept between 8" to 10",and not shorter than six Mowing begins before vegetation reaches a hazardous condition, such as sight distance, blocking reflectors, hiding animals or causing drifting snow Damaged or dead vegetation is replaced	90% of landscaped areas meet general requirements	In-house or outsourced crew, weed eaters, small tractor with 5 ft. wide bush hog OR Subcontractor. In-house crews will cut brush or weeds for site distance as needed. Subcontract work where appropriate
10.4	Trees, Brush, Ornamentals	Trimmed in accordance CDOT standards; do not interfere with sight distance; dead vegetation removed; dangerous trees removed by licensed persons; undesirable vegetation removed; diseased removed by licensed personnel	100% compliance	In-house or outsourced crew, weed eaters, small tractor with 5 ft. wide bush hog OR Subcontractor. In-house crews will cut brush or weeds for site distance as needed. Subcontract work where appropriate
10.5	Wetlands	properly managed in accordance w/ permits	100% meet permit requirements	In-house and Subcontracted specialist
10.6	Water Quality Ponds	Maintenance of all vegetation within the pond area	Visual inspection of ponds	Maintained as required per the design

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
11.1	Slope - Stability	All structural or natural failures of the embankment, cut slopes, and slope and ditch pavement Defects on the Site are repaired.	No slope failures; no unsealed cracks or joints on paved slopes. No vegetation on paved slopes. No rut, washout etc. greater than 6 inch deep or 2 feet wide	In-house staff for immediate response and localized repairs.; Crew trucks, dump body, skid steer and other excavation equipment as needed, concrete saw, chipping hammer and hand tools. Subcontractor supplement or for larger repairs.
11.2	Slopes-General	Maintained in conformance to original cross sections	No slope failures; proper removal and disposal of eroded material	In-house staff for immediate response and localized repairs.; Crew trucks, dump body, skid steer and other excavation equipment as needed, concrete saw, chipping hammer and hand tools. Subcontractor for larger repairs.
12.1	Graffiti	Removal on all Elements	Graffiti removed - 100%	In-house or outsourced crew will power wash or paint over graffiti. On-call crews may need a bucket truck to reach areas
12.2	Offensive Graffiti			
13.1	General	Respond to Incidents in accordance with the Incident Response Plan.	98% of responses within time limit	In-house crew and Courtesy Patrol with supplement by Subcontractor
13.2	Spillage of Hazardous Materials	For any hazardous materials spills, comply with the requirements of Schedule 17.	Records show compliance	Courtesy Patrol and O&M Staff for initial support of HazMat authorities and HazMat contractor as required
13.3	Elements damaged as a result of Incident - Structural Assessment	Evaluate damage to structures and liaise with Emergency services to ensure safe working in clearing the Incident.	Records show compliance	O&M staff for initial response, Bridge Inspection firm for assessment where structural damage suspected, CDOT bridge office notified immediately.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
13.4	Elements damaged as a result of Incident - Temporary and permanent remedy	Propose and implement temporary measures or permanent repairs to Defects arising from the Incident. And Ensures the structural safety of any structures affected by the Incident.	Records show compliance	In-house staff for immediate response and localized repairs.; Crew trucks, dump body, skid steer bucket truck as needed, concrete saw, chipping hammer and hand tools. Subcontractor for specialized repairs.
14.1	Maintenance Yard: Developer Identification Signs	Signs installed at the entrance(s)/ exit(s) to/from the maintenance yard	100% compliance	In-house crew, signing tools.
14.2	Maintenance Yard: Environmental contamination	No increase in contamination.	No increase from construction levels	NA
14.3	Maintenance Yard: Maintenance of grounds and buildings	Kept in a neat and tidy order. And kept structurally safe.	Compliance	In-house Maintenance Staff
15.1	Snow removal: Response Time, material application vehicle	The manning and loading of material application vehicles for a Precipitation Event	30 minutes to leave the yard on precipitation. Start; one hour for round-trip of plows/spreaders; continuous operation till bare pavement is maintained; one hour after event or 3 hours on shoulder for total bare pavement.	In-house and as needed availability staff, potential subcontract support or performance. Tandem Plows, Tow Plows, Spreaders Front end Loader and/or blower, patrol trucks.
15.2	Response Time - plow	Manning		
15.3	Plowing and material application	continuous plowing and material application		
15.4	Circuit time	complete entire route within 1 hour		
15.5	All lanes, ramps, paved shoulders	Bare and wet pavement during event		
15.6	Hazards	Address snow and ice hazards immediately upon notification or detection		
15.7	Isolated slippery conditions	address slippery conditions		
15.8	Materials storage	materials in tanks or covered		

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
15.9	Reporting	All Schedule 11 Reporting requirements timely accurate complete		
15.10	AVL	All vehicles with AVL at all times		
15.11	Spreader calibration	Spreader controller calibration is operational		
15.12	Winter Drainage	melted snow/ice causing flooding		
16.1	Courtesy Patrol	Respond to any calls on the General Purpose Lanes or Tolled Express Lanes 15min after being dispatched.	100% response rate	In-house or outsourced courtesy patrol crew and outsourced tow vehicles meeting requirements of Appendix B
17.1	Sweeping	i) Keep all channels, lanes, hard shoulders, gore areas, ramps, intersections, islands and frontage roads swept clean. ii) Clear and remove debris from all paved areas other than as required in Section 1.1 of this Appendix A-2. iii) Remove all sweepings without stockpiling in the right-of-way and dispose of at approved site.	All hard surfaced areas kept clean	likely subcontracted sweeping service
17.2	Litter	i) Keep the Site in a neat condition, remove litter regularly ii) Pick up large litter items before mowing operations. iii) Dispose of all litter and debris collected at an approved solid waste site	100% compliance	In-house or outsourced courtesy patrol crew and outsourced tow vehicles meeting requirements of Appendix B

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
17.3	Sweeping	Clear and remove granular and sand material used as deicer or tractive material at the end of Precipitation Event	100%	likely subcontracted sweeping service
18.1	Cover: Snow and ice removal	Snow and ice removal in the Cover section and at access and egress points	No snow on structure wall or soffit or right shoulder at access/egress points	remove by hand or small truck with plow
18.2	Cover: Subsurface structures	All subsurface structures, including passive fire protection, will be free of Defects.	Elements free of O&M Defects	tunnel maintenance technician for minor technical repairs and Subcontractors supplement
18.3	Cover: Structural supports and Connections for all miscellaneous structural attachments or supports.	Structural Supports & Connections for all miscellaneous structural attachments or supports will be free of Defects.	All Elements with full capacity connections; no loss of connection material	Specialized Subcontractor
18.4	Cover Retaining Walls	As a minimum free of the Defects as noted in Section 3 above	<5% wall area showing cracking with leaking, efflorescence, delamination, spalls or rust staining, cracks >1/8" No spalls >1" deep; no settlement over 1.5" or .5" in 5 year period; no rotational movement over 1/2 over 10ft vertical.(equals 1/4 degree angle). Free of vegetation and overgrowth	In-house staff for immediate response and repairs.; Crew trucks, dump body, skid steer and other excavation equipment as needed, concrete saw, chipping hammer and hand tools. Subcontractor supplement or for larger repairs.
18.5	Cover Waterproofing	Free of leaks in subsurface structures.	The subsurface structures will be free of leaks.	Specialized Subcontractor
18.6	Cover Finishes	All finishes free of Defects and clean	Maintain level of reflectivity, free of damaged finish materials; fully functioning Emergency equipment	In-house or outsourced staff for repairs. Crew trucks, and hand tools.

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
18.7	Drainage	Subsurface drainage and pumping systems fully operational and clear of debris.	Free from blockages, all components and systems fully functioning	In-house or outsourced staff for repairs. Crew trucks, and hand tools.
18.8	Fire Protection	Fire protection systems such as but not limited to fire detection, alarm, notification and suppression systems fully functional and operational.	Quarterly inspection by Fire Protection Subcontractor	In-house or outsourced staff for repairs. Crew trucks, and hand tools.
18.9	Electrical Systems, regular and Emergency Lighting	Lighting system fixtures, lamps and control functioning to provide the intended illumination level, light output, lighting quality, duration and energy efficiency, for the location	Functioning correctly 100% and in full compliance with MMP	In-house or outsourced staff for repairs. Crew trucks, and hand tools.
18.1	Electrical Systems, Fire / vehicle Detection and Alarm and Emergency way-finding signage	Fire / vehicle detection and alarm Systems provide the intended detection and notification functions including Emergency way-finding signage.	Fire alarm system performs as designed; all detectors operating; all inspections performed; all PM performed and documented	In-house tunnel maintenance technician for minor technical repairs qualified Subcontractors where required
18.11	Electrical Systems, Communications including Radio Rebroadcast, 2- way Radio, public Emergency message rebroadcast, voice alarm and public address, telephone and closed-circuit television (CCTV)	Communications systems serving their intended functions	All systems perform as intended; all inspections conducted; all PM performed; free from security breaches; electronic retention of database files.	In-house tunnel maintenance technician for minor technical repairs qualified Subcontractors where required
18.12	Electrical Systems, Distribution – Normal, Essential & Emergency	Electrical system serving connected loads with intended capacity, voltage regulation, protection, control and monitoring.	All Elements of electrical systems distribution normal, essential and Emergency functioning as designed 100% of the time.	

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
18.13	Command, Control and Monitoring System	Command, Control and Monitoring System provides intended function of control, monitoring, communication and visual display of all connected systems including integration with other systems.	All Elements of Command, Control and Monitoring System functioning as designed 100% of the time.	
18.14	Electrical Systems, Grounding and LP	Grounding and lightning protection systems provide intended function and level of protection for equipment, structure and personnel protection.	All Elements of Grounding and lightning protection systems functioning as designed 100% of the time.	
18.15	Ventilation System	Ventilation system fully maintained, functional and operational.	All Elements of the ventilation system functioning as designed 100% of the time.	as 18.1
18.16	Cover electrical Supplies	Electricity supplies, feeder panels, transformers, cabinets, switches and fittings are electrically, mechanically and structurally sound and functioning	A continuous availability level of 100% from metered source to all O&M equipment and facilities.	as 18.1
18.17	Cover firefighting water supplies	Water supplies, plumbing, pipe, valves mechanically and structurally sound	continuous availability of 100% of all firefighting equipment and facilities	In-house tunnel maintenance technician for minor technical repairs qualified Subcontractors where required
18.18	Plant Rooms	Electricity supplies, panels, cabinets, switches, heating/cooling/air conditioning and fittings are electrically, mechanically and structurally sound	A continuous availability level of 100% to all O&M equipment and facilities.	

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
19.1a	ITS Equipment installed by Developer, Operating Period Only	Fully functional and operational without damages	No instances of malfunction or damages to devices or equipment	ITS maintenance Subcontractor during first 2 years of Operating Period. In-house staff or outsourced crews for civil infra. Crew trucks, compressor, skid steer bucket truck and other excavation equipment as needed, concrete saw, chipping hammer and hand tools. Subcontractor supplement or for larger repairs. **For the period commencing the operations of the ITS and/or Tolling Equipment installed by the Developer, up to two Calendar Years after Final Acceptance*.
19.1b	ITS Devices including but not limited to CCTV, microwave vehicle radar detection, road weather information systems, automatic traffic recorders, ramp meters, variable message signs and doppler radar units – Construction Period Only	Existing equipment shall be maintained to ensure equipment are fully functional and communicating, including but not limited: • Equipment are clean; • O&M Defective equipment, fiber or devices are replaced or repaired	Visual inspection and/or as identified by Department	
19.2a	Backbone communication and VTMS	Fully functional and operational without damages	No instances of communication or VTMS failures	
19.2b	ITS and ETC Equipment (owned by Local Agency or by Department) installed by Developer and Backbone Communication – Construction Period Only	Developer to provide reporting on inefficiencies or malfunction of ITS and ETC equipment, and backbone communication	100% reporting and follow up reporting on equipment corrections, repairs and connections to communication lines to ETC System Integrator, CTMC, and the Local Agency.	
19.3	ITS Equipment and Backbone communication and VTMS	Developer to provide reporting on inefficiencies or malfunction of ITS and ETC equipment, including ramp meters, and backbone	100% reporting and follow-up reporting on equipment corrections, repairs and connections to communication lines to ETC System Integrator and CTMC.	

	Element	General	Level of Maintenance	Summary of Maintenance Tasks
19.4	ITS and ETC civil infrastructure, such as pullboxes, manholes, cabinets, foundations, ITS sign structures,	Fully functional and operational without damages.	100% of time.	

w. Maintained Elements Manufacturers/Vendors

Table 9 provides a list of all the major maintained Elements. The manufacturer and/or vendor will be included on this list once confirmed. In the column for contact information FRMG will provide: contact person, address, telephone number(s), website address and e-mail address.

Table 9. Maintained Elements.

Maintained Element	Manufacturer/Vendor	Contact Information
COVER		
Drainage		
Fire Protection		
Electrical Systems, Regular and Emergency Lighting		
Electrical Systems, Fire / Vehicle Detection and Alarm and Emergency Way-finding Signage		
Electrical Systems, Communications including Radio Rebroadcast, Two-way Radio, public Emergency message rebroadcast, voice alarm and public address, telephone and CCTV		
Electrical Systems, Distribution – Normal, Essential and Emergency		
Command, Control and Monitoring System		
Electrical Systems, Grounding and LP		
Ventilation System		
Cover Electrical Supplies		
Cover Firefighting Water Supplies		
Plant Rooms		
ITS AND ETC FACILITIES:		
ITS and ETC Elements Installed by FRMG*		
Backbone Communication and VTMS*		
ITS and ETC Equipment Installed by Developer and Backbone Communication		
Cover Firefighting Water Supplies		

***For the period commencing the operations of the ITS and/or tolling equipment installed by FRMG, up to two calendar years after final Acceptance.*

x. Unplanned Maintenance Services

Table 10 indicates the activities that will have unplanned but anticipated maintenance.

Table 10. Unplanned Maintenance Services.

Element	Unplanned - Anticipated Maintenance
Roadways	• Severe weather storm that could result in increasing winter operation equipment to ensure safety of the roadways and achieving required level of service
Structures	• Carry out unplanned inspections to establish the condition of a bridge or other highway structure following an accident or incident • Repair damage to the structure resulting from accident or incident
Sign structures and signs	• Repair damage to the sign structure and signs resulting from accident or incident • Remove graffiti • Repair damage resulting from vandalism
Pavement markings	• Repair damage to the pavement marking resulting from accident or incident
Guard rails and traffic barriers	• Repair damage to the guardrails or traffic barriers resulting from accident or incident
Impact attenuators, anchor assembly, and end assembly	• Repair damage to the impact attenuators resulting from accident or incident
Traffic signals – general	• Repair damage to the marking resulting from accident or incident
Roadway lights	• Repair damage to the roadway lights resulting from accident or incident within the scope of FRMG
Cover MEP systems	• Respond to malfunction in any component of the Cover MEP systems
ITS and ETC equipment (up to two years after final Acceptance)	• Respond to power outage and fix short circuit • Software troubleshooting by of scanning, identifying, diagnosing and resolving problems, errors and bugs in software

y. Anticipated Repairs

Repair procedures will be updated in the final MMP. The repair procedures outlined in **Table 11** represent many of the repairs envisioned for the Project. Crew sizes indicated reflect optimal projections. Crew sizes will be adjusted for field conditions and resourcing.

Typical production will vary greatly dependent on actual crew size, variations in equipment, scale of work, and degree to which repairs are localized. Maintenance of traffic may utilize outsourced support for longer or more complex Closures. Activities may be subcontracted subject to adherence of all applicable MOT, safety, and Project Agreement requirements. Additional repair procedures will be developed as appropriate prior to the issuance of the final MMP.

Table 11. Repair Procedures.

Asphalt Repair (Manual)	**Description:** Bituminous surface patching, spot replacement or leveling with premix without the use of mechanical spreader.
Unit of Measure: Tons **Typical Crew Size:** 4 **Typical Production:** 2.75 **Typical Equipment:** • Flat Bed or Dump Body • Tamper • Roller • Hand Tools	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in o CDOT Manual of Maintenance Procedures o Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) o CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Clean the surface failure area and square depressions and edges • Apply tack coat of liquid • Spread bituminous material in layers not to exceed 1.5” • Compact material with hand tamper or roller • Achieve final layer after compaction flush with pavement • Patches at EOP are not to extend beyond edge • Sweep loose material from road surface • Terminate traffic control

Asphalt Repair (Mechanical)	**Description:** Bituminous surface patching, pavement edging, leveling, or overlaying with premix and the use of a mechanical spreader

Unit of Measure:
Tons
 	
Typical Crew Size:
8
 	
Typical Production:
27
 	
Typical Equipment:
• Tandem Dump Body
• Asphalt Paver Distributor
• Roller
• Power Broom
• Crew Trucks
• Hand Tools
	Procedure:
	• Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in
	  o CDOT Manual of Maintenance Procedures
	  o Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor)
	  o CDOT M&S Standard Plans as applicable
	• Install appropriate traffic control devices per MUTCD, including the Colorado Supplement
	• Mark limits of work
	• Power broom the surface square transition points
	• Apply light tack coat of liquid
	• Spread bituminous material in layers not to exceed 2”
	• Feather edges before rolling
	• Roll immediately after spreading
	• Achieve final layer after compaction flush with pavement at longitudinal edge and transition edge
	• Sweep loose material from road surface
	• Terminate traffic control

Concrete Pavement Joint Sealant	Description: Cleaning and sealing random cracks in concrete pavement. Also included are any non-functioning lesser (non-expansion) joints
Unit of Measure: Liner Feet (LF) Typical Crew Size: **6** Typical Production: **5,000** Typical Equipment: • PPE • Crew trucks • Hand tools • Pickup • Crew Cab w/ Flat Bed • Concrete Saw • Asphalt Kettle • Compressor with Hot Air Lance	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Route, saw, air or sandblast random cracks in the pavement to clean the track • Use hot air lance with compressed air to remove debris and moisture from cleaned crack or joint • Inject asphaltic, rubberized, or polymeric sealer • Form sealer with template / shoe • Allow proper curing time before releasing traffic • Terminate traffic control

Sodding	**Description:** Placing sod in areas along the roadside associated with localized failures, slopes, ditches, median islands, utility strips and repairing washouts.
Unit of Measure: SY **Typical Crew Size:** 4 **Typical Production:** 250 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Crew Cab w/ Trailer • Water Truck • Skid Steer w/ attachments	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Rake and grade areas to be sodded to proper contours, and removing deleterious material • Haul pallet sod to work site • Place sod in staggered rows and stake as needed • Water sodded areas as needed • Clean up work site • Terminate traffic control • Ensure proper quantities are recorded for MS4 and interlocal reporting
Rework Unpaved Shoulder	**Description:** Reworking of non-paved shoulders, front slopes, roadside ditches and turnouts either by addition or suitable material and reshaping, or by cutting down built-up areas. This work includes work done after resurfacing projects.
Unit of Measure: AC **Typical Crew Size:** 7 **Typical Production:** 2 **Typical Equipment:** • PPE • Crew Trucks • Hand tools • Crew Cab • Dump Truck with Trailer • Motor Grader or Positrack • Loader • Sweeper	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Disc shoulder if necessary to loosen material • Peel off sod and top soil with motor grader and windrow along pavement edge • Cut excess material off shoulder and windrow • Load excess material on to trucks and dispose at designated areas • Make additional passes as necessary to obtain proper shoulder slope for drainage to ditch • Apply seed or sod • Sweep loose material off pavement surface • Terminate Traffic Control • Ensure proper quantities are recorded for MS4 and interlocal reporting

Miscellaneous Slope and Ditch Repair	**Description:** Bituminous surface patching, spot replacement or leveling with premix without the use of mechanical spreader.
Unit of Measure: SY **Typical Crew Size:** 4 **Typical Production:** 85 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Excavator • Crew Cab • Dump Truck	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement. • Mark limits and set grades as needed in areas to be reshaped and graded. • Rework and grade existing material and/or place new material to return area to grade. • Compact material in lifts with mechanical tamper or roller. • Haul off excess material. • Sod or seed and mulch all disturbed areas • Clean work area. • Terminate traffic control. • Ensure proper quantities are recorded for MS4 and interlocal reporting.
Drainage Structure Cleaning	**Description:** Mechanical or manual cleaning of storm drains, French drains, manholes, side drains, cross drains, inlets, piped outfalls, box culverts and other miscellaneous drain structures
Unit of Measure: Liner Feet (LF) **Typical Crew Size:** 3 **Typical Production:** 220 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Crew Cab • Backhoe, skid steer, or mini-hoe • Vac Truck	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Remove all debris from drainage structures • Clear box inlets of sediment and debris • Clean vegetation and excess soil from around structure entrance and from grates • Remove sediment, soil and vegetation from structures by hand or mechanical means • Check, remove and reshape soil on vegetation around outfall end of structure. • Ensure proper disposal of vac truck contents • Clean up work area • Terminate traffic control • Ensure proper quantities are recorded for MS4 and interlocal reporting

Roadside Ditches – Clean and Reshape	**Description:** Cleaning and reshaping of roadside and right-of-way ditches
Unit of Measure: Liner Feet (LF) **Typical Crew Size:** 7 **Typical Production:** 400 **Typical Equipment:** • PPE • Crew Trucks • Hand tools • Crew cab • Excavator • Grade-all • Dump Truck with Trailer	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Place erosion control devices as appropriate • Set grades as needed along ditches • Clean, re-grade, and shape ditches by hand or mechanical means • Load excess material into trucks and hail to approved disposal sit • Clean and dress around ends of pipes and headwalls; sod as needed • Clean up work site • Terminate traffic control • Ensure proper quantities are recorded for MS4 and interlocal reporting
Outfall Ditches – Clean and Reshape	**Description:** Cleaning outfall ditches and restoration of slopes and bottom areas. Do not report to this activity when efforts are limited to brush and weed cutting
Unit of Measure: Liner Feet (LF) **Typical Crew Size:** 4 **Typical Production:** 300 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Excavator • Crew Cab with Trailer	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Place erosion control devices control runoff, and soil erosion • Clear and level access area along ditch and slope • Re-grade, shape and remove excess material a long ditch bottom and slopes • Haul excess material to disposal site • Provide additional erosion protection as needed, riprap etc. • Sod or seed and mulch as needed • Clean up work site • Terminate Traffic Control • Ensure proper quantities are recorded for MS4 and interlocal reporting

Large Machine Mowing	**Description:** Mowing of roadside areas with large mowers where conditions accommodate the efficient use of 7 foot and larger mowers, alone or in combination
Unit of Measure: AC **Typical Crew Size:** 4 **Typical Production:** 600 **Typical Equipment:** • PPE • Crew trucks • Transport Trailer • Hand tools • Mowers • Crew Cab • Utility Van	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Transport equipment to work site • Service equipment prior to mowing operations • Set mowers to appropriate mowing heights • Pick up debris and litter prior to mowing and haul to an approved disposal site • Perform mowing operations • Trim with hand operated weed cutter around all obstructions • Review areas mowed for proper height and quality • Terminate traffic control
Slope Mowing	**Description:** Grass, bush and weed cutting along slopes that are too steep to mow with conventional mowing tractors. All mowing and brush cutting with a mechanical slope mower is to be reported to this activity
Unit of Measure: AC **Typical Crew Size:** 8 **Typical Production:** 12 **Typical Equipment:** • PPE • Crew Trucks • Hand tools • Crew Cab/van • Slope Mower or weed cutter	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in • CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement. • Transport equipment to work site. • Service mowing equipment prior to mowing and haul to an approved disposal site. • Perform mowing utilizing hand operated weed cutters or approved mechanical mowing equipment. • Remove excess vegetation to an appropriate site. • Terminate traffic control.

Small Machine Mowing	**Description:** Mowing the roadside with small hand or riding mowers having a cutting width of 60 inches or less
Unit of Measure: AC **Typical Crew Size:** 3 **Typical Production:** 2 **Typical Equipment:** • PPE • Crew Trucks • Hand tools • Crew Cab with Trailer • ZTR Mowers	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Transport equipment to worksites • Service equipment prior to mowing operations • Pick up debris and litter prior to mowing and haul to an approved disposal site • Perform mowing operations utilizing small mowers. Review areas mowed for quality • Trim with hand operated weed cutters around all small obstruction • Terminate traffic control
Weed Control (Manual)	**Description:** Brush, weed, and grass cutting (4 inches in diameter or less) performed with hand tools
Unit of Measure: AC **Typical Crew Size:** 3 **Typical Production:** 105 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Pickup Truck • Herbicide Tank	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Transport equipment to worksite • Service equipment to worksite • Utilize appropriate safety equipment • Clear areas that cannot be cut with mechanical mowers or controlled chemically • Use brush chipper and chip brush and weeds on-site • Clean up work site • Terminate traffic control

Tree Trimming and Removal	**Description:** The trimming of the height and sides of trees and removal of undesirable trees (over 4 inches in diameter or trimming that cannot be done under activity 487). To include the chipping and/or removal of all debris from work site.
Unit of Measure: AC **Typical Crew Size:** 4 **Typical Production:** .50 **Typical Equipment**: • PPE • Crew trucks • Hand tools • Lift Truck • Crew Cab • Trailer or Dump Body	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Confirm crew chief has received FRMG training in landscape design intent, and appropriate trimming methods for species to be maintained. • Cut or trim tree limbs or vegetation in or over travel way or side walk clear zone • Cut or remove dead vegetation outside clear zone which could fall into Clear zones • Chip or site or haul debris to an authorized disposal site • Clean up worksite • Terminate traffic control
Landscape Area Maintenance	**Description:** Maintenance of landscaped areas including moving, weeding, and replacement of plant material. Not to include any efforts associated with the planting or maintenance of wildflowers
Unit of Measure: SY **Typical Crew Size:** 4 **Typical Production:** 3,000 **Typical Equipment:** • PPE • Crew Trucks • Hand tools • Crew cab/Dump Body	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Confirm crew chief has received FRMG training in landscape design intent, and appropriate trimming methods for species to be maintained • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Cut or trim tree limbs or vegetation within landscaped areas. • Cut or remove dead vegetation and replace as necessary within landscaped areas • Chip on-site or haul debris to an authorized disposal site • Clean up worksite • Terminate traffic control

Weed Control Application	**Description:** The application of herbicides to control undesired vegetation in turf within the highway right-of-way. This involves application of selective chemical formulations by wiping and handgun methods. Do not include herbicide efforts within mitigation or landscape areas
Unit of Measure: AC **Typical Crew Size:** 1 **Typical Production:** 30 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Herbicide Rig	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Confirm crew chief possesses applicable required herbicide certifications • Determine wind speeds are below acceptable thresholds • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Load herbicide tank with appropriate mix to control designated species • Apply prepared mix in accordance with design and label requirements • Clean equipment and herbicide containers as required • Log herbicide applications daily • Terminate traffic control
Delineators	• Description: Installation, replacement, repair, and maintenance of flexible and non-flexible roadside delineators and object markers (6-inches by 12-inches or three button markers)
Unit of Measure: SY **Typical Crew Size:** 4 **Typical Production:** 250 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Pickup Truck	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Remove existing damaged or Defective delineator and object markers • Install, replace, or repair delineators and object markers in accordance with established standards • Clean up work site • Terminate traffic control

Ground Sign Repair	**Description:** Installation, replacement, repair, overlay, and maintenance of Type 1 or Type III object markers, signs, sign posts, and the repair and maintenance of small sign structures
Unit of Measure: EA **Typical Crew Size:** 3 **Typical Production:** 19.60 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Pickup Truck	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Load replacement panels to avoid damage to fragile reflective sheeting • Remove existing damaged or Defective signs, object markers, sign posts and small sign structures • Install, replace or repair signs, object markers, sign posts, and small sign structures in accordance with established standards and specs • Clean up work site • Terminate traffic control
Overhead Sign Repair	**Description:** Replacement, repair and overlay of large signs over 30 square feet and all overhead and cantilever signs. Also includes bolt tightening and torqueing
Unit of Measure: EA **Typical Crew Size:** 3 **Typical Production:** Varies **Typical Equipment:** • PPE • Crew trucks • Hand tools • Pickup Truck • Bucket Truck • Boom/Crane Truck	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Remove existing damaged or Defective large signs including over lane and Cantilever signs • Install, replace or repair large signs including over lane and cantilever signs in accordance with established standards and specs • Check and replace bolts as needed, tightening and torqueing each bolt • Clean up work site • Terminate traffic control

Guardrail Repair	**Description:** Repair of damaged or deteriorated guardrail
Unit of Measure: LF **Typical Crew Size:** 5 **Typical Production:** 92.72 **Typical Equipment:** • PPE • Crew Trucks • Hand Tools • Crew Cab • Post Driver/Auger	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Transport to job site appropriate guardrail and its components to make repairs • Remove Defective sections of guardrail and/or components • Repair or replace damages sections of guardrail, post, or other components • Check guardrail, post, end sections for proper height and alignment • Replace missing delineators • Clean up work site • Terminate traffic control
Fence Repair	**Description:** Repair of fence, including replacing deteriorated components. Not to include new fence installation
Unit of Measure: LF **Typical Crew Size:** 3 **Typical Production:** Varies **Typical Equipment:** • PPE • Crew Trucks • Hand Tools • Fabric Stretcher • Crew Cab with Flat Bed • Skid Steer with Attachments	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Transport appropriate fence components to work site for type of fence being repaired • Remove Defective fence components along worksite • Replace or repair Defective fence components • Tighten and align fence • Place temporary fence to secure limited access if unable to complete the installation • Clean up work site • Terminate traffic control

Pavement Striping	**Description:** Localized machine striping of longitudinal markings of pavement surface. Includes paint lines and other material used for this purpose
Unit of Measure: LM **Typical Crew Size:** 5 **Typical Production:** 27 **Typical Equipment:** • PPE • Crew Trucks • Hand Tools • Hand Applicator • Paint Truck • Dump Truck with Attenuator • Variable Message Sign	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Survey roadways to be striped to determine traffic conditions, strip at times of low traffic volumes or congestion • Service equipment used in striping operations • Load material appropriate for entire day operation • Place highway striping, check equipment and striping thickness routinely to provide a finished product meeting specifications • Clean up work site and equipment • Terminate Traffic Control
Raised Pavement Markers	**Description:** Localized replacement of raised pavement markers
Unit of Measure: EA **Typical Crew Size:** 4 **Typical Production:** 120 **Typical Equipment:** • PPE • Crew Trucks • Hand Tools • Epoxy, or hot bituminous applicator • Crew Cab with Flat Bed • Truck Mounted Attenuator	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement. • Review pavement sections to determine location for placement of markers • Remove existing damaged or Defective pavement markers and clean surface as needed • Install markers in accordance with specifications for hot bituminous or epoxy • Review work site after installation to insure reflexivity and alignment of all marker • Clean up work site • Terminate Traffic Control

Graffiti Removal	**Description:** Removal (by waterblast, paint or chemicals) or unsightly markings from bridges, barrier walls, and other structures within the right-of-way. Does not include any sign work
Unit of Measure: SF **Typical Crew Size:** 2 **Typical Production:** 700 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Pressure washer • Pickup Truck • Bucket Truck	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Pressure clean graffiti areas with high pressure washer or chemicals • For obscene graffiti, cover with available paint as temporary means • Apply color matched covering over the defaced areas • Terminate traffic control
Litter Removal	**Description:** Cleaning roadways and roadside of debris, such as cans, bottles, paper and trash. Includes the hauling and disposal or litter
Unit of Measure: AC **Typical Crew Size:** 6 **Typical Production:** 105 **Typical Equipment:** • PPE • Crew trucks • Hand tools • Crew Cab • ATV	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Pick up litter and debris from roadway and roadside and place into litter bags • Place large debris and litter bags into truck • Dispose of collected litter at approved disposal site • Terminate traffic control

Mechanical Road Sweeping	**Description:** Machine sweeping of roadway to protect the facility from excessive accumulation of debris
Unit of Measure: CM **Typical Crew Size:** 2 **Typical Production:** 10 **Typical Equipment**: • PPE • Crew trucks • Hand tools • Mechanical Sweeper • Dump Truck w/ Attenuator	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Sweep in the direction of traffic flow • Utilize water for dust control • Operate street sweeper in accordance with operations manual so as to pick up dirt and debris from roadway • Confirm material is hauled to an approved dump site • Terminate traffic control
Lighting Maintenance	**Description:** Repairing of LED lighting fixtures within the Cover including circuits, pull box, electrical pads, lamps, control boards and all wiring
Unit of Measure: MH **Typical Crew Size:** 2 **Typical Production:** Varies **Typical Equipment:** • PPE • Crew trucks • Hand tools • Man lift • Panel Truck	**Procedure:** • Confirm before leaving yard that foreman or senior crew member has received FRMG training within the last 6 months in CDOT Manual of Maintenance Procedures • Technician or Technician Supervisor as appropriate (or supported by traffic control specialist Subcontractor) • CDOT M&S Standard Plans as applicable • Install appropriate traffic control devices per MUTCD, including the Colorado Supplement • Follow NEC and PA requirements for electrical repairs • Implement lock-out, tag-out where applicable • Diagnose electrical deficiency • Repair electrical deficiency • Test repaired electrical components • Clean up work site • Terminate traffic control

z. Environmental Requirements

For the purposes of the MMP FRMG have highlighted the following focused Environmental Requirements. In addition to the content of the following section, FRMG will meet the requirements of the Environmental Compliance Work Plan.

As described in Section 1.1 of Schedule 17, FRMG and this Environmental Compliance Work Plan acknowledge and accept FRMG's obligations to comply with all other Environmental Requirements applicable to the Project and the Work and delegation of the Department's obligations, commitments and responsibilities for environmental management and environmental compliance in accordance with the requirements identified in the PA and all applicable Environmental Law and Environmental Approvals.

FRMG is responsible for creating environmental awareness among all Project personnel, completing environmental tasks, implementing and monitoring mitigation, and documenting that

the environmental aspects of the Construction Work and the O&M Work are completed in accordance with the specified delegation of responsibility and all other applicable Environmental Law, Environmental Approvals and provisions of the Project Agreement. FRMG will assist the Department in implementing any and all non-delegable obligations, commitments and responsibilities regarding applicable Environmental Law and Environmental Approvals. Unless specifically noted otherwise, the requirements of Schedule 17 apply to all aspects of the Work, throughout both the Construction Period and the Operating Period.

FRMG'S Environmental Compliance Tracking Matrix (Appendix 1 of the Environmental Compliance Work Plan) directly incorporates and tracks each mitigation measure listed in Exhibit 14 of the ROD 1: Phase 1 and includes the following mitigation categories:

- Transportation
- Social and Economic Conditions
- Environmental Justice
- Land Use
- Relocations and Displacements
- Historic and Archaeological Preservation
- Paleontological Resources
- Visual Resources and Aesthetic Qualities
- Parks and Recreational Resources
- Air Quality
- Energy
- Noise
- Biological Resources
- Floodplains and Drainage/Hydrology
- Wetlands, Open Waters, and Other Waters of the U.S.
- Water Quality
- Geology and Soils
- Hazardous Materials
- Utilities
- Section 4(f) – Recreational Resources

Scope of the Environmental Activities

Typical O&M Work specific to Maintenance activities include the following scope:

- Chemical use and storage
- Solid waste management including recycling
- Landscape maintenance chemical use and storage
- Stormwater Management
- Spill Prevention, Control and Countermeasures

Chemical Use and Storage

A complete inventory of chemicals used in all operations and maintenance activities will be maintained by the O&M Manager. Chemicals will be stored in proper containers, labeled with the exact contents, and stored in appropriate containment cabinets. No hazardous materials will be stored in the Operations Center. Fuels, cleaners, refrigerants, pesticides, and herbicides will all be stored in properly labeled cabinets at secure remote locations. Containers will be placed into secondary containment large enough to hold 110% of the container volume. A Material Safety Data Sheet will be maintained in accessible locations.

At this time, all vehicles will be serviced at a local commercial service vendor.

At the writing of this draft plan, there is no anticipated chemical use that will result in disposal of hazardous waste. However, generation of cleaning, stripping, spoilage, and spillage can result in quantities of waste materials that may need to be reviewed for proper disposal.

During the job analysis and task input, the use and disposal of these types of materials will be carefully reviewed for any chemical use that may result in generation of hazardous waste. For example, any solvents used for parts cleaning, waste from sandblasting, spills from vehicles and other hazardous materials that become unusable creates waste that may be hazardous.

The O&M Manager will evaluate all chemical use and storage practices for opportunities to reduce chemical use and ensure proper handling and storage. Results of the evaluation will be used to improve procedures and improve handling and storage.

Solid Waste Management Including Recycling

The goal is to reduce solid waste to minimal quantities by carefully planning purchases of materials with disposable packaging during the procurement process, eliminating disposable products, reusing materials where feasible to obtain secondary uses, and recycling as possible.

Scrap from operations and maintenance tasks will be sorted and recycled as possible. Metals, wood, plastic, tires, and glass all will be recycled. All packaging materials will be recycled or reused. Electronic equipment and supplies will be recycled. Ink and toner cartridges, computer parts and cables, and accessories will all be recycled.

Landscape Maintenance

Landscape maintenance and management has become an important environmental component to facility management sustainability and operations. Maintenance of plants is essential to ensure line of sight, security, lighting, visual barriers, energy reduction from shade, stormwater management, and erosion reduction.

Pesticides will only be applied sparingly and by trained and licensed applicators. Storage of any herbicides and pesticides should be accomplished in properly designed and labeled cabinets not located indoors.

A landscape maintenance plan will be developed to guide FRMG's maintenance staff and landscape Subcontractors in the care and management of vegetation along the roadway and

facilities. The procedures will consist of best practices for caring and pruning plants, planting new plants, controlling invasive plants and use of any herbicides.

Waste generated from landscape activities will be removed by the landscape Subcontractor and composted or disposed as biofuel.

FRMG will take actions as necessary to control all noxious weeds throughout the Construction Period and the Operating Period. This will include implementing proactive procedures to eradicate the occurrences of List A species on the Site. FRMG will also implement proactive procedures to eliminate the occurrences of List B species in areas of the Site where the ground has been disturbed by the Work, and reduce the occurrences of List B species on the remainder of the Site.

FRMG will submit an Integrated Noxious Weed Management Plan ("INWMP") to the Department for Acceptance prior to the issuance of NTP2. The INWMP will be implemented during the Construction Period and the Operating Period and will include identification of noxious weeds in the area, weed management goals and objectives (specific to levels of disturbance), and preventive and control methods. The INWMP shall convey that List A species are eradicated throughout the Project; management of List B species may vary based on disturbance activities and Colorado Department of Agriculture and local requirements (for example, elimination of List B species in disturbed areas and management for suppression in areas with no ground disturbing activities).

The INWMP will also include a requirement for recurring noxious weed surveys. During the Construction Period the noxious weed survey shall be conducted monthly from March 1 through October 31. During the Operating Period the noxious weed survey shall be conducted three times per year spread evenly over the growing season. The Developer shall create a monthly Schedule of Planned Noxious Weed Management Activities based on the findings of the latest Noxious Weed Survey noxious weed survey that shall be submitted to the Department for Information. Please see the INWMP for further details on noxious weed management and control, reference to be added upon development of INWMP.

Stormwater Management

Stormwater, or rain that has washed over land, is responsible for the direct impairment of local streams and rivers. Removing large quantities of rainwater quickly from the roadway for safety reasons can lead to erosion problems due to concentrating water during drainage from the roadway. Typically, discharges from large public stormwater conveyance systems are controlled under a discharge permit that requires some treatment to slow down the velocity, reduce the volume, and allow sediments and pollutants to settle out of the water.

Such practices span from detention/retention to actual biological treatment with a planted wetland. These ponds, wetlands, and rain gardens collect sediment and trash and require periodic maintenance to function correctly. A maintenance schedule will be established in the MMIS for periodic maintenance of the various stormwater management assets. Periodic inspections of the assets will be conducted to ensure security at assets with standing water.

Stormwater Management Plan (SWMP)

FRMG has a responsibility for managing stormwater volume and quality that is the result of the traveling lanes and associated infrastructure's operations and maintenance. The SWMP is implemented to focus best practices on reducing pollution at the source and integrating those practices into everyday activities.

Examples of best practices for controlling stormwater quality include reducing blowing trash, sweeping up grit and debris before it enters storm drains, fixing building and vehicle coolant and oil leaks, closing trash containers, and covering all loads. Stormwater volume is best controlled by using low impact development principles to retain stormwater on-site and allow it to soak into the ground. Other strategies include reducing compaction of soils in landscaped areas, reducing pervious surfaces, reducing grassed areas in favor of landscape conservation and rain gardens, vegetated roofs, reusing rainwater for irrigation, are examples of best practices to reduce stormwater quantities.

FRMG's procedures and SWMP will be consistent and comply with all applicable regulations and permits obtained during the Construction Period including but not limited to:

- Colorado Discharge Permit System-Stormwater Construction Permit (CDPS-SCP)
- BMP
- CDOT New Development Redevelopment Program (NDRD) or Permanent Water Quality Program
- Denver MS4 Permit
- CDOT Erosion Control and Stormwater Quality Guide and the UDFCD Urban Storm Drainage Criteria Manual
- US Army Corps of Engineers Section 404 Permit for the portions of the storm drainage system that are subject to permitting under the Clean Water Act

The engineered stormwater management best practices include roadway sweeping, protecting storm drains during spills and from litter, debris, and sediment, and use of infiltration trenches and pervious pavement to allow rainfall to infiltrate where appropriate. These areas also may require more maintenance like vacuuming to function correctly.

During any soil disturbance, protective measures will be taken to control soil erosion during storm events. Use of silt fencing will be mandatory. Open soils will be covered with seed and mulch or covered with protective covers if work is ongoing. Newly established plants and grass will be maintained by watering and preventing wildlife from disturbing emerging plants.

Traffic Incident and Construction Related Spills

For traffic incident spills FRMG Developer shall comply with the CDOT Procedures for Hazardous Materials Spills that Occur on State and Federal Highways within Colorado as a Result of a Highway Transportation Incident with respect to spills resulting from vehicle traffic incident spills incidents

Renewal Work

FRMG will develop and implement an Environmental Compliance and Mitigation Training Program ("ECMTP") for FRMG's personnel, including those of Subcontractors who will enter within the Site boundaries to perform Construction Work and Renewal Work. All such personnel shall complete this training prior to performing Construction Work and any Renewal Work on the Project. In addition, IQC inspectors, IQC supervisory staff, and the IQCM shall participate in the ECMTP. The ECMTP shall cover the Environmental Requirements for the Project and train personnel to stay in compliance with the Environmental Requirements. The ECMTP shall include the following Elements:

- Water quality requirements;
- Wetlands and waters of the U.S.;
- Maintaining approved limits of disturbance;
- Tree and shrub protection;
- Avoidance and minimization of impact to waterways and stormwater conveyances;
- Seasonal work restrictions – trees, waterways, and migratory birds;
- Pumping and dewatering operations;
- Discovery of archaeological material or human remains;
- Discovery of paleontological resources;
- Hazardous Substances;
- Historic property protection requirements;
- Construction noise mitigation;
- Dust and construction emissions mitigation;
- Site general housekeeping measures;
- Concrete and asphalt waste material management;
- Spill prevention, response, and cleanup;
- Protection and access requirements for parks and maintenance of trail detours;
- Impacts and consequences for departure from approved operating procedures;
- Additional topics as needed to maintain compliance with the Environmental Requirements; and
- Responsibilities of production supervisors and inspectors in connection with environmental compliance.

Reporting

FRMG will report on the status of activities undertaken in accordance with the Environmental Requirements on a regular basis. During the Operating Period FRMG will submit an ESR quarterly for Acceptance. The ESR shall be submitted no later than 10 Working Days following the end of the reporting period. The ESR shall:

- Include the current status of compliance with the Environmental Requirements;
- Include a section devoted specifically to water quality. This section shall summarize the water quality protection activities that have occurred during the reporting period and shall include a statement certifying that the Developer is in compliance with the CDPS-SCP, CDOT's MS4 Permit, and the Construction Standards for Water Quality Control and

Erosion Control. During the period beginning with the issuance of NTP1 through the second anniversary of Final Acceptance, the certification statement shall be signed by the Environmental Manager. After the second anniversary of Final Acceptance through the end of the Operating Period, the certification statement shall be signed by the Project Manager. If the certification statement cannot be signed, a separate Corrective Action Plan shall be submitted for Approval, which will:

- Document any pertinent environmental issues and include a narrative of the compliance actions and environmental activities which have occurred during the reporting period;
- Include a summary of any stakeholder communications and Governmental Authority communications that have occurred during the reporting period;
- Include a summary that lists the plan sets and submittals which have undergone environmental cross-disciplinary review since the last ESR;
- Include dated photographs documenting environmental compliance and activities; and
- Include any other content requirements specified in Schedule 17 or other sections of the Project Agreement.

aa. Inspection Plan

The FRMG approach to inspection and testing of facility items, and the identification, classification and rectification of O&M Defects and inspection failures are proactive in correcting observed deficiencies on a routine scheduled basis. Please see **Section b. *(Inspection Work*)** above for a detailed list of inspections and frequencies.

Conformance with requirements and rectification of O&M Defects is accomplished first and foremost through training of staff. Project inspectors, management, crew supervisors, field technicians and Courtesy Patrol drivers are all trained to identify damage and deficiencies and just as importantly to understand and recognize desired levels of service. This allows management to commit dedicated resources to ensure required performance levels are met or exceeded.

Where work is subcontracted, FRMG inspection responsibilities are to assess the daily condition of the highway and determine the magnitude and qualities of repair/maintenance work needed in order to implement rectification in a timely and efficient manner complying with performance requirements.

FRMG staff is charged with highway asset condition assessment and development of work needs and quantities which is a key source of needs identification. Using FRMG's MMIS, each supervisor or designate is responsible for managing subcontracts and inspecting both Subcontractor and crew performance. The Health & Safety/Operations Superintendent will administer work orders, inspect work quality, verify material Acceptance, document contractor activities, record work progress, and generally serve as an on-site inspector to ensure Subcontractor and in-house operations adherence to standards and specifications in the rectification process.

FRMG personnel receive extensive training in CDOT generated specifications and design standards as well as applicable national standards such as MUTCD. This training gives

particular emphasis to areas of traffic services and technical components such as lighting, signing, guardrail, and pavement markings that typically have a higher failure rate during final inspection process.

This trained oversight of FRMG personnel and specialty contractors not only facilitates rectification during the Operating Period, but also during close out inspections of the Construction Period.

FRMG's routine maintenance and Courtesy Patrol crews also assist our management in conducting work needs assessments and field measurements for quantities. They work in tandem to ensure that Project performance standards are met.

Where the construction Phase is completed, it is FRMG policy to require properly documented as-built record drawings, shop drawings, manufacturers' literature, and maintenance manuals in both hard copy, PDF and database format. FRMG's MMIS maintains records of all work orders, selected resource allocation and daily inspection reports in a data base that are backed up daily. Records of as-built plans and daily inspection reports are also filed and stored at the maintenance facility and within a database for accessibility and searchable fields for future reference. Records are scanned and stored electronically annually. The database allows management to access plans queried by asset groups. This enables management to track life serviceability of assets and Project replacement cost.

bb. Best Management Practices

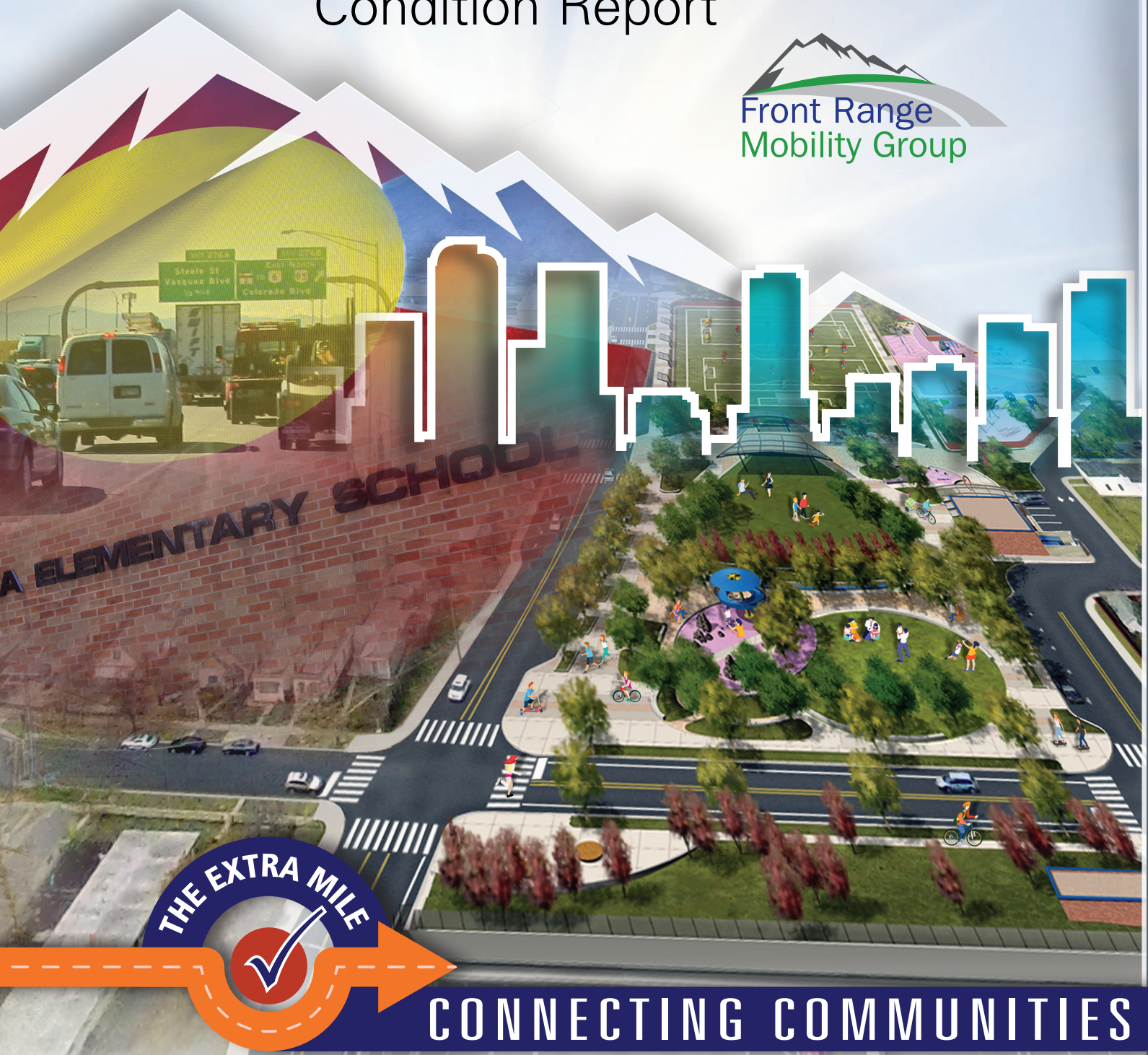
The best practices that will guide this Project are rooted in asset management principles and is derived from AASHTO and FHWA guidance, and begins with strong tracking of inventory, condition, and work. A best practice entity maintains a geographically-referenced database not only of bridges, tunnels, and ancillary structures, but also of any other assets attached to or associated with those structures. Inspections are carried out according to FHWA mandated practice (i.e. the National Bridge Inspection Standards), and each inspector records the condition of individual bridge Elements using standardized common language. The type and number of these Elements are recorded in the database as characteristics of the bridge.

Repair procedures are established over many years of field trials and by developing standard operating procedures that have not only proved to be successful, but in the effort to be efficient in operations, they were successful in limiting traffic exposure to crews.

These practices are developed by evaluating BMP's by both public and private agencies and by mining data on optimum crew sizes for optimum production. Technology innovations are continuously monitored and trialed by both the private sector but also through publicly funded studies through Transportation Research Board (TRB) and AASHTO. FRMG prides itself by remaining connected throughout the industry and keeping current on BMP's such as the NPDES through US Environmental Protection Agency publications and the American Public Works Association. We are committed to improving efficiency through our BMPs and would welcome a partnership with the Department in evolving and sharing of ideas.

Appendix A
Baseline Asset Condition Report

Front Range Mobility Group



CONNECTING COMMUNITIES

Appendix A – Baseline Asset Condition Report

FRMG will carry out inspections and tests to determine the existing condition of each Element of the Project (excluding all Elements within or forming part of the Limited O&M Work Segments) to be maintained by Developer during the Construction Period as required in Schedule 11.

FRMG will assess and describe the existing condition of all such Elements (including details such as photographs or test results, as applicable), which description and condition assessment reporting will be by reference to CDOT's Highway Level of Service Manual; at a minimum, include, but not be limited to, all such Elements listed in Appendix A-1 to Schedule 11, referencing additionally any other assessment criteria identified in Appendix A-1; and by updating the Performance and Measurement Table set out in Appendix A-1 to Schedule 11, list the target minimum baseline asset condition in accordance with which such Elements will be maintained by FRMG during the O&M Period during construction, which such target minimum baseline condition will allow for the safe and reliable operation of the existing asset and will meet or exceed the existing condition of the relevant Element, except to the extent that a target is specified for such Element in Appendix A-1 of Schedule 11, in which instance the specified target condition will be the minimum baseline asset condition.

FRMG will submit the proposed scope of the baseline inspections it intends to carry out, together with the methodology proposed and the list of qualified testing organizations in carrying out the proposed scope ("Baseline Asset Condition Inspection Plan") to, and obtain the Acceptance thereof from, the Department prior to the issuance of NTP2. Following Acceptance by the Department of the Baseline Asset Condition Inspection Plan, FRMG will provide to the Department a minimum of 10 Working Days' written notice prior to the commencement of the baseline inspections.

After carrying out the baseline inspections, FRMG will submit the BACR to, and obtain the Acceptance thereof from, the Department prior to the issuance of NTP2. The accepted BACR will be an appendix to this MMP

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Appendix B
Renewal Work Plan

Front Range
Mobility Group

CONNECTING COMMUNITIES

Appendix B – Renewal Work Plan

The approach to developing this Renewal Plan is to make determinations of Useful Life projections asset by asset. Useful life means, for an Element, the period following its first construction or installation, or following its last reconstruction, rehabilitation, restoration, renewal or replacement until the Element will next require reconstruction, rehabilitation, restoration, renewal or replacement.

The Useful Life Baseline Requirements Table is provided in Appendix B of Schedule 12 of Project Agreement. In accordance with Section 6.1.4 of Schedule 11 of the Project Agreement any updates to Useful Life baseline requirements will be submitted for approval no later than 90 days before substantial completion and thereafter 60 days before end of each Contract Year.

The Useful Life projections of the assets are based on consideration of historical deterioration rates and where applicable, (e.g. pavement) deterioration curves considering operator and agency experience in similar conditions for all other assets. Based on this approach the estimate will then apply realistic asset usage and unit costs estimations across inventory quantities at rates of renewal and replacement that will:

- When performed in conjunction with routine maintenance activities maintain compliance with Performance Requirements throughout the entire O&M Period; and
- Provide for preservation of asset conditions such that at the end of the Term Handback Requirements will be met. The same condition projections are used to program routine maintenance activity rates for purposes of compliance and optimization of total LCCs.

These Useful Life projections reflect not only the industry or manufacturer consideration of time to asset failure but more importantly the Noncompliance and Handback Requirements as a means of defining asset failure.

Renewal Work consists of maintenance, repair, reconstruction, rehabilitation, restoration, renewal or replacement of any Element of the Project of a type that is not normally included as an annually recurring cost in highway/bridge maintenance and repair budgets. The majority of these activities will involve capital expenditures during the Operating Period with some non-capital expenditure for pure maintenance activities that occur only on a periodic basis.

a. Meeting Renewal Work Requirements

FRMG will perform Annual Renewal Work Plan updates throughout the Term to reassess asset performance, preservation of asset condition, risk of future Noncompliance, and relative Residual Life remaining.

FRMG staff will analyze as part of this annual review, the Project required asset condition assessment data gathered from the inspection regimes as explained in detail in Section 1.11 and 1.14 of this document, FRMG specific asset condition assessment data, general and Specialist Inspection data including pavement inspections and NBIS bridge inspections, as well as field reviews of assets that have been conducted to determine optimization of asset specific renewal scheduling. Renewal schedule will be advanced or delayed as appropriate each year in

order to optimize asset life, while at the same time ensuring technical and Handback Requirements are met. This optimization will evolve over the O&M Period and benefit further from leveraging evolving new technologies and subsequent refined routine maintenance strategies.

No later than 60 calendar days before the end of the Contract Year, FRMG will submit to the Department for Acceptance the detailed Annual Renewal Work Schedule and the Five-Year Renewal Work Schedule that will meet all requirements of 6.3.3 of Schedule 11 and demonstrate how the Handback Requirements will be met.

The updates of this Handback Renewal Work Plan will be submitted annually with the MMP meeting all requirements of 6.1.3 of Schedule 11 (incorporating the results from FRMG annual review as described above, any updates to the Useful Life Baseline Requirements include the estimated cost and a schedule for submission to the Department in line with the requirements and schedule of Section 6.1 of Schedule 11 of Project Agreement. FRMG breaks down renewal work requirements into asset groupings as categorized the in the following sections.

Meeting Renewal Work Plan Requirements for Pavement Assets:

FRMG's Asset Management Plan for pavement renewal is founded on a sound analysis of our pavement design report and its associated life cycle analysis. FRMG's pavement asset management strategy considers the structural adequacy, smoothness and surface condition of our pavement design when estimating the future interventions and evaluates future performance meeting Handback Requirements using both structural and surface condition depreciation models. The loss of strength, surface distress, serviceability, and ride quality (IRI, rutting) is predicted and used to estimate the anticipated future interventions.

For each of the mainline roadway sections and the ramps/connectors, FRMG developed multiple pavement design options, for both new construction and reconstruction areas as well as resurfacing areas, using CDOT data, such as historical and forecasted traffic, historical pavement condition and smoothness, boring and coring data, and non-destructive deflection testing [NDT] data), as well as additional survey and testing data collected by our team. The designs were developed in accordance with the requirements of the CDOT Mechanistic-Empirical (M-E) Pavement Design Manual, and through the AASHTO-Ware Pavement ME Design software. We conducted a life cycle cost analyses (LCCAs), based on those results and other factors, we selected different pavement types for different segments of the alignment. (Refer to pavement design 2.1.7.c of technical proposal)

For flexible pavements, our preliminary loss of strength prediction models are based on the AASHTO layer coefficient reduction factors to validate that end of Term pavement structural requirements will be met. Our approach incorporates the projected degradation of the structural adequacy of pavement materials over time and not only predicts crack initiation but also crack propagation rates, rutting, potholes, weathering and raveling, roughness and considers the interdependences of structural adequacy, cracking and roughness.

In addition to our robust design stage pavement structure life cycle modeling, which provides an initial basis for our overall Asset Management Plan including maintenance and renewal Plans, our development of pavement structure life cycle asset management continues into the construction stage and ultimately throughout the Operating Period with a focus on quality control, routine maintenance activities, and observation/inspections. The timing of renewal strategies for paved sections is carefully planned.

Asphalt Concrete Flexible Pavements

For asphalt concrete flexible pavements (ACP) typical maintenance and rehabilitation activities include, but may not be limited to:

- Seal coating
- Crack filling and localized machine patching
- Partial depth repairs
- Full depth repairs
- Mill and inlay / overlays

The selection of the appropriate treatment would be based on pavement condition and the nature of the distress to be treated. Maintenance planning include common effective treatments such as seal coating, crack sealing and machine patching. A crack sealing program will be undertaken on an annual basis to minimize moisture penetration into the pavement section or subgrade. This has been proven to be an effective treatment to extend pavement life.

More extensive treatments will be considered when areas of surface deterioration are noted that could lead to accelerated pavement deterioration. This may include machine patching (mill and inlay or overlay) to address surface deterioration such as segregation/raveling. While this would be applied on an as needed basis, interim machine patching has been planned between pavement renewal cycles.

FRMG's life cycle pavement design indicates that an overlay between years 7-10 and mill and fill between years 19-23 together with deep patch repairs are required for flexible pavements. Surface machine patching will also be carried out between these intervention cycles. Frequency will be adjusted based on actual condition assessment to provide for optimization and to ensure that all Performance Requirements are met.

Rigid Pavements

Portland Cement Concrete (PCC) rigid pavements are often referred to as long life pavement. A well- designed and constructed PCC pavement will typically require a reduced level of preventative maintenance compared to ACP. A typical preventative maintenance 'toolbox' of treatments will include:

- Joint/crack sealing
- Slab stitching
- Load transfer retrofit
- Slab jacking or stabilization

- Full or partial depth slab repairs
- Local re-texturization

The selection of the appropriate treatment will be based on pavement condition and the nature of the distress to be treated. Preventative maintenance planning includes common cost-effective treatments such as joint/crack resealing and both partial and full depth repairs. A joint/crack re-seal program has shown benefits to mitigating moisture infiltration but also keeps the joint free of non-compressible material that may impede slab expansion and contraction. Non-compressible material within joints can lead to distresses such as joint spalling and slab blow ups.

More extensive preventative maintenance treatment would include patching of joint spalls and corners breaks. Both distresses can lead to reduced pavement performance. Often more extensive preventative maintenance treatments may leave the pavement surface rough. If maintenance treatments affect ride quality (as measured by IRI), local diamond grinding will be performed to rectify the situation.

Typical maintenance activities for rigid slab pavements may include crack filling and patching, partial depth repairs, full depth repairs, joint resealing, diamond grinding, and texturing.

FRMG's life cycle design modelling indicates that in the years between 8-10 and 21-24, diamond grinding, panel repairs and joint sealing activities will take place. Frequency will be adjusted based on actual condition assessment to provide for optimization and to ensure that all Performance Requirement Targets are met.

Asset Management for pavements

FRMG's Asset Management Plan including , including renewal, for pavement is based on the Project Performance Requirements as detailed in Schedule 11 and is tailored to addresses the local geotechnical conditions, FRMG's understanding of performance data related to similar, including local, infrastructure, and our collective global experience and best practices.

Our pavement strategy for the Project's existing and new roadway infrastructure will begin during the Proposal Preparation Phase in order to optimize the Project's whole-life costs (including renewal) while meeting the Performance Requirements, including Handback. Based on this optimized pavement design strategy, our pavement rehabilitation plan will continue to be developed through the Construction Period and will ultimately be realized and optimized throughout the Operating Period so that maximum Useful Life is achieved and that the performance specifications, including the Handback Requirements, are met.

In addition to our robust design stage modeling, which provides an initial basis for our maintenance and rehabilitation plans, our development of pavement asset management continues into the construction stage and ultimately throughout the Operating Period with a focus on Quality Control, routine maintenance activities, and observation and inspections. FRMG will annually survey pavement condition of the pavement assets within the O&M limits to measure all necessary criteria including ruts, cracking, faulting, skid resistance and ride quality (IRI) in accordance with the measurement and inspection methods given in Appendix A-1 and

A-2 of Schedule 11 of Project Agreement. FRMG will leverage its experience in pavement assessment and as the condition of the pavement changes, as evidenced by ongoing inspection regime warrants, adjustments will be made our Asset Management Plan and (including Renewal Work Plan) to continue to deliver an optimal strategy over time. In this way, FRMG selects the optimum time for an intervention in order to maximize life, avoid Nonconformances and optimize efficiency.

The key principle of pavement management is to provide safe, serviceable roadways that will be sustainable for future use. FRMG will schedule its maintenance and renewal activities in order to facilitate the implementation of these principles and to promote effective asset management of the pavement infrastructure. In order to efficiently and effectively manage pavement rehabilitation, FRMG will utilize a pavement management system as part of MMIS, which has been and continues to be used and validated by FRMG's team members on other similar projects. The system is based on the following fundamentals:

- An in-depth knowledge of the pavement structure
- A clear definition of measurable performance indicators based on the performance requirements
- Systematic scheduling of inspections that allow for annual updating of the pavement data
- The definition of an intervention policy as it relates to performance specifications, evolution models, and associated risks
- The definition of alternative maintenance options (such as crack sealing, milling and replacement of bituminous wearing courses, new wearing courses allowing for different mixes, overlays, etc.) and related durations and long-Term costs
- A preventative maintenance approach and strategy

The Project's pavement assets will be divided into sections that can be categorized according to parameters such as historical data, date of construction, previous renewals, accumulated traffic, future traffic, subgrade, existing pavement sections, layer thicknesses and materials, drainage considerations and functional and structural conditions.

Having categorized and coded the full extent of the roadway's alignment, FRMG will develop and implement its pavement management system as part of MMIS to consider the following inputs for each coded segment:

New construction and reconstruction details (as appropriate) include:

- Traffic data and its evolution
- Functional and structural data obtained from specialized inspections (carried out periodically)
- Detected O&M Defects and failures
- Maintenance activities
- Other inputs, such as accidents, drainage or signage problems, or any other relevant information that may be related to the pavement's performance

- Measurable condition indicators have been defined in accordance with the performance specifications as set out in the Technical Requirements (e.g. IRI, specific surface distresses, rut depth, and deflections)

The system allows monitoring the evolution of these indicators, in the different areas, in relation to the continuously updated input data (mainly real traffic and time passed since the last intervention), thus establishing behavior model analyzes, which enables performance improvements that can be achieved from maintenance and repair activities, limits and thresholds that are then used to trigger maintenance activities. Based on these models, we will be able to develop the following guideline (which also confirms our commitment to implementing continuous improvement):

- Evaluation of risks related to the required pavement performance
- Creating a plan for managing preventative maintenance and repairs between rehabilitation
- Prioritization of works, following identification of pavement conditions per section
- Routine and periodic maintenance intervention levels
- Realistic and achievable targets that address major risks and provide priorities for inspection, maintenance and repairs
- Developing an optimal work program that includes the actions needed in each area so that the pavements' structural and functional performance can meet performance requirements, including those necessary related to safety as well as to control and minimize any required periods of unavailability

FRMG's Renewal Plan will address both Construction Period and Operating Period separately. As given in Appendix A1 and A2 of Schedule 11, the performance criteria in each period differs from one another where during the Construction Period, the Renewal Work is mostly about maintaining Baseline Asset Conditions excluding ride quality (IRI) criteria.

Meeting Renewal Work Plan Requirements for Structural Assets

FRMG's approach to asset management for structures will respond to performance requirements for the Project's structures which are targeted to ensure that:

- Public and structure safety
- Structure functionality is at an acceptable level
- Structure asset consumption is limited

The scope of structures on the Project includes:

- Bridges
- Cover structure
- Major retaining walls, concrete, MSE, noise walls, fences
- Major culverts
- Sign structures and other miscellaneous structure

Given that many of the Elements within the scope of the Project's structures have a relatively long-term life cycle (i.e. greater than the Operating Period of the Project Agreement), FRMG's asset management strategy for these assets acknowledges that some degree of asset consumption is expected to occur.

It is also recognized that some components of the bridge structures, for example, have a relatively short-term life cycle and as such FRMG's asset preservation practices will need to be applied not only to meet network serviceability but also to deliver good custodianship and to limit asset consumption. The performance requirements developed specifically for structures are based upon requirements of NBIS bridge condition rating procedures, CDOT Pontis Bridge Inspection Coding Guide and AAHSTO manual for bridge inspections; performance reporting and the asset condition data obtained from our inspections of structures will provide the input to these measures.

The records as required will be in accordance with CDOT Pontis Bridge Inspection Coding Guide and AAHSTO manual for bridge evaluation.

FRMG's approach to structures asset management will focus on delivering a safe and effective operating condition throughout the Operating Period as well meeting the Handback Requirements. The structures will require preventative maintenance, standard maintenance and periodic renewal actions during the Operating Period. The structures are required to be designed for the Design Life given in PA. FRMG's maintenance and renewal program is designed to achieve the quality and standards as required.

A key element of FRMG's asset management approach for structures is the regularly scheduled and proactively managed field inspections to identify and monitor condition. Our inspection programs for structures will be prescribed and managed by a qualified and certified Structural Engineer and implemented by bridge inspectors required by NBIS and NTIS. The results of these inspections will form a basis for our renewal strategy and identify appropriate corrective maintenance activities (including the rectification of any urgent Category 1 items), preventative maintenance activities, and renewal activities, each as warranted.

Our inspection activities further discussed previously in MMP Section k. Monitoring and Maintaining and Section n. Routine Maintenance and Renewal Work will include:

- Maintenance inspections, which will focus on road user safety and structure functionality
- Detailed inspections and load rating calculations at the frequency specified in Appendix A-1 and A-2 of Schedule 11, which will provide a general assessment of condition and inform FRMG's development of our renewal strategies; additionally, NBIS inspections as per FHWA regulations, AAHSTO Bridge Management, and AAHSTO Manual for Condition Evaluation of Bridges
- Additional inspections as may be required, for example in response to a vehicle collision with a structure
- FRMG's Asset Management Plan will detail the assessment of Performance Requirements, which are based on the definitions provided in the Appendix A-1 and A-2 of Schedule 11, and based on this assessment; intervention criteria will be adopted to

reinforce our whole-life approach to asset management, with a focus on preventative rather than corrective maintenance

- Our Structures Asset Management Plan will be developed to address the intervention triggers associated with
  - Minimum condition indices
  - Limits related to the acceptable deterioration of non-critical and critical Elements (where critical Elements are those Elements that are considered critical and should not be allowed to deteriorate below a certain condition, including deck top, deck soffit, expansion joint, bearings, barriers, substructure, embankments, girders and slope protection)

FRMG's Structures Asset Management Plan will identify the type of frequency of specific testing activities related to the Project's structures, and these inspection activities will be integrated and coordinated with our Maintenance Plan and together these activities will inform any revision to our Renewal Plan.

FRMG's inspection, preventative maintenance, and condition based maintenance components of its structures asset management strategy will be managed to identify future potential deficiencies as well as existing deficiencies on an ongoing basis and where conditions warrant, these will be addressed. Examples include:

- Misalignment or deformation to steel girders caused by collision damage, overloads or other causes will be repaired
- Excessive cracking, spalling or reinforcement damage to concrete girders caused by collision damage, overloads or other causes
- Potholes in the bridge deck
- Deck joint components protruding above the riding surface and causing an uneven running surface
- Bridge and/or Cover deck water proof layer O&M Defects
- Misalignment, cracking or rupture of bridge rail or guardrail components caused by collision damage or other causes
- Bridge culverts with deformations exceeding those allowed by the Technical Requirements
- Misalignment and cracking in sign structure support components
- Risk Management for Bridge (and other major) Structures

FRMG's approach to risk management of structural assets includes probabilistic assessments of potential impacts. This approach will be included in our Structures Asset Management Plan, including the definition of investigation and testing requirements, planning and implementation of preventative maintenance strategies and the schedule of future renewal interventions. **Table 13** provides an illustrative risk assessment matrix related to Bridge Structure assets.

Table 13. Illustrative Risk Assessment Matrix.

Impact of Event	Probability of Event: Low	Probability of Event: Medium	Probability of Event: High
Low	• Groundwater Seepage	• Slope protection settlement • Local erosion • Concrete sulfate damage • Caulking failure	• Slope protection settlement • Local erosion • Concrete sulfate damage • Caulking failure
Medium Low	• Laminated neoprene bearing failure • Movement of abutments, piers, or wing walls	• Crack development in concrete Elements • ACP rutting/breakup • Pot bearing failure	• High skew expansion joint/bearing failure
Medium High	• Damage from high load/accident • Deck protection system Failure		
High	• Corrosion of concrete deck, curb, and barrier		

Inspection data will be assessed by a certified Structural Engineer for bridge inspections. The appropriate response will be outlined in our Structures Asset Management Plan, which will address safety, quality, and a life cycle approach to maintenance and renewal that responds to the Project's performance requirements and availability optimization.

If an issue is identified through an initial investigation, further inspections and condition evaluations may be warranted, for example when deterioration of structural components may affect load carrying capacity, damage is caused by impact (e.g. as a result of accident), renewal of the structure may affect its load bearing capacity, or there is an increased demand on the load bearing capacity.

The key objectives of bridge rehabilitation management are to provide safe, serviceable bridge and major structures that will be sustainable for future use. FRMG will schedule maintenance and renewal activities to meet these safety and serviceability principles while always respecting the Technical Requirements as well as FRMG quality requirements. Behavioral changes are continually taking place in bridge components, whether as a consequence of the environment, service loads or simply due to the cycle of decay. All of these highlight the importance of continual review of the condition of the bridge structures and emphasis on management of the process.

Deficiencies identified through the life of a structure can be classified as either short or long-Term in their development and include:

- Initial O&M Defects in materials or construction
- Accident damage
- Deterioration of concrete decks and barriers

- Bridge interaction with changing site conditions, such as settlement issues and adverse environmental conditions

A structural component failure or individual component breakdown can occur unexpectedly. To avoid these O&M Defects from causing chain reactions, prompt attention will be given to all O&M Defects or structural component failures observed.

FRMG will repair O&M Defects on an ongoing basis as they appear, categorizing between Category 1 and Category 2 Defects. The predictive structural rehabilitation activities that FRMG will perform over the Project's life cycle are included in **Table 14**.

Table 14. Renewal Activities over the Project's Life Cycle.

Renewal Activity (Activities Complementing Preventative Maintenance Activities)	Year(s) of Anticipated Activity
Slope protection and/or erosion repairs	As Required
Removal and replacement of bearings, if required	Year 26 - 29
Replace expansion joints (full replacement of metal components) if required	Year 26 -29
Deck Wearing Surface pavement 2-inches depth complete mill and inlay (top lift) for addressing surface deterioration	Year 15 / Year 26 - 29
Deck repair defined below and full depth ACP wearing course replacement (if required) with mill and inlay	Year 26- 29
Concrete bridge concrete deck – partial repairs (requires repair, replacement of ACP/membrane)	As Required
Concrete bridge concrete deck – full repairs (requires repair, replacement of ACP/membrane)	As Required
Major coating refurbishment extensive or complete recoat of steel structural components (in addition to touch up and partial during Term)	Year 26- 29

**Note: The schedule is subject to change based on actual condition data*

Meeting Renewal Work Plan Requirements for Drainage Assets

The Project's drainage assets that will be the subject of our Asset Management Plan will include:

- Roadway curbs and gutters
- Culverts running under the roadway and lowered section culverts
- Adjacent roadway ditches
- Ponds, stormwater basins, catch basins, inlets, riprap, filters, rock channels
- Other drainage structures such as pump stations, energy dissipaters, inlet protection, aprons

FRMG's Asset Management Plan for these Elements of the Project is important for reducing water and debris accumulation on the Project infrastructure, which will serve to increase safety and security for users as well as reducing the degradation of other related assets, such as pavement structures.

FRMG's Asset Management Plan in respect of the drainage infrastructure relies on a robust inspection plan and data collection as well as the assessment of the inspection results by a qualified engineer. As the drainage infrastructure deteriorates our intervention levels will be sequentially triggered in accordance with our asset management strategy.

FRMG's inspections of the drainage infrastructure will include:

- Maintenance inspections, which will focus on user safety and drainage infrastructure functionality
- Annual inspections, which will focus on general condition assessments which in turn will inform the development of our rehabilitation strategies
- Detailed inspections, which will focus on comprehensive condition assessment and physical non-destructive testing, where required, to further inform our rehabilitation program. Our drainage condition inspections for culverts will use the format and details consistent with those specified in the CDOT Level of Service Manual for drainage systems.

Culverts inspection will typically be conducted in spring and summer, and after storm events. Inspections will include documentation by photograph, which will support our the visual inspections related to corrosion, seam (joint) separation, distortion, pipe blockage, fill settling, cavitation of fill (sinkhole), sediment buildup within the culvert, and effectiveness of the present inlet/outlet inverts. Inlets and outlets will also be checked for signs of scour, degradation, aggradation, debris, channel blockage, diversion of flow, bank and other erosion, and flooding.

Inspections will be scheduled in accordance with the frequencies prescribed in the performance requirements and for drainage infrastructure that exhibits significant deterioration, O&M Defects or damage, inspection frequency would be increased as deemed appropriate by the qualified engineer (and in accordance with the Asset Management Plan, in consideration for potential opportunities to implement continuous improvement). A qualified engineer will assess the drainage infrastructure functionality, risk and road user risks to determine an appropriate rehabilitation strategy.

FRMG's Asset Management Plan will detail the assessment of Performance Measures, which are based on the definitions provided in the CDOT Level of Service Manual for drainage structures, and based on the assessments; intervention criteria will be adopted to reinforce our whole-life approach to asset management, with a focus on preventative rather than corrective maintenance.

Our Asset Management Plan will be developed to address the intervention triggers associated with minimum condition ratings and the potential to cause high risks to the drainage infrastructure itself, or associated/adjacent infrastructure, including related structures.

Our Asset Management Plan for drainage structures will be guided by our experience and best practices related to drainage maintenance. For example, with respect to steel culverts, it is important to clear debris, which if left unattended could contribute to deformation at the ends and/or along the barrel. In addition, while corrosion of steel culverts is typical along the barrel (i.e. between the normal and high water level) and can often simply be superficial staining, pitting and loss of cross-section may occur and inspections for these deficiencies is important as severe rusting can be a failure mode for a steel culvert. Concrete culvert inspection will seek to identify:

- Scaling, which typically results from freeze-thaw cycles
- Disintegration, which can result from continued and untreated scaling
- Erosion, which may result from ice flows or other waterborne agents (e.g. gravel, sand, etc.)
- Delamination of the surface concrete
- Spalling, which can result from continued and unattended delamination as well as overloading
- Cracking
- Other O&M Defects, including, general wear, pop-outs, stratification, deposits, etc.

Meeting Renewal Work Plan Requirements for ITS and Electro-Mechanical Assets of Cover Structure

The assets include:

- Fire Protection systems
- Electrical systems, regular and Emergency lighting
- Fire vehicle detection, alarm and Emergency way-finding systems
- Communication systems (Public Announcement, radio, telephone, CCTV)
- Power Distribution Systems
- Command Control and Monitoring Systems
- Grounding and Lightning Protection systems
- Power feeder systems, switchgears, transformers
- Ventilation systems
- Firefighting and protection systems
- ITS system components of the tunnel
- Drainage pumps

FRMG's approach to maintaining the electrical infrastructure is;

- To achieve the required levels of service and meeting the performance targets described in the MMP which will be developed based on Tunnel Operations, Maintenance, Inspection, Evaluation Manual (TOMIE), the SNTI, applicable NFPA standards and manufacturer's recommendations
- Limit the extent of asset consumption over the Operating Period

- Achieve the Design Life expectations based on industry best practices and standards of the electrical infrastructure components

FRMG's equipment assessments will include:

- Inspections and operational testing at specified intervals as described in manuals and standards in Appendix A-2 of Schedule 11
- Continuous monitoring through self-systems diagnostics and failure detection
- Rating the condition of the field components
- Programming corrections of any deficiencies
- Undertaking remedial O&M and Renewal Work as maybe required
- Inventory updating; and reporting achievements

b. Optimizing the Useful Life Baseline

The initial life cycle process is optimized first by establishing an accurate baseline of Element condition. The baseline is compared by continuous assessment of existing conditions compared to the minimum acceptable condition.

Element Useful Life is optimized through the use of preventative maintenance techniques. Preventative maintenance is work done when minimal distress is present, with the objective of preserving a good serviceability level. When preventative maintenance is no longer feasible, and corrective maintenance becomes excessively cost prohibitive, it becomes cost-effective to employ restoration strategies to ensure reliability of asset performance. As explained in detail in **Section o. *(Live Cycle Assumptions and Renewal Work*)** of this document, FRMG uses LCC analysis techniques based on a holistic asset management approach in determining the optimum timing of these various treatment strategies.

This approach treats each asset when minimal problems exist, reducing the cost of preserving a higher level of performance. This includes arrestment of deficiencies upon observation and initiating arresting activities such as sealing of asphalt pavement cracks and concrete joints as an example of preventative measure on pavements.

Accomplishing these objectives requires site specific information about the rate of change in the condition of a particular asset, and accurate prediction of when the minimum acceptable level of service will occur. FRMG establishes an asset database with a detailed analysis major asset Elements. FRMG relies on accurate depreciation calculations of various Elements, therefore the initial cost and future replacement cost is considered in each treatment decision.

For example, the FRMG pavement evaluation process will indicate when pavement is in need of extensive repair, when it is suitable for preventative maintenance, and when requiring corrective maintenance is optimally applied. It will determine when restoration is more cost-effective than continued corrective maintenance, and the optimum time for applying preventative maintenance.

c. Updating the Useful Life Baseline Requirements

FRMG submits updates to the Useful Life Baseline Requirements table to the Department for Approval no later than 90 calendar days before the anticipated Substantial Completion date, to reflect good industry practice and specific attributes of FRMG's final plan set (for example, where the final plan set incorporates a feature that is not included as a renewal Element in the Useful Life baseline requirements table given in Appendix B of Schedule 12), and thereafter no later than 60 calendar days before the end of each Contract Year.

Actual condition of each asset over time is of course a dynamic condition. Asset condition will be monitored on a continuous basis throughout the Term to assess actual progression of the life cycle deterioration of an asset and also in order to optimize routine activity levels and expenditures. These assessments provide ongoing identification of correctable deteriorations (i.e. surface corrosion, spalling, cracking etc.) that could shorten the actual Useful Life of an asset so that repairs can be promptly scheduled in order to lengthen the life cycle curve at minimal costs thus integrating them into the deterioration curve of the asset. It is imperative to intercede at the appropriate time of the deterioration curve to maximize the available service life.

FRMG develops and implements procedures for optimizing the Useful Life of each Element, describing how the replacement cycle is determined based upon initial cost; maintenance cost, reliability; obsolescence; and other relevant factors. FRMG, through experience gained during other operations term work scopes, possesses historical records of asset age vs performance over time for many assets such as lighting luminaries, sign panels, barriers, walls, fences etc. FRMG uses all available tools; as given in Section 1.11, routine maintenance inspections, pavement condition surveys, NBIS inspections, pavement management systems and bridge management systems in conjunction with MMIS to predict Useful Life deterioration curves for structure and pavement assets.

These assessments occur annually and projected treatments are updated annually to maximize Useful Life of all assets including but not limited to pavement, bridges, other structures including Cover and electrical, mechanical systems. Historical performance and Useful Life records of similar asset conditions along with current industry state of practice uses are considered in developing strategic treatments for preservation. FRMG will use the results of the inspections described in its MMP and other relevant information to determine, on an annual basis, or more frequently, the Useful Life and Residual Life of each applicable Element updating the scope of the Renewal Work Plan. For each renewal Element, FRMG provides evidence based upon actual performance and condition in service, together with appropriate operations and maintenance records that the Useful Life as set forth in the Useful Life baseline requirements table will be met or exceeded.

For each Renewal Element, FRMG will demonstrate through the final Handback Inspection report that, from the time of its last reconstruction, rehabilitation, restoration, renewal or replacement, such Element has a Useful Life that meets or exceeds its Useful Life baseline requirement.

d. Assessing the Condition of all Elements

Pavements and structures are routinely considered to be the most critical structural Elements in highway infrastructure. However, each Element asset is routinely inspected for existing condition and projected Useful Life.

Structure – Inspections

FRMG will use structural inspections to establish the baseline condition state of new and existing structures, as well as monitor deterioration of the structures due to normal use and exposure to the environmental conditions. We will use bridge inspectors trained to identify early evidence of deterioration, and to identify the causes of deterioration. Inspection reports and load rating calculations prepared at the frequency specified in Appendix A-1 and A-2 of Schedule 11 as well as NBIS inspections as per FHWA regulations at the frequency specified in FHWA regulations, AAHSTO Bridge Management and AAHSTO Manual for Condition Evaluation of Bridges (and Cover/other structures as per NBIS and NTIS) will describe the deficiencies found, identify the likely causes of deterioration, and make recommendations for maintenance and rehabilitative repairs. Early detection of deficiencies and prompt corrective action greatly reduce the LCCs associated with advanced deterioration of all structures. Bridge inspection reports will describe deficiencies found in a way that allows tracking and monitoring of progressive deterioration. Reports will also discuss the effectiveness of maintenance and repairs, and make recommendations regarding improvements or changes to the maintenance program.

Inspection reports, recommendations, and repairs will be tracked and archived within a Bridge Management System which is an integrated component of the MMIS. The system will provide a means of initiating repairs as recommended in the bridge inspection reports, tracking of the progress of repairs, and the completion of repairs. The effectiveness of repairs will be evaluated during the next inspection.

The O&M team will use the required NBIS inspections to monitor bridge conditions, budget and schedule bridge maintenance and rehabilitation, and program the bridge renewal needs. Our bridge and Cover structure inspection program will satisfy NBIS and NTIS requirements, as well as provide for the needs of bridge and Cover structure operations and maintenance, to make most efficient use of maintenance budgets, and reduce overall LCCs.

The inspection team will recommend maintenance activities that will improve the durability and reduce future repairs and maintenance, and deterioration will be monitored in order to assess and/or adjust the maintenance and rehabilitation regime as conditions dictate.

To comply with NBIS requirements, and identify deterioration and required maintenance below the waterline, our inspection team will complete underwater inspections at the initial inspection, and every five years after that, through the O&M Period.

FRMG will schedule bridge superstructure maintenance and repairs in accordance with the CDOT or FHWA. Upon observance of a critical condition, or by notification, FRMG will respond immediately to access and correct the deficiency. If immediate corrective action is not possible, FRMG will provide protection for the traveling public.

Superstructure maintenance and repairs will be performed in accordance with the Department's Standards and Specifications and current industry standards. FRMG structure crews will utilize a one-ton enclosed utility bed crew cab as their primary operational unit. These units provide exceptional utility for maintenance operations. Materials, equipment and manpower can be delivered and removed from a worksite efficiently. Crew cabs will be equipped with highway safety equipment, traffic control equipment, arrow boards, mounted lift crane, welder, generator, air compressor, powered tools and hand tools. The combination of the crew cab utility bed body with the additional equipment and materials listed above creates an exceptional platform for maintenance activities.

Assessment methodologies of non-critical structural Elements are detailed in **Section b, (*Inspection Work*)** of this document.

Pavement – Inspections

Pavement inspections will be undertaken by an independent consultant specializing in pavement condition survey inspections.

Inspections will provide a continuous or near-continuous record of Residual Life in each lane. Where the inspection method does not provide a continuous record of Residual Life, the number of valid measurements in each measurement section will be sufficient to give a statistically valid result.

Inspections will be repeatable to an agreed level of accuracy and inspection contracts will include an agreed proportion of inspections to verify accuracy.

Inspections will include automated condition distress survey, ride quality, skid resistance, rutting and faulting, and measurement of structural capacity of the pavement. FRMG uses procedures, techniques and the measuring equipment, for measurement criteria of pavement related performance requirements consistent with the CDOT Distress Manual for HMA and PCC Pavements by the National Center for Pavement Preservation, Appendix B of the Development of a Pavement Preventative Maintenance Program for the Colorado Department of Transportation, Report No. CDOT-DTD-R- 2004-17 Final Report.

The Department will also conduct a routine annual roadway condition survey as part of the Department statewide annual pavement condition data collection services. Data collected will include IRI, rutting, maximum faulting and average faulting and cracking distress.

Management of the pavement network requires a unique understanding of the environment in addition to pavement maintenance and preservation techniques. The goal of the FRMG pavement Asset Management Plan is to provide an adequate level of service to our customers, while optimizing the life cycle program interventions associated with doing so. This requires the conduct of pavement maintenance so that the defined pavement Performance Measures and Handback Requirements are met under the designed traffic volumes.

Two vital Elements must be merged in order to accomplish this objective; maintaining the condition of the pavements, and managing this work such that it can be accomplished in a

quality manner under the constraint of maintaining reliable traffic usage without service interruption.

Two general levels of maintenance are generally required to manage paved lanes; corrective and preventative. Preventative maintenance is work done when minimal distress is present, with the objective of preserving a good serviceability level. When preventative maintenance is no longer feasible, and corrective maintenance becomes excessively expensive, it is more cost-effective to employ restoration strategies. FRMG uses LCC analysis techniques in determining the optimum timing of these various treatment strategies.

Isolated sections of the pavement can be strengthened by localized repair, making them perform consistently with the rest of the pavement. Treating the entire pavement section as a rehabilitation design extends the performance life of continuous sections.

The objective of FRMG's Asset Management Plan is to operate a proactive preventative maintenance program. This approach treats the pavements when minimal problems exist, reducing the cost of preserving a higher level of performance. This includes arrestment of pavement failures upon observation and sealing of asphalt pavement cracks and concrete joints as a preventative measure.

Accomplishing these objectives requires site specific information about the rate of change in the condition of a particular pavement section, and accurate prediction of when the minimum acceptable level of service will occur. FRMG establishes a pavement management database with a detailed analysis of the pavement sections.

The FRMG pavement preservation program is targeted at correcting deficiencies, and maintaining minimum service level objectives. This two-tiered structure will result in both levels of activity going on concurrently. The correction of deficiencies will include a program to address all the indicated needs. Pavement analysis and LCCA will be used to develop the plan for conducting repairs. As discussed above, the goal will be to determine the most advantageous timing for carrying out these repairs, within the context of programmed budgets and asset feature management.

The FRMG pavement evaluation process will indicate pavement when in need of extensive repair, when suitable for preventative maintenance, and when requiring corrective maintenance. It will determine when restoration is more cost-effective than continued corrective maintenance, and the optimum time for applying preventative maintenance. LCCA is a particularly valuable tool for making decisions about when maintenance treatments remain cost-effective, or more extensive pavement restoration should be undertaken.

FRMG considers factors such as anticipated pavement treatment performance, expected contract unit price, unavailability cost and operating discount rates as the risk elements in LCCA. The use of probabilistic pavement LCCs analyzes affords the FRMG asset management team the tool needed to effectively evaluate and minimize these risks. Since costs and risks to FRMG may be different than those used by public agencies, FRMG can control its investments in pavement assets to better optimize the timing of investment in pavement preservation

activities. The bottom line, however, is to assure that the condition of the pavement sections never drops below the minimum serviceability levels required.

Pavement repairs are a priority and will be scheduled upon observation, Specialist Inspections and technical evaluations. Managers and crew supervisors will conduct daily condition needs surveys and report pavement failures immediately. The FRMG asset management team will be able to identify an appropriate repair strategy, based on the field review.

To expedite response times, optional repair strategies will be developed, together with criteria for application. This will make the repair assessment of these areas straightforward in many cases. More extensive investigation will be carried out when unique conditions indicate specific repair recommendations. Repair techniques and materials have a very significant impact on achieving successful pothole repair.

Other pothole or spall repair techniques typically require good installation techniques to produce satisfactory long-Term performance. Procedures for accomplishing this include removal of all deteriorated material, and producing sound, clean faces on the repair area for bonding. An effective tack coat or bonding agent particularly around the edge facing will greatly enhance bonding. Patch material must be well compacted if it is to perform for more than a short period of time.

Cold patch materials were developed specifically for use in inclement weather conditions. They often contain modified binders, and other additives, which may improve their performance. Several such products may be considered for use. Their use will be limited to short-Term mitigation until weather or temperature restrictions allow the use of hot mix. This repair strategy minimizes traffic disruption and lane Closures and has proven to be a reliable method.

Finally, it should be noted that the frequency of pavement deficiencies are anticipated to be minimal given the preservation and preventative strategies and regular renewal program implemented through an effective pavement management plan.

e. Industry Practices

FRMG will apply our existing good industry practices, which draw on lessons learned from numerous successful projects, as well as from our participation in industry associations such as the AASHTO, the FHWA, and the TRB, among others. FRMG stays up-to-date through literature research and participation in annual meetings (TRB, IBTTA, and AMOTIA) and our research participation with these same agencies. These practices include health, safety, quality, and environment management and maintenance approaches to achieve serviceability, reliability and availability, and to preserve asset life. However, unlike public agencies, FRMG also develops understanding of life cycle maintenance through lessons learned on our multiple P3 projects around the globe. Participation in the Project by partner companies and their support staff enable FRMG to reach a broader experience level internationally.

Maintenance Strategy and Regime Optimization: We will use our asset management based approach to optimize our maintenance strategy, ensuring the highest levels of availability, reliability, and safety. FRMG will utilize the data in the MMIS, including our asset assessments

and maintenance records, to inform our maintenance interventions and Maintenance Plan revisions.

Continual Improvement: FRMG will keep up with evolving good industry practices through our affiliations with the associations and organizations named above, and attendance at their industry conferences. Our annual plan review will investigate and incorporate new best practices, as appropriate. These improvements will be implemented through training, knowledge transfer, and new skills development.

The best practice for Renewal Work is derived from AASHTO and FHWA guidance, and begins with strong tracking of inventory, condition, and work. A best industry practice maintains a geographically-referenced database not only of bridges, tunnels, and ancillary structures, but also of any other assets. Inspections are carried out according to FHWA and other mandated practice (e.g., the National Bridge Inspection Standards).

Ultimately, condition rating metrics are used to set goals and identified deficiencies are associated with known maintenance tasks, which are prioritized procedurally using projected deterioration to minimize full LCC. FRMG will adopt as warranted the techniques and research discussed, as well as other future applicable industry standards, in annual updates of the Renewal Work Plan.

f. Selection of Suppliers and Subcontractors

Throughout the Operating Period, FRMG will use third parties to provide specialized skill sets and increase local economic benefits. The O&M Manager is responsible for Subcontractor procurement while the Maintenance Superintendent is responsible for managing Subcontractors' work.

Third parties will be pre-qualified using metrics that include their ability to provide the goods and services required within the applicable Project time frames and other key considerations such as financial strength, past performance history, bonding capacity, manpower position and availability, experience in the industry, and their quality program. In addition, a critical part of selecting Subcontractors by FRMG will be the Subcontractors being recognized DBE and or SBE businesses. The subcontracting of renewal work to DBE and or SBE businesses will form an integral part of FRMG's ongoing relationship with the local community for the Term.

Each category prescribes actions FRMG will take to control or reduce risk when working with a Subcontractor. Where possible, FRMG will select Subcontractors with a lower risk rating. When that is not possible, FRMG will work with the Subcontractors, demonstrating leadership and mentorship as detailed in the table below, until Subcontractor behavior and performance align with FRMG's expectation for a lower risk Subcontractor. Subcontractor safety documentation and statistics will be retained for future reference.

Third-party employees are required to complete all the same safety orientation programs before working on-site as FRMG employees. Before a Subcontractor's commencement of work or supplier's first supply of material, FRMG will obtain a signed agreement from the Subcontractor, original bonding certificate, insurance certificates, and safe working clearance, and will ensure

that all documents meet the requirements as outlined in the Project Agreement. FRMG will hold a kick-off meeting with each Subcontractor to discuss safety, Schedule, reporting requirements, meeting requirements, quality, invoicing, and any other site specific issues.

When possible, FRMG will carry forward local Subcontractors and personnel used during the Construction Period into the Operating Period to provide valuable insight into ongoing whole-life management.

As detailed further in Section r. of the MMP, Maintaining Spare Parts and Inventory FRMG will be using a system that is fully comprehensive in terms of tracking and logging materials information. As part of the invoice payment process signatories will be required to evaluate the Subcontractors being paid. This evaluation is input into the tracking system and can be recalled when selecting future subcontracting hires.

Subcontractors hired by FRMG will be expected to meet the same level of quality as FRMG. As part of the site and job orientation FRMG will review quality procedures with the Subcontractor to ensure they are familiar with the unique requirement of this contract. In addition, FRMG will use the same procedures as detailed in the attached Appendix D – O&M Quality Management Plan for reviewing the work of Subcontractors.

g. Staffing and Organization for Residual Life Methodology for Handback

The schedule and various activities and deliverables for Handback are shown in Table 14 above. The Handback process will start no later than 70 months prior to the Expiry Date when FRMG will submit to the Enterprises for Acceptance the Handback Schedule and the Residual Life Methodology Report as required in Schedule 12 3.2 and 3.3. Once this is Accepted by the Enterprises, the next step will be to commence the Initial Handback Inspections by an Accepted Independent Consultant to identify and establish the asset condition, Residual Life and period remaining of the Useful Life of all Elements and verify the required Handback Work. The inspection schedule will be coordinated with the Enterprises and take into account joint inspections. This will include conducting the testing required to determine the condition of Elements. The testing will be conducted under the control of the Accepted Independent Consultant.

Once that is complete the Asset Condition Report and Initial Handback Inspection Report will be prepared and submitted detailing the following:

- List of Residual Elements that meet or exceed the Target as set out in the Performance and Measurement Table in Appendix A-2 of Schedule 11 (a) at time of inspection, (b) at Expiry Date without Handback Work and (c) each asset that meets or exceeds the Residual Life Minimum Requirements at the Expiry Date without Handback Work.
- List of Elements that did not meet the Target and will require Handback Work to do so and/or to meet its Residual Life Minimum Requirement

- List of Elements that did meet the Target and/or Residual Life Minimum Requirement but will require Handback Work to achieve that status at the Expiry Date.
- Handback Work Schedule detailing all Handback Work Required, the timing and implementation strategy.

The Second and Third Handback Inspections will update the Asset Condition Report of each Element and record wherever actions have been taken such as repairs, Renewal Work and/or Handback Work to address the findings of the previous Handback Inspection Report. The Second and Third Handback Inspection Reports will provide the results of the relevant Handback Inspection(s) along with a list of repairs, Renewal Work and Handback Work undertaken subsequent to the Handback Inspection(s) plus the revised Asset Condition Report for all Elements; and revised Handback Work Schedule.

Any Handback Work necessary for any Residual Element to or exceed its Residual Life Minimum Requirement will be completed no later than 18 months prior to the Expiry Date. All other Handback Work will be completed prior to the Expiry Date. Throughout the Handback Work Period, FRMG will continue to maintain all Elements to meet the General Requirements and meet or exceed the applicable Targets.

For final set of activities, FRMG will prepare the Final Handback Inspection Report that includes the final Asset Condition Report along with a demonstration of completion of all Handback Work. Satisfactory completion of this step will result in receiving the necessary Handback Certificate from the Enterprises.

h. Achieve Handback Requirements

The initial programming, costing and developing of strategies for Handback has already taken place during the FRMG Proposal preparation phase and will continue during the detail design development Work. FRMG has completed a rigorous examination of the asset components developed from the inventory based on the reference design, including grade separation structures, drainage structures, the Cover section, pavements, ITS/electro-mechanical systems and other minor infrastructure. This inventory derived from reference design forms the basis of our Asset Management Plan that must meet asset Performance and Handback Requirements.

During the Term, FRMG's over-riding strategic goal is to ensure that work performed on assets – routine, preventative, periodic, and rehabilitative – is strategically planned to optimize efficiencies in extension of the Useful Life. From our upfront life cycle analysis, we have determined a realistic and achievable rehabilitation schedule of routine and preventative work that will ensure general and specific Handback Requirements are achieved. Throughout the Project Term, our comprehensive schedule of activities includes close monitoring of all assets which includes the specific asset history and the inputs from the inspections of the asset condition which then allows us to fine tune the routine and rehabilitation work plans and cycles.

Our team will utilize a life cycle approach in preparing the designs for the Project including structures, pavement, approach slabs and other ancillary roadway items to balance the initial cost of construction with a Project-specific regime of maintenance and rehabilitation to meet or

exceed the Handback Provisions at the end of the Agreement Term. As part of this life cycle analysis, we utilize a rehabilitation activity matrix developed based on our team's experience on similar projects. The matrix addresses procedures for monitoring, measuring, and predicting asset consumption during the Operating Period along with the appropriate strategies for maintenance and rehabilitation activities.

Actual condition of each asset over time is a dynamic condition that is monitored on a continuous basis as part of our inspection regimes to assess the actual progression of the life cycle deterioration and to optimize routine activity levels and expenditures. Annual reviews will include items such as IRI and skid resistance in pavement and NBIS bridge inspections information. These assessments provide ongoing identification of correctable deteriorations (i.e. surface corrosion, spalling, and cracking), so that repairs can be promptly scheduled at the appropriate time in order to lengthen the life cycle curve at minimal costs and maximize the available service life

As discussed above, FRMG will maintain a Renewal Plan throughout the Term. Updates to that plan will involve assessments of asset performance, best methods for preservation of asset condition, potential risk of future noncompliance, and relative Residual Life remaining. Elements of the Renewal Work Plan will be executed as appropriate each year in order to ensure Performance Requirements and, ultimately, Handback Requirements are met. The program will be adjusted periodically to account for inspection results that show variations from the assumed degradation of the asset and life expectancy. The Renewal program will also evolve over the Term and benefit from leveraging new technologies and subsequent refinement of routine maintenance strategies in a continuous process of LCC analysis.

As part of the routine reporting requirements, the Department will have visibility of asset data including condition and work conducted. At final inspection, the Department will benefit from this continuous reporting by having the knowledge of work and performance history by asset, to support the provided final plans for Handback Work. By programming the work with the life cycle needs at the forefront, the inspections required at Handback point will verify the anticipated performance and rehabilitation needs and minimize the need for unanticipated Handback Work.

i. Cost of Renewal Work

The O&M team analyzed the Project's Handback Requirements to ensure that our construction, maintenance, and renewal activities meet or exceed all Performance Requirements. Our approach to LCCA drove the constructability, durability, and maintainability of our Proposal to optimize value for the Department. The assessment of Useful Life for each asset is the primary factor in projecting renewal and replacement costs. Useful Life projections for each asset for this Project are founded on historical data, and also based on a strict and thorough adherence to routine maintenance strategies.

We will implement LCCA for making decisions about when maintenance treatments remain efficient in terms of life cycle interventions, or more extensive pavement restoration should be undertaken. We consider factors such as anticipated pavement treatment performance,

expected contract unit price and price variation of materials as the key risk elements in the LCCA. Our use of probabilistic costs analyzes affords us the tools needed to effectively evaluate and minimize these risks and adjust the rolling schedule of major repairs and replacement. The O&M team will ensure that the condition of the pavement, structures, and Cover remains above the performance levels required. Decisions made in the design process are critical to the LCCA. FRMG's approach to life cycle modelling and costing process during design, bid and operations is explained in detail in **Section o. *(Life Cycle Assumptions and Renewal Work*).**

Our O&M team will continue to provide maintenance engineering input on material durability and cost-benefit analysis through final design. We will build quality and maintainability directly into the Project to reduce future maintenance requirements, increase the design life of critical Elements and ensure that we meet the Handback Requirements.

From our life cycle analysis, we have determined a realistic and achievable renewal schedule of routine and preventative work. This comprehensive schedule of activities allows us to properly address needed maintenance activity through Handback.

Because Renewal Work typically involves specialized Subcontractors, costing of rehabilitation work is based on historical published local pricing averages wherever possible, and also considers experiential data. Our team's costing approach considers established unit rates in conjunction with ancillary costs for major interventions such as design, specialized staffing where required, mobilization and maintenance of traffic costs. Specific strategies were developed for each asset, including structures, pavement, signs, lighting, pavement markings, retaining walls and guardrail.

FRMG's Asset Management strategy with integral links to the budgeting and planning processes will facilitate monitoring and updating life cycle cost models throughout the duration of the project and will provide for efficient Routine Maintenance and Renewal processes.

j. Planned Closures

The Renewal Work that will primarily make up the planned renewal Closures are pavement surface and structural system deck wearing surface replacement works.

In accordance with Schedule 10 - Section 2 on Maintenance of Traffic Control, FRMG will design, provide and maintain safe and effective traffic control on all roadway assets that are affected by the maintenance and Renewal Work for the movement of people, goods and services through and around the Project while minimizing impacts to local residents, businesses and commuters. FRMG's Transportation Management Plan submitted prior to NTP2 and updated during the Operating Period as required will follow the requirements shown in CDOT's Work Zone Safety and Mobility Procedures Document.

FRMG will prepare a Traffic Control Plan to control traffic on the Project for performing maintenance and renewal activities. The Traffic Control Plan will conform to the requirements specified in Section 2 of Schedule 10 and the CDOT Standard Specifications.

The Closures occurring during the Operating Period will be pertinent for the purposes of FRMG performing Renewal Work in compliance with the most recently Accepted MMP and in the case of Renewal Work, the most recently Accepted Renewal Work Plan.

All lane Closures for Renewal Work of all roadway assets such as milling and filling or overlay of pavement assets or replacing wearing course on bridge decks will be performed at night within permitted lane Closure time periods as well as within lane Closure constraints as defined in Section 2 Schedule 10 without incurring any lane Closure penalties. The Renewal Work Plan will indicate work schedules ahead of time and will be communicated to the Department. Traffic control will be provided as required by utilizing lane Closure signage and other equipment per the Traffic Control Manual for Work on all roadway assets. Allowances for reduced productivity for working in confined time frames at night time will be incorporated in renewal work schedules.

Appendix C
O&M Safety Plan

Front Range
Mobility Group

CONNECTING COMMUNITIES

Appendix C – O&M Safety Plan

Occupational Safety & Health Manual

Date: May, 2017

Table of Contents

1) FRMG Safety & Health Policy

The Management of FRMG values the safety and health of our employees, our clients and the public above all other concerns. Our Project culture will exemplify Leadership in assuring the safety of our employees and operations. Safety assurance will take precedence over all other concerns on the Project.

We will plan our Work to prevent or control hazardous exposures. We will provide a safe place of employment, free from recognized hazards. We will comply with OSHA, the Department and other safety regulations applicable to our Work.

Each employee must understand that working safely is a condition of employment and is empowered to stop work immediately and notify their supervisor if they feel endangered.

Our Project success depends upon our employees working safely. We will continually improve our safety program and work practices to ensure the best level of protection. To achieve this improvement, we need the agreement and participation of each employee.

"Rarely is a hazard a simple case of one singular cause resulting in one singular effect. More frequently, many contributing factors tend to line up in a certain way to create the hazard." (OSHA)

2) OSHA Requirements

- The US Dept. of Labor (US DOL) includes the OSHA. (www.OSHA.GOV)
- OSHA makes and enforces workplace safety rules for industry. The Standards contained in OSHA CFR 1926 address safety for the construction industry.

Additional OSHA safety compliance requirements include:

- Injury recording and reporting – OSHA Log & Summary Report
  - OSHA notification is required for amputation, fatality, hospitalization
- Recordkeeping requirements for the OSHA Log and associated documents
- The OSHA Safety poster must be displayed in the workplace (Con Ex Box, truck, etc.)
- Employees may file a safety complaint directly to OSHA, via telephone or in writing or e-mail
- Whistle Blower protections are in place against employee retaliation or reprisal
- Provisions are made for translating safety materials for Spanish speaking employees
- The OSHA 10 Hour Construction Safety Course is available in English and Spanish for FRMG employees
- Maintenance of safety meetings, health exposure date and safety training records is required
- Progressive and fair disciplinary measures will be used when necessary to ensure employee compliance with OSHA regulations

FRMG requires that as a condition of employment all applicable OSHA safety regulations must be followed by our employees at all times.

We will continually upgrade our safety training and operational support for employee safety. We need each employee to fully engage these safety requirements and to ask questions or bring to our attention any situation or condition arising on the job which they believe may adversely affect their safety. Each employee is empowered to immediately STOP their work and seek guidance from management if they are in a compromised safety situation. They will not be the subject of retaliation for bringing to light safety issues.

3) Employee Safety Conduct Policy

OBJECTIVE:

To ensure orderly operations and provide the best possible work environment, FRMG expects each employee to understand and follow basic rules of safety and conduct intended to protect their safety and the interests of our organization. Because our Project is user and safety oriented, each employee is a representative of our Project.

General Conduct & Behavior

We expect each employee to use **good judgement and responsible conduct** when on the job.

The following are examples of the general rules of conduct, violations of which may result in disciplinary action, up to and including termination of employment. Because there are many different circumstances of conduct, the list is representative and not all inclusive.

Prohibited Workplace Behavior:

- Theft, conversion or unauthorized removal or possession of Project, Department or User property; other criminal activity.
- Working under the influence of alcohol or illegal drugs. The possession, distribution, sale, transfer or use of alcohol or illegal drugs in the workplace, while on duty or while operating Project vehicles or equipment.
- If an employee is taking prescription medication for any reason, they must inform their supervisor if could affect their ability to operate machinery or drive a vehicle.
- Fighting or threatening violence, use of inappropriate language or gestures in the workplace
- Verbal or physical abuse of co-workers, the Department or the public
- Insubordination of management, failure to follow instructions from supervision
- Failure to follow safety rules and practices, i.e. not using personal protection equipment (PPE)
- Other inappropriate behavior on the job or in public
- Sexual or other unlawful or unwelcome harassment
- Possession of dangerous or unauthorized materials, such as fireworks, explosives or firearms or weapons in the workplace.
- Unauthorized use of Project phones, mail system, or other Project equipment.
- Failure to report an injury, accident, incident or near miss
- Improper or unauthorized use of Project vehicle
- Unauthorized disclosure of Project business, secret or confidential information.
- Improper use of Project credit or debit card; unauthorized use of Project funds or resources;

- Other conduct causing a disruption in the workplace or to our Project or adverse impact on our stakeholders.

Safety Meetings:

- A weekly safety meeting (Tool Box Talk) will be held to review the work plan. Employees are required to be present and participate in the meeting to review and discuss the safety aspects of their individual and collective assignments.
- This will include things such as PPE, tools, power sources, materials and safety characteristics, fall protection, equipment use, etc.
- Periodic Safety Meetings –will be held to review additional Elements such as OSHA and customer safety requirements.
- Ask questions, make comments, participate and engage in the discussion. This is YOUR safety program.
- Safety training and refresher training may be included in these meetings. FRMG is accountable for providing this training and YOU are responsible for compliance.

Early Return to Work Policy

Our Safety Program is structured to provide a safe work environment and prevent accidents of all types. We need every employee to be safety conscious and engaged toward working and driving safely at all times.

In the event an employee is injured on the job and is placed out of work by a doctor, FRMG will attempt to make arrangements for the employee to return to employment in whatever capacity is medically appropriate, usually in the form of 'Light Duty' or other limitation. This temporary arrangement is to allow recovery and continue your wages and benefits. If our job classification permits, we will try to make the accommodation.

The employee should ask their doctor to specify the medically required work restrictions and capacities, such as no lifting over a specified weight, or no climbing of stairs or ladders. This information should be in writing on a medical note with a limited time-frame.

We will try to make a reasonable accommodation for the physical restriction to allow the employee to return to work in a wage earning capacity and maintain their benefits status. We will work together with the employee and our Workers Compensation Insurance Company to provide a fair wage replacement until you can return to full employment.

Please consult with your supervisor for guidance if you are in this situation.

Near Miss & Close Call Reporting

A Near Miss is considered to be a reportable occurrence. A Near Miss is an unplanned event that did not result in injury, illness, or damage – but had the potential to do so. We will investigate the incident and make a determination what could be done differently to avoid this from recurring. A very small difference in the sequence of events can result in an accident.

We will not penalize an employee for reporting a Close Call. We need to know the circumstance in order to take avoidance measures. Please communicate any Close Call events to your supervisor.

On The Job Training (OJT)

FRMG will provide a Safety Orientation to new employees, supplemented with hands-on instruction on proper work practices and methods. During this training time employees must be supervised closely for the following exposures:

- Use of proper PPE including high visibility apparel for the Project as appropriate
- General ergonomic principles and correct posture when lifting
- Following all applicable safety instructions for the specific task
- Proper use of hand and power tools
- Hand & finger injury prevention
- Slip & fall prevention
- How to hook up and route air lines and power cords, electrical safety
- Use of fall protection – harness and lanyard, etc.
- Safety practices for elevating work platforms, aerial lifts, etc.
- Safe use of staging, ladders, scaffolding
- Hazard Communication Program
    - Proper industrial hygiene practice
    - Safe use of chemicals, Safety Data Sheets (SDS's), Pictograms
- Good housekeeping on the Project
- Defensive driving/backing/parking – on Interstate highways, in and around work Zones
- Incident Response – Basic safety practices
- Traffic control principles; upstream warnings, etc.
- Basic hazard recognition and avoidance – what to look for, how to prevent incidents
- Attendance at safety meetings
- Other safety information depending on the nature and location of work

Drug & Alcohol Testing – Employee Agreement

I understand and agree that the results of drug and alcohol tests may be used for employment decisions or continuity of employment with the FRMG Project.

I authorize the laboratory or medical clinic to release my results to FRMG Inc., including supervisory or managerial persons, our Human Resource manager and our insurance company.

I agree to hold FRMG Inc., its agents, Officers and employees harmless from and waive all existing and future claims for any and all liability (including negligence) arising in connection with drug and alcohol testing, test results disclosure and reporting.

Agreed To:_____ Date:_____

Witness:_____ Date:_____

Refused:_____ Date:_____

Witness:_____ Date: _____

Acuerdo Pruebas de Drogas y Alcohol

Entiendo y acepto que los resultados de las pruebas de información de las pruebas de drogas y alcohol y otros tratamientos médicos de interés o pueden ser utilizados para decisiones laborales o la continuidad del empleo con FRMG
Por la presente autorizo el laboratorio o clínica médica para liberar mis resultados de Estructuras FRMG Inc., incluyendo la supervisión o administración personas, el gerente de Recursos Humanos y nuestra compañía de seguros.

Estoy de acuerdo en mantener FRMG Inc., sus agentes, oficiales y empleados de y renuncian a toda reclamación existentes y futuras de cualquier y toda responsabilidad (incluyendo negligencia) que surja en relación con las drogas y pruebas de alcohol, resultados de las pruebas de divulgación e información.

Firma: Dato:
Testigo:

On The Job- Safety Training

FRMG will provide qualified safety training to our employees where applicable, in accordance with OSHA and other requirements as well as Department and construction industry practices.

The main elements in each category of training will focus on specific hazard identification and control, through the use of engineering, administrative measures and use of PPE.

Oral, written and practical tests may be done to confirm employee retention of the key learning concepts.

Training may be a combination of classroom based and hands-on, job site or simulated exercise. Supervision will closely monitor OJT for new employees.

The primary set of employee safety training may include the following:

- New Hire Safety Orientation
- OSHA 10 Hour Construction Safety Course
- PPE
- Work Zone Traffic Control in accordance with CDOT
- Fall Protection, issuance of personal harness
- Hazard Communication/Globally Harmonized Standard
- Electrical safety – overhead, underground, energized conductors, clearances
- Fire safety – proper use of an extinguisher
- Lock Out/Tag Out – Machine & Process Safeguarding
- Rotary cut off and chop saws, chain saw, angle grinder, abrasive and cutting tools, jack hammers, etc. – pneumatic, gasoline & electric
- Manual materials handling practices – safety lifting, back injury prevention, ergonomics
- Basic Industrial Hygiene Practices
    - Close Fitting Respirator Certification when applicable
    - First Aid/CPR/Blood Borne Pathogen Awareness
- Equipment Operator Certification, as applicable to job site
- Scaffold and staging, ladder competency – install, inspect, maintain, disassemble
- Backing Safety
- Other training as required by hazard exposure

A competent person will evaluate and inspect designated work areas for potential hazards in advance of starting work. We will use JHA (See Appendix 1 section on JHA) and other tools to determine:

1. Hazard identification and employee exposure
2. Injury severity potential
3. Likelihood of an accident
4. Protective measures – including the need for safety training, engineering controls, PPE, safety hardware, access to the work area (i.e. aerial lifts), etc.
5. Other relevant factors in assuring a safe workplace.

The relative level of training detail will be matched to the level of hazard.

Safety training records will be maintained for all courses, including a description of the source material and content, employee name and training date, expiration or refresher date and instructor name. We will issue a certificate or card or other credential to the employee.

Competent Person Designation

A sample **Letter of Competency** is included in the Appendix. In certain cases we will designate an employee as a competent person for safety monitoring and assurance on topics such as:

- Fall Protection
- Trench & Excavations
- Scaffolding, Staging, Ladders
- Aerial Lifts

A letter and certificate will be presented to the employee upon completion of training and job practice skills confirming they possess sufficient ability to control a work site for these risk factors. This designation is an important measure of trust and confidence in an employee's ability.

OSHA and our client requires having Competent Persons on certain work sites for specific activity. If you are designated as a competent person, we are basically counting on you to fulfil the responsibility described and protect the employees on the site.

SAFETY DISCIPLINE – A Three Step System

Our employees are conscientious, safety-minded and dedicated. We understand there may be an occasional mistake or omission resulting in a deviance from accepted safety practice.

We will respond to each situation in an appropriate manner. If there are repeat, willful or serious violations, the following disciplinary policy is in effect to address correcting on the job employee safety behavior.

- First violation: Safe Work Practices Counseling and or Verbal Warning
- Second Violation: Written warning; suspension without pay; safety retraining
- Third violation: Immediate suspension pending further investigation. Possible termination of employment

FRMG will permanently retain records of disciplinary action and safety retraining.

Emergency First Aid & CPR

Employees will periodically be enrolled in first aid classes for their initial and refresher training. Certification Cards will be issued.

- First Aid kits will be located on our jobs and in our vehicles.
- Only persons who have received training should use the first aid kits.
- A record of any first aid incident must be made by the job supervisor and the kit replenished for any used materials.
- In cases of severe injury – such as heavy bleeding, head or vital organ injury or loss of consciousness, you must call 911 immediately.
- When making a 911 emergency call for assistance from a work zone, be aware that your location may not be readily apparent to first responders.
    - Be specific and clarify your location. Have a co-worker or Spotter or other person look for the Emergency Medical Services (EMS) people and guide them to the scene.
    - Mistaken response is common. Stop the work activity to minimize distractions and allow for an orderly response to the emergency.

Blood Borne Pathogen Awareness – Universal Precautions

As part of your first aid training, you will learn about blood borne pathogens (BBP). Certain exposure to blood or other bodily fluid can carry diseases such as HIV (AIDS) and Hepatitis.

You must use proper PPE to protect yourself from exposure to another person's bodily fluids at all times on the job and during first aid treatment.

Potential BBP Exposures:

- Applying bandage to another person. Giving CPR to another person
- Sanitary Sewer work
- Drain cleaning or repair
- Litter pick-up - be alert for used needles, particularly around homeless encampments

- Other items or objects with the potential for human bodily fluid contact: used diapers, bloody bandages or gauze, feminine hygiene items, articles of clothing, blankets, oral care debris (toothbrush, etc.), vomit, mucous, spit, urine, excrement, etc.

When needed, we will offer employees the opportunity to have vaccinations against Hepatitis C. Normally our work does not contain exposures to require this.

- Protective materials for avoiding contact with human bodily fluids are contained inside our first aid kits. Gloves, mouth piece, eye protection, sanitizer, and other materials should be used to protect yourself from contact.
- Report all instances of first aid treatment. Report to your supervisor if you have or think you have been exposed to blood or bodily fluids.
- The first aid kits are placed on our jobs in case you must give treatment to yourself or another FRMG employee. They are not intended to treat the public, or any other person not with our Project.

At all times, act within the limits of your training. Do not attempt to do something you are not trained for, since this could cause you to become injured and possibly make the situation worse. In most of our job locations we are within minutes of 911 EMS responders. THINK before you try to do something dangerous. Our insurance program will ask the question in the event there needs to be a claim filed.

Zika Virus Awareness

OSHA / NIOSH has issued an advisory regarding the Zika virus, which is transmitted by certain types of mosquitoes. Employees must be alert for mosquito exposure and when noted or thought to be present, take protective measures, such as:

- Wear long sleeve garments, with full trousers.
- Use a repellant such as DEET or OFF.
- When possible, remove or passivate mosquito breeding areas from work areas, such as standing water, discarded tires, anything that can hold water will be a breeding area for mosquitoes.

More information on Zika:

https://www.osha.gov/zika/index.html

Emergency Response - Emergency Action Plan (EAP)

In the event of a serious accident, this procedure will be followed.

- EMS or law enforcement will be notified via 911
- Supervisor on the job will contact their next level of reporting
    - Supervisor will begin a preliminary incident investigation
- Supervisor of Project Manager will notify the employee's family of the circumstance
- Project Manager will notify the Department as required by the Project Agreement
- Supervisor or Project Manager will accompany the injured person to clinic or Emergency Room
- Depending on severity, a report will be made to Workers Compensation insurance
- Arrangements will be coordinated for follow-up medical needs, transportation, paperwork, other details as needed
- Investigation report will be finalized and communicated.

In the event of a serious accident or incident involving an employee or any other aspect of FRMG business, employees must follow this Chain of Command reporting structure.

Your job supervisor must be notified of the occurrence immediately – face to face or via cell phone

- Provide details of the incident as they are known to you. Provide your follow-up contact information.
- Cooperate with law enforcement or EMS. Begin recording the facts surrounding the event immediately.
- Use the Incident Report form as per the Incident Management Plan
- Do not rely on EMS to make a report. EMS does do not disclose their reports for medical privacy reasons.

Typical Emergency Situations:

- Extreme weather/ natural disaster i.e. tornado, violent storm
- Criminal, i.e. Road rage, robbery, hold up, mugging, Active Shooter
- Accidental – work or personal related, i.e. fall from height
- Fire or explosion; gas main blow up, other large scale event
- On the job accident – amputation, hospitalization, fatality
- Motor vehicle accident involving FRMG and/or third-party or pedestrian
- Traffic – Work zone accident
- We will typically have advance notice of a severe weather event such as a tornado or heavy rain. This will give us time to prepare, primarily by securing out

work areas, covering or protecting equipment and making other appropriate precautions.

Violence in the Workplace

- Incidents of gun or weapon related violence are increasing. In the event of an incident in or near our work areas, the following sequence is recommended by the US Dept. Homeland Security:

1) Run – to a safe place away from the incident
2) Hide – in a concealed/ protected place
3) Fight Back – using any means available

In an active shooter situation it is difficult to predict what a reasonable course of action will be. Try to protect yourself and others in whichever means is available to you.

4) Hazard Communication Program

Globally Harmonized Standard (GHS)

OSHA 1910.1200

OSHA 1926 Construction

https://www.osha.gov/dsg/hazcom/index.html

OSHA® DATOS RÁPIDOS

Pictograma para la norma sobre la comunicación de peligros

A partir del 1.° de junio de 2015, la norma de comunicación de peligros (HCS, por sus siglas en inglés) exigirá pictogramas en las etiquetas para advertir a los usuarios de los peligros químicos a los que puedan estar expuestos. Cada pictograma representa un peligro definido y consiste en un símbolo sobre un fondo blanco enmarcado con un borde rojo. La clasificación del peligro químico determina el pictograma que muestra la etiqueta.

Pictogramas y peligros según la HCS

Peligro para la salud	Llama	Signo de exclamación
• Carcinógeno • Mutagenicidad • Toxicidad para la reproducción • Sensibilización respiratoria • Toxicidad específica de órganos diana • Peligro por aspiración	• Inflamables • Pirofóricos • Calentamiento espontáneo • Desprenden gases inflamables • Reaccionan espontáneamente (autorreactivas) • Peróxidos orgánicos	• Irritante (piel y ojos) • Sensibilizador cutáneo • Toxicidad aguda (dañino) • Efecto narcótico • Irritante de vías respiratorias • Peligros para la capa de ozono (no obligatorio)
Botella de gas	**Corrosión**	**Bomba explotando**
• Gases a presión	• Corrosión o quemaduras cutáneas • Lesion ocular • Corrosivo para los metales	• Explosivos • Reaccionan espontáneamente (autorreactivas) • Peróxidos orgánicos
Llama sobre círculo	**Medio ambiente** (No obligatorio)	**Calavera y tibias cruzadas**
• Comburentes	• Toxicidad acuática	• Toxicidad aguda (mortal o tóxica)

Para más información:
OSHA® Administración de Seguridad y Salud Ocupacional
Departamento de Trabajo de los EE. UU.
www.osha.gov (800) 321-OSHA (6742)

OSHA® QUICK CARD™

Hazard Communication Standard Pictogram

As of June 1, 2015, the Hazard Communication Standard (HCS) will require pictograms on labels to alert users of the chemical hazards to which they may be exposed. Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard(s). The pictogram on the label is determined by the chemical hazard classification.

HCS Pictograms and Hazards

Health Hazard	Flame	Exclamation Mark
• Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	• Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	• Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder	**Corrosion**	**Exploding Bomb**
• Gases Under Pressure	• Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	• Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle	**Environment** (Non-Mandatory)	**Skull and Crossbones**
• Oxidizers	• Aquatic Toxicity	• Acute Toxicity (fatal or toxic)

For more information:
OSHA® Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

OSHA 3491-02 2012

Safety or Chemical EMERGENCY: Call 911

Determine who your local 911 EMS service will be in advance whenever possible. Be aware that your location may not always be easy to find. Confirm in advance with local EMS so they know where you are in event of an accident.

ALWAYS check your SDS for specific Emergency Information.

Haz Com/GHS Intro & Policy

Tutorial and Written Program

- Review the text of OSHA Haz Com /GHS Standard www.osha.gov
- GHS Pictorials – As explained during employee Safety Orientation & Refresher
- Review the Basic IH Tutorial
- SDS's: will be obtained at time of product purchase.
    - They can also be obtained on-line from vendor or suppliers website.
    - If a Data Sheet is MISSING from the library, DO NOT USE THE PRODUCT until we obtain a SDS.
- Periodically review the SDS library to ensure we are using the latest version of the SDS. They are periodically updated.

Additional Training & Safety Program Measures

- The **Primary Routes of Chemical Exposure** are Inhalation, Ingestion, and Absorption.
- The correct type of PPE for each chemical is described on the SDS.
- Be aware of physical hazards of certain materials, specifically - compressed air and hydraulic oil under pressure.
- A JHA will include the name of whatever chemical we will use and the required PPE.
- Be aware of the hazards of Non-Routine Tasks, such as cutting into tanks, pipelines or other containers.
- ALL containers including pipelines and tanks MUST be clearly marked with contents, even though it may be obvious (i.e. water tanks must be marked as 'Non-Potable Water'). Pipelines and other underground utilities need to be marked out and protected. Be sure the Miss Utility/Dig Safe permits are up-to-date.

Haz Com Tutorial – Basic Principles

- Wear your Proper PPE at all times on the job.
- Wear your gloves. Fluid leaks around hydraulic lines can penetrate your skin and cause serious harm.
- Review the SDS for any material you will use for the first time. Read the sections on Emergency first aid, Firefighting and spill clean-up.
- Remember your basic fire chemistry: NEVER throw water on a burning liquid. This will cause it to spread. Use dry chemical or foam or CO2 to extinguish a fire.
- Make sure you read the label and understand the PICTORGAM associated with the material you are using.
- Make sure your work area is not cluttered with stray orphan containers of random chemicals. An SDS must be on hand for all these chemicals. Keep on hand only what you need for the job.
- Plan ahead and be sure the data sheet is on hand for whatever you will be using.
- Study these pictograms – we discussed these in your training. Understand what they mean.
- Ask your supervisor if there are any questions.

General Safety Practice for Haz Com

- Use a rag to wipe down lines and hoses or pressure wash and inspect visually. No bare hands.
- Wear your safety glasses. They protect against a wide range of eye hazards such as liquid splash or sloshing. Avoid using tinted lenses for close up work on indoors.
- Use the proper container and a funnel or spout to pour liquids. Avoid overfilling reservoirs. Leave room for fluid expansion.
- Clean up spills immediately. Use absorbent materials to catch overflow. Oil film will attract dirt. Keep it clean.
- Wipe or wash off fuel reservoir filler caps before opening. This prevents dirt on the cap from going into the reservoir, which can cause early part failure.
- Check for fluid compatibility. For example, do not add COLD water or fluid to a HOT system. It can react and blow back on to you.

- When handling or pouring ACIDS, such as battery electrolyte, always pour the STRONGER solution INTO THE WEAKER solution. This helps prevent BLOWBACK by diluting the mixture. Wear PPE.
- All containers must be properly labeled. In the shop, the storeroom and on your truck. Pictograms must be present on containers and SDS's.
- Keep containers of chemicals and substances Covered securely at all times. This prevents evaporation and limits vapors.
- Use the original container when possible and avoid transfer of contents.
- If transfer to a smaller container must be done, be sure the new container is properly labeled with new contents. Use a marker to write on the new container.
- Be alert when handling flammable liquids. Sparks from static electricity or adjacent hot work operations can ruin your day very quickly.
- Do not fill a gasoline can on board a vehicle. Place it on the ground to discharge static electricity, or use a ground strap.
- Keep a fire extinguisher handy when working around highly flammable materials such as gasoline or thinner or ether.
- Make sure you know where the first aid Kit and Water Gel Burn Blanket is located.
- NEVER aim a compressed air hose at another person or use an open air line to clean the shop or yourself or a machine. You could be injured, or hurt a co-worker.
- Respect the physics of compressed air. It has caused many serious injuries and the occasional fatality by being misused.
- Use a REDUCER on the airline to less than 30 LBS pressure if you must use air for cleaning.

- Be alert for blowback when using compressed air, sand blasting or any other tool or process that can ricochet material back at you. Avoid standing directly behind the nozzle. Wear PPE.
- Use disposable coveralls and gloves to avoid becoming contaminated with whatever you are working with. Such as epoxy, greasy parts, sloshing liquids, etc.
- Hand and finger injuries are common. They are all preventable.
- Use a tool to do the probing, such as poking in a blind hole or tight space, reaching into a tool box or inside an engine compartment.
- Wear gloves to protect your skin and also give you a better grip on tools and parts.
- REMOVE RINGS and jewelry, tie back long hair, remove any loose clothing such as scarves, head bands, bandanas, etc. NO BLING belongs on the job, it is not a fashion show.
- Use the right tool for the job, such as when trying to pour or transfer a chemical. Use a funnel or other means to contain the material. Avoid spillage.

Hazards of Non-Routine Tasks

- Examples:
- Refueling from tanks or transfer cans of any size, such as if a machine runs out of gas; using starting fluid – (ether is highly flammable)
- One-time jobs, such as field repairs, mechanical work on pumps, painting, other incidental use of a chemical
- Jump starting vehicles (battery acid and vapor exposure, electrical hook up, etc.)
- Trouble- shooting equipment – Use proper Lockout/Target (LOTO) methods to de- energize.

Contractors & Subcontractors

- Any person bringing a designated substance on to our work site must provide safety equipment in accordance with the SDS for the product, such as fire extinguisher, first aid gear, eye wash, PPE, clean up materials, proper labeling of all containers, proper storage and handling and disposal arrangements

- We will inform Contractors of the designate substance that are being used, in accordance with this plan or client requirements.

Inventory List of Designated Substances on FRMG Job Site

1) Diesel Fuel
2) Gasoline
3) Hydraulic Oil
4) List other chemicals …

Safety Data Sheets (SDS)

- Ansul Sentry ABC Fire Extinguisher Agent
  - http://www.afpnj.com/admin/files/Ansul_ABC_Dry_Chemical_New_Extinguisher_2011_04_13.pdf

- PB Blaster
  - Penetrant Catalyst
  - http://blastercorp.com/images/sds/PB-Penetrating-Catalyst-Aerosol-OSHA-GHS-SDS-2015-06-03.pdf

- WD 40 Company
  - www.wd40company.com/files/pdf/CPSC_vs_OSHA_GHS_Labeling_Q_and_A.pdf

- Diesel Fuel- on & off road
  - http://www.marathonpetroleum.com/brand/content/documents/mpc/sds/0291MAR019.pdf
- Unleaded Ethanol Gasoline – Multiple sources, (Marathon Spec.) grades
  - http://www.marathonpetroleum.com/brand/content/documents/mpc/sds/0130MAR019.pdf
  - Link to all Marathon SDS's
  - http://www.marathonpetroleum.com/brand/Products/SDS/

- Sand & Gravel- Diatomaceous Earth – (Silica)
  - https://www.vulcanmaterials.com/docs/default-source/msds/3239-003-(natural-sand-and-gravel).pdf

Consumables:

- Carbon Monoxide – engine exhaust – this is a by-product of gasoline fueled internal combustion engines:
  - https://www.airgas.com/msds/001014.pdf

- NEVER run a gasoline engine inside of or near a confined space. Carbon Monoxide is an odorless gas that can asphyxiate you very suddenly.

Chemical EMERGENCY: Call 911

Determine who your local 911 EMS service will be in advance whenever possible. Be aware that your location may not always be easy to find. Confirm in advance with local EMS so they know where you are in event of an accident.

Make sure you have cell phone coverage in your job location OR make alternate plans for communication to 911/ EMS

Basic first aid for chemical exposures

Eye Rinse – Hold eye open and squirt a stream into the eye. Keep it up. If a fixed station eye wash is available, use it as needed.

Poisoning Instructions: Read the SDS for Instructions on Accidental Ingestion.

- Some materials if ingested need to have forced vomiting to expel.
- Some poisons can be tolerated in the stomach by ingesting the antidote, such as a pacifying agent such as lime/chalk/milk of magnesia or other pacifier.
- Keep a bottle of **Activated Charcoal** on hand in the first aid Kit. This is used in some cases of poisoning – check the SDS for specific information.

Summary: FRMG will keep this list up-to-date using Best Available Technology and good inventory management practices.

We will advise our employees and vendors and Subcontractors of our policy regarding the Hazard Communication Program and GHS requirements. We will control what is brought on to our projects in accordance with sound safety management practices.

Our goal is to protect the health and safety of our employees by providing a workplace free from recognized hazards, in this case, the exposure to chemicals and substances.

For more information, contact the FRMG Safety Representative:

5) Fire Prevention, Use of Extinguishers

Job sites will be maintained in a state of good housekeeping at all times. This includes preventing the buildup on large amounts of combustible materials, such as empty paper bags, pallets, lumber, paper and other materials that can catch fire and burn.

Fire Extinguishers will be located in strategic areas on the job site, to minimize time needed to reach one. They will be located on our Project vehicles, pieces of equipment having a gasoline or other fuel tank.

Extinguishers will be inspected at least monthly and placed in visible locations for fast access. Discharged extinguishers will be replaced immediately. Spares will be kept in our tool inventory.

Employees will receive instruction on how to properly use the extinguisher

Water Gel fire blankets will be kept with first aid kits

Hot Work

We do not often perform hot work, but if we do, the following will apply:

- A Fire Watch with extinguisher will be stationed to monitor the hot work
- Area will be cleared of combustibles
- Wetted down in advance or protected
- Extinguishers will be on hand, or a hose
- Sparks or slag will be captured as best as possible
- Hot Work includes welding, torch cutting or heating; use of abrasive wheels, etc.
- Use caution when wearing insulated coveralls while doing hot work.

6) PPE

Employees will receive instruction on the selection, use, care and maintenance of all forms of PPE. It will be issued to the individual at time of hire.

Hazard Recognition – employees will receive instruction on how to recognize hazards in the workplace. These may include hazards from use of hand and power tools, materials such as chemicals, coatings and lubricants. When alternate measures such as engineering controls are not practical, selection of approved types of PPE will be made.

Hierarchy of Controls: forms of hazard control: Engineering – Administrative – PPE

FRMG will attempt to engineer the hazard out of existence whenever possible. Because of the highly mobile nature of our work, this may not always be possible, but we will look for ways to improve protection.

We will use administrative measures when possible to minimize or lessen the exposure to an identified hazard, including methods such as training and educations, warning signs and barricades, job rotation to minimize exposures, and other methods.

PPE will be used as a last line of defense against identified hazards.

General Provisions for PPE:

- Personal clothing must be suitable for the job.
- Excessive wear or soiled personal garments are not acceptable.
- Long hair, dangling jewelry, excessively loose clothing, finger or nose rings, ear or facial jewelry, and other forms of cosmetic effects are generally not permitted.
    - These elements can create a safety hazard, such as entanglement, snag hazard, electrocution risk, and other avoidable exposures.
    - Job foremen will be alert for these elements and employees may receive a warning and be sent home for the day without pay or until the personal hazard is removed.
- All PPE will be ANSI approved
- No home-made or improvised or non-approved PPE is permitted on the job.
    - For example, sun glasses purchased at the Dollar Store do not meet the ANSI standard for impact protection.
- PPE must be maintained in a sanitary state at all times. Wash out your hard hat periodically.
- PPE must be inspected by the user before each use.
- Store PPE in a clean container, such as the original bag or box it came in.
- Protect the PPE from direct sunlight when not in actual use. UV light can accelerate degradation of synthetic materials, such as a hard hat.

Primary Types of PPE

- **High Visibility Apparel**
    - Class III ANSI Approved Upper Body Coverings (Vests) are required for general daily use on a job site, both in and outside of a machine cab.
    - Class E (Full Body) is **required for night work** on Interstate or other designated exposures.
    - Wear the high viz garments fastened properly for full deployment of high viz fabric.
    - Keep garments clean. Wash or replace if the reflective or retro-reflective materials are degraded.
- Eye Protection
    - Several different types are used depending on the exposure; wrap around style is the most common.
        - Side Shields must be worn on all other types of glasses

  - Do not over-use tinted lenses, such as on a cloudy day or working in a shaded area, or under a bridge or at night
  - Use a retainer cord to prevent glasses from falling off your face or to keep them handy when not on your face; do not allow the cord to become a snag hazard. It must be a 'break-away' type cord.
- Face
  - Several different face shield configurations are available
  - Select the correct shield material for the job you will be doing
  - Screen mesh may be preferred for some applications such as chain saw or chop saw.

- Hand
  - Several different glove designs and materials are available
  - Characteristics include:
    - Grip enhancing surface
    - Impermeability (i.e. nitrile coated or dipped)
    - Abrasion resistance for handling rough materials (i.e. masonry)
- Body
  - Rain gear, seasonal items of protective apparel (i.e. helmet liners)
  - Chest protectors, bibs, aprons
  - Knee and elbow pads
  - Protective sleeves
- Foot
  - Steel toe work boots are required
  - Rubber boots with steel toe

- Head
  - Hard hats are required on most of our work
  - Chin-straps may be required to keep hat in place when working in gusty wind or aloft, or when looking down
  - Ratchet headgear is available to adjust the tension on the headband
  - Keep your hat clean. Wash the inside regularly, including the suspension and sweatband
  - Do not drill holes in a hard hat, such as for ventilation
  - Some face shield assemblies mount to the hard hat. Make sure your hat and shield are compatible
- Respiratory
  - Dust masks are available for voluntary use in certain conditions, such as high wind, or extreme cold.
  - Employees will receive a medical review and fit test before being issued a 'close fitting' respirator.

  - Fit testing and use instructions will be given when the employee is certified as capable of using the respirator.
  - Inspect the respirator before each use. Keep it clean. Store in a clean container. Wash and sanitize daily.
  - Facial hair that interferes with a proper seal on the respirator must be trimmed.
- Hearing
  - Ear plugs or muffs are available depending on the noise exposure
  - Follow the ear plug fit description and procedure on the package
  - Use only break-away cords on ear plugs in case of snag
- Life Jackets – Personal Flotation Device (PFD)
  - An approved (US Coast Guard) PFD is required to be worn when working above or near water
  - The PFD is designed to keep your head tilted up and float you to the surface in the event you are unconscious. Make sure it is properly fastened when working
  - A skiff (small boat) must be in the vicinity for rescue on water
  - A life ring with 50 feet of rope must be on hand in the area
  - A pole or hook must be handy to assist in rescue

7) Fall Protection Program

FRMG will comply with the **OSHA 1926 Construction Safety** regulations governing the need for fall protection at six foot and over height. This height may be decreased depending on our assessment of the fall hazard but in no case will we go over six feet without protection

Employees will receive training on the use of Personal Fall Protection. Correct use of harness and attachments, anchorage points, calculating fall distances and rescue provisions will be part of the training.

All training will be documented. Periodic refresher training will be done.

Identification of fall hazards

  - During our job estimate we will include the assessment for fall protection and make provisions accordingly as part of our bid package. In other words, safety and fall protection is not an afterthought, it is an integral part of the job.
- Employee Training in Fall Protection and Prevention
  - Employees will receive instruction on the nature of fall hazards, how to recognize them, and the requirements for use of fall protection as part of their Safety Orientation and ongoing periodic update refreshers.
- Types of fall protection

  - Preferred method: Properly constructed guard rails, physical barriers, fences, etc.
  - Alternate methods include:
- Personal fall arrest system components:
    - Anchorage
    - Lanyards, shock absorbing
    - Personal fall arrest harness
    - Retractable reels (yo-yo's)
    - Double Acting Closure Hardware – snap hooks.
- Other methods such as nets are also available. Due to the highly mobile nature of our work, the use of nets is generally impractical.

Inspection of Fall Protection Systems

- Employees will visually inspect their fall arrest harness and all attachments and anchorages daily before each shift.
- Because we will typically wear our harness assembly all day, it is unlikely that it will need to be inspected during the interim. However, employees should be alert to the possibility of damage during use, such as contact with hot surfaces that could cause melt-through of the synthetic belting, chemical exposures such as acid that could cause rapid deterioration of synthetics, cuts, severe abrasion, job related damage and other possibilities.
- The manufactures booklet on proper use and care of the harness and lanyards will be retained on the job site and periodically referenced such as in tool box safety meetings for refresher information. The Manual is multi-lingual with pictorials to illustrate key concepts.
- Supervisors will periodically review and update this safety protocol to ensure employees remain aware of their obligation for safe use of this and all safety equipment.
- Supervisors will observe the use of fall protection and confirm proper use on the job on a daily basis.

Aerial Lifts – JLG / Scissor

- Person fall protection is required in the basket during aerial lift operations
- Do not reach or climb outside the basket, even with your harness attached
- Only trained operators are permitted to drive the lift
- Follow manufactures instruction for safe set up and use

Rescue after a fall

- In some cases we will provide stirrups to relieve pressure on harness. Training will include correct method of deployment of the stirrups and other measures (i.e. looping a foothold in the lifeline)
- Emergency response provisions will include calling 911 for High Angle Technical Rescue
- Location specific planning must be part of the job protocol to ensure timely response by EMS.

8) Confined & Restricted Space Safety

FRMG does not typically work in or on Permit Required Entry confined spaces. Work in a 'Permit Required' confined space requires additional safety training and specialized safety equipment.

Upon completion of a pre-work safety assessment, we may work in restricted or non-permit required spaces, or controlled access space. These spaces will have been determined to be safe for our work to proceed.

This section discusses the nature of confined space hazards and how to identify them, however it does not authorize employees to enter these spaces. It is for awareness only.

Employees will not enter areas or spaces defined below without authorization:

- A space that is marked as Do Not Enter – Confined Space
- A space that is not designed for continuous occupancy
- A space that has limited or restricted means of ENTRY or EXIT
- May contain a hazardous atmosphere such as:
  - Flammable or explosive gas
  - Air-born combustible dust
  - Insufficient or too much oxygen concentration - below 19.5 or above 23.5%
  - A toxic atmosphere or substance
  - Danger of engulfment; danger of falling more than 6 feet
  - Mechanical, electrical or other physical hazard

A person authorized by FRMG will evaluate the area and approve entry.

CONFINED SPACE SAFETY AWARENESS

There will be no unauthorized entry into a confined space by a FRMG employee.

An authorized and qualified person will examine, test and evaluate a potential entry space to:

- Determine if it qualifies as a "NON-PERMIT REQUIRED SPACE" and meets the following requirements:

- Does NOT contain any atmospheric hazard or danger of engulfment or entrapment
- The space has been PROVEN SAFE by accepted means of safety assurance such as:
- Visual inspection from outside the space
- Atmospheric testing using a properly calibrated instrument, called a four Gas Meter
- Determination that there are no physical hazards in the space such as remote operating mechanical parts, motors, fans, pumps, etc.
- Other hazards may include: remote acting mechanisms, linkages, conveyors, louvers, fans, ventilation equipment, fans, sumps, piping, remote acting valves, inwardly converging walls, sloped floors, electrical apparatus; communications hardware, microwave and radio equipment (may have electrical), etc.
- Determination that there are no environmental conditions that may cause a hazard inside the space, such as weather, vehicle traffic in the area, sewer backup, flooding, etc.
- Determination of the existence of any other safety hazard
- Determination that the space is safe for the intended work to proceed and that we will not introduce any hazards into the space which could create a dangerous situation
- Warning: the presence of birds, rodents, reptiles, vegetation, homeless persons, etc. is not an indicator of a safe to enter space. Protect yourself at all times by verifying the space is safe to enter
- When these conditions have been satisfied the ALTERNATE ENTRY PROCEDURE may be followed
- If these conditions are not met and the space does contain any of the hazards listed above, then a full PERMIT ENTRY PROCEDURE must be followed. Additional employee safety training is required

Confined spaces can be present practically anyplace. LOOK at the structure or enClosure and confirm it is safe for entry. Do not just climb in. Oxygen deficiency is undetectable without an instrument. Some deadly gasses are invisible, odorless and undetectable without an instrument.

We do not want any employee to take the risk. STOP, and check with your supervisor if you are not sure as to the existence of a confined space.

Additionally, confined or restricted or concealed spaces of all types may contain an animal or bird or rodent or reptile or insect hazard. Be alert for the presence of nests, burrows, lairs, etc. Bird droppings can be extremely harmful. Do not create or inhale dust from any source particularly animal related. Protective measures against these hazards are not clearly stated in OSHA safety regulations. Be alert for the presence of ‘natural hazards’ such as mosquito, bees, snakes, etc. when working outdoors.

9) Ladders – Scaffolding – Staging

- When using a ladder or staging, the following safety provisions will apply.
- FRMG employees will receive safety training on how to recognize the hazards associated with working at heights, specifically when using staging, scaffolds and or ladders.
- Only Designated/ trained employees are permitted to install, inspect, maintain and disassemble staging systems or erect a ladder.
- Ladders, staging and climbing devices will be approved by the recognized authority for that hardware, such as ANSI.
- Ladders, staging and scaffolding materials will be inspected by a competent person upon delivery to our job site.
    - Inspection elements include:
        - Correct and compatible system components
        - Signs of heavy corrosion or other degradation
        - Misalignment, bent, crushed, cracked welds, other defects
- Ladders, staging and scaffolding will be visually inspected by a competent person before each shift and documented – a Green Tag is normally located on the staging for initial/date to signify inspection.
- If repairs or modifications are required to the staging assembly, they must be made by a Staging/Scaffold competent person.

Ladder Safety

- Select the proper type of ladder for the application. A wide variety are available.
- The most common type is Fiber-Glas reinforced ladders which are non-conductive.
- Other ladders types include:
    - Aluminum ladders
    - Wood
    - Composite
    - Telescoping, folding, collapsible, etc.
    - Wide selection of folding step ladders
- All ladders must be inspected before being deployed to the field.
- Most ladder damage occurs in handling and transport. Use appropriate care when handling, transporting and storing ladders.
- If damage is noted, do not use the ladder until a determination is made to replace or repair it.
- Once erected, ladders **must be secured** by a rope or other means of tie-off to prevent displacement **OR** be stabilized by another person while in use. The preferred method is to tie-off.

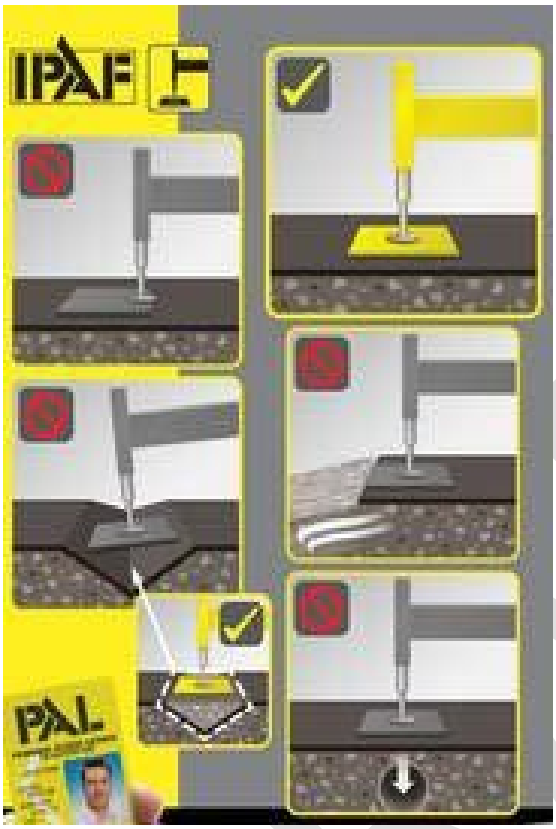
- This tie-off requirement **includes step ladders.**
- Ladder displacement (slippage) under load is a leading cause of accident.
- Reaching off to one side of the ladder is a dangerous practice. Stay centered on the ladder. This practice results in many falls.
- Do not climb to the highest step of any ladder. Get the correct size ladder.
- Ladders are not considered working surfaces. They should only be used when necessary for access to a working level such as a staging. Stairs are the preferred method of access on multi-level staging.
- Assess the work area before erecting a ladders. Look closely for overhead hazards such as electrical drops, cables, wires, etc.
- Check the ladder footing for stability. Make provisions for stable base of ladder.
- Ladders may also be used for inspection and estimating. This is a leading category of ladder accident.
- FRMG will try to avoid the use of ladders whenever possible by Engineering or use of aerial devices.

10) Aerial Lifts- JLG– Scissor Lifts, etc.

- Operators and users (i.e. laborers and helpers) of this equipment will receive training and carry their proof of training when using the lifts.
- Lift inspection - pre-use or daily visual inspection is required. Use a checklist.
- Set up & stability- verify correct placement of outriggers, spreader pads, ground bearing surfaces.
- Plan for safe travel and positioning of the lift.
- Check to be sure that ground bearing pressure is adequate. Sinkholes and voids may not be apparent.
- In questionable situations, determine if underground utility lines, buried tanks, vaults, etc. will be affected by machine or outrigger weight. Use proper spread-footing pads or other protection.
- All persons in the basket must wear fall restraint (personal fall arrest harness) while in basket. The boom can act as a catapult if the lift becomes unstable and eject persons with great force.

- Check your clearances on surroundings. Entrapment and crush is a leading cause of accidents.
- Check the area for overhead power lines. Allow a safe clearance, at least 20 feet.
- Do not operate the lift over people or traffic.
- Do not allow any person to walk or stand beneath the raise basket or lift boom.
- Use caution when handling tools in the basket. Use tool tethers to prevent dropping tools.
- NEVER attach a banner or other solid sheet material to the lift basket. This has caused lifts to fall over from wind resistance.

Examples of outrigger and stabilizer pad placement, bearing and support: good and bad examples:



11) Machine & Equipment Safety

The hazards associated with working on, with and around heavy equipment are clearly understood by FRMG employees. Our Operators and ground-person receive ongoing and periodic safety instruction, education and advice related to the safe operation of our equipment. This is how we make our living and we desire to learn, practice and improve our performance in accordance with OSHA and Best Industry Practices.

Primary areas of concern are the prevention of incidents associated with:

- Run over
- Back over
- Struck by – such as hydraulic attachment
- Caught in or between – such as counterweight swing; outrigger placement
- Contact with overhead electrical or underground utility line

The primary types of machinery included in this category are:

- Dump trucks & haul vehicles, off road and OTR, owned or contract haulers
- **Vendor delivery vehicles** such as boom trucks, cement trucks, etc. These vehicles may not have safety warning devices or safety trained Operators. Include this on your JHA as a precautionary control.
- Loaders – tracked or RT
- Bull dozers, other tractor type vehicle
- Excavators, Grade-All, etc.
- Skid steers and other PIT's
- Cranes – multiple types
- Paving machine, roto mill, roller, etc.

The National Institute of Occupational Safety and Health (NIOSH) reports that over half of work zone fatalities involve **workers on foot** who are killed by construction vehicles **moving in reverse**.

In most cases, the backed-over victims were in the **blind spot** of the operator. When workers are in the blind spot, even items such as backup alarms and high visibility garments that have proven effective in preventing accidents **may not be enough to protect them.**

https://www.youtube.com/watch?v=gGGPAeFmy1c

Safety precautions include:

- **Do not create an 'on the ground' exposure unless absolutely necessary.** PLAN the job to minimize boots on the ground. When it is necessary to have person on the ground, MINIMIZE their exposure as much as possible. In all instances, keep a safety margin of CLEARANCE between employees and the machine.
    - Assign a SPOTTER with a warning device if needed.
- **Never assume** the Operator knows where you are or what you are doing.
- If you must walk around or near a piece of heavy equipment, alert the operator before you approach. They should stop the machine or move to a safe position. Confirm that they see you. Make eye contact. Remember, they are in a glassed in cab and may not see you from inside.
- Be aware of your surroundings and the path of moving equipment. Use a Spotter in compromised situations.
    - All persons including Operators, Spotters, supervisors, etc. must wear high visibility outer garments. No CAMO!
- Identify and protect the **pinch, shear, wrap and crush points** on equipment. Use caution tape, cones or other means if these hazards
- Stay well clear of and out from under loads on cranes or hoists, even if it means taking the long way around. Be aware that a falling load can cause other consequences, such as catapulting heavy materials for long distances or knocking other things over, creating large vibrations, etc.
- Avoid walking behind a piece of equipment that is backing up. You could trip and fall. This has caused numerous fatal accidents.
    - Do not attempt to ride on any vehicle or equipment that does not have a passenger SEAT and SEAT BELT. Do not ride in back of a pick-up truck.
- If you're working on portable staging, scaffolds or platforms, get off while the machine or structure is being moved.

- Caution: when wearing hearing protection around heavy equipment, be careful not to overprotect to the point that you can no longer hear backup alarms or the operator.

The use of ear buds, head phones, random wireless communications, head sets, cell phones, games, texting, IM's, etc. are generally prohibited on our job sites. Each site has different characteristics. We do not want DISTRACTIONS from any source to create a hazard.

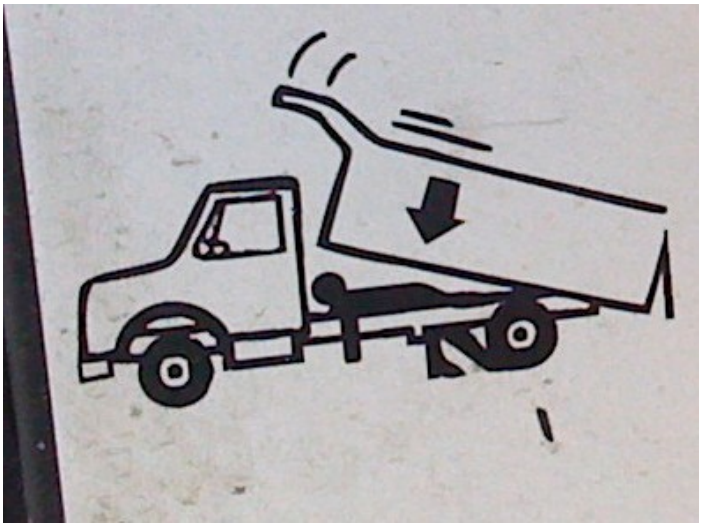
Safe Transport, Loading and Unloading of Equipment

- Inspect the transporting equipment such as low boy and tractor. Perform a visual walk around the rig. Make sure it is clean and in proper condition.
- Provide for the protection of the public. If you will be blocking or causing an impairment of a travel lane, take protective measures, such as:
    - Having a law enforcement 'Blue Light' to warn traffic
    - Using advance signage to warn approaching motorists
    - Deploy flares to warn
    - Position an attenuator vehicle as protection
    - Use Spotters and Flaggers to direct, guide, warn, etc.
    - Any combination of the above. Collisions in and around temporary work zones are common. Prevent the occurrence by planning the protection
    - Use Oversize Load banners, front and rear
    - Check warning strobes and clearance lights, reflective conspicuity tape
- Map out the travel route and pre-drive to determine clearances, obstructions, overhead lines, rail crossings, turning radius, etc. if the site is unfamiliar or complex to access. Use pilot vehicle, local law enforcement or escort vehicle when needed.
- When entering or leaving a job site or work zone, provide for safe entry or exit. Check for oncoming traffic. Avoid creating a jam-up. Check for proper traffic controls, signage, etc.

- Estimate the center of gravity for the equipment to be loaded. Be sure weights and capacities are properly sized for the move and the rig is not overloaded.
- Try to position the rig and loading/unloading movement on level ground.
- **USE WHEEL CHOCKS** or other means to effectively prevent movement or displacement during weight transfer of trailer or carrier during load/unload.
- Move equipment slowly on to or off of the carrier. Stay centered, use a Spotter(s) to guide the movement. Stay straight on ramps. Wear your SEAT BELT when moving the machine on to a trailer. If it becomes unstable, do not attempt to JUMP clear. This can be highly dangerous. Stay in position in the cab.
- When equipment is to be driven off-site, check steering, braking and light systems for proper operating condition.
- Secure the equipment to the carrier with proper attachments such as ratchet type chain binders. Avoid using compression type handles, since they can cause injury if not handled properly. Use shackles or other attachments at bearing and attachment points. Use double wraps to prevent sway movement under load.
- Use proper attachment points as designated on the machine. When strapping tracks down with chain hooks, make sure the pulling surface is 'locked' to prevent displacement under road vibration.
- Use chafing gear or other protection on sharp edges. Understand that 'steel on steel' surfaces can be slippery. Use wood or other compressive material for safer gripping.
- Be sure that the boom or any other extensions of the equipment are properly secured.
- When working with others, work as a team. Confirm the presence of others when making a movement. Stay in a clear zone when movements are being made. Do not expose yourself or other needlessly by staying too close to moving machinery, such as ramping up on to a low boy or flat bed.
- Keep your hands and boots dry and free of grease and oil as possible. Avoid pinch points.
- Handle heavy materials such as chains and binder using proper ergonomics to avoid shoulder strains. Keep loose ends of chains and rigging gear under control to prevent snags.
- Use caution climbing on to or off of machines and trailer decks. Use three point stance. Never jump down from any height. Lower yourself in a controlled manner.

- Establish a danger zone, that is; the working area where contact could result in personal injury or damage during operations.
- Use predefined hand signals or use of two way radios between the operator and person in charge of the work crew to accomplish any and all movement.
- Maintain a clear line of site between the operator and workers. Blind spots are common. If you can't see the operator, they can't see you.

- Use a spotter when heavy equipment is in motion. This requires communication between the operator and workers to maintain safe movement.
- Always try to walk on the driver side of equipment as the passenger side has a larger blind spot.
- Use a step ladder or other means to gain access to heights. Avoid 'free climbing' on to machines, particularly when they are on trailers.
- Keep the loading area free of debris and unnecessary tools. Uneven surfaces can cause weight to shift, such as muddy tracks, ice or snow or wet.
- CLEAN THE RIG before moving it on to the trailer. Use a broom or shovel to clear the rollers, wheel wells, trailer decks, etc. Loose material on the machine can fly off due to road vibration and cause a hazard during transport.



12) Safe Use of Fork Lift – Bob Cat – Lull – aka PIT

References: OSHA – Powered Industrial Truck Standard (PIT); Backing Safety

On some jobs we will need to position equipment and supplies using PIT's. In some situations we may use lifts belonging to others, such as the client/ Contractor. The same protocol will apply to our Project using any PIT: Inspect the machine; climb on board properly; wear seat belt; use a spotter; check clearances; operate safety.

FRMG employees may use these lifts provided they meet the following criteria:

- Have a current PIT Safety Training license showing they are capable of handling loads up to a specified weight and truck capacity. The License is valid for 3 years, then refresher training

- Perform a visual safety inspection of the PIT before operating
- Verify that the Backup and/or Travel Alarm is functioning
- Do a test lift on any load approaching 75% of the lift capacity
- Do not add extra weight or allow employees to stand on the machine counterweight – there is a You Tube video showing a fork lift crush a person who jumped on the counterweight
- Use caution when adjusting fork width. Use a tool to move the forks, such as a pry bar or other implement
    - Keep feet, hands and fingers clear
    - Do not allow fork to slip off the header bar. Wear gloves and foot protection
- Use a Spotter when backing or driving in reverse for visibility
- Operate with caution and alertness at all times; use moderate speed, even when not carrying a load. Check your ground conditions frequently. No distractions, no cellphones while operating the PIT
- Make provisions for: work near travel lanes; night work; inclement weather
- Check the fire extinguisher – charged and accessible
- Mount & dismount properly- this is the largest single category of injury to operators
    - ALWAYS use three point stance when climbing
    - Clean your boots before climbing into cab. Keep area under pedals clean, particularly in cold weather. Mud can freeze and form a 'block' under a brake pedal.
- **Refueling** – propane or liquid fuel – follow the proper safety practice associated with the refueling operation, i.e. engine off, use spout, funnel, dispenser nozzle, etc. Keep fire extinguisher handy. Avoid over-fill. Clean up spillage. Do not smoke when refueling.

Hoisting With Crawler and Rubber Tire Crane, Truck Crane, Excavator or Other Lifting Mechanism

FRMG may need to use a crane or similar machine for positioning of materials or access to work locations. If the situation arises, we will either rent a crane and operator or the client / contractor will provide us with a crane and operator.

- Our Safety Policy is to complete a **JHA** for overhead lifting operations
- In all cases, the weight of the load, plus attachments, plus rigging gear will be determined. Good practice is to mark the load clearly with this weight
- Rigging gear must be rated for the capacity and inspected before use by a competent person, usually our Site Superintendent
- Lifting attachments such as hooks and clevis must be positive locking, except where the configuration of the load prevents this. Alternate measures may be used to secure rigging attachments such as mousing the hook or other means

- Lifting gear must have a tag showing its capacity and material
- Protect nylon/synthetic slings against cut or abrasion damage, chemical or heat damage, etc.
- When directing movement via hoisting by a crane, employees will use an agreed upon set of hand signals and verbal commands (see Chart in Appendix)
- They will do the same when using powered equipment for hoisting, including using the Lull or JLG lift (if the machine is approved for lifting)
- The weight of the load will be determined, estimated, calculated or measured when possible. The weight must be within the allowance for the machine
- Whenever possible, verify and clearly mark the WEIGHT of the object to be lifted. This is part of good rigging practice
    - If necessary, use a physical materials density and volume calculation to arrive at a best estimate. Use a generous safety margin
    - Allow for weight of rigging, pallets, packaging and other peripherals as part of the calculation
    - Always stay within the limits of capacity for the machine / load. If needed, get a bigger machine
- Agreed upon hand signals or verbal communications will be part of the JHA
- Suspended loads must have a tag line to allow the grounds person to stay out from beneath the load and control it while suspended
- Use extreme caution when lifting sheet materials. They will act as a sail in wind turbulence. Persons trying to hold a tag line could be carried into a hazardous area such as traffic lanes. Plan for this on the JHA

See Hand Signal Chart in Appendix.

13) Zero Energy Assurance – Lock Out/ Tag Out (LOTO) Procedure

PURPOSE

To assure employee protection from unintended machine motion or release of energy during service, maintenance or repair which could cause injury.

Management Responsibility

- FRMG supervisors will train new employees and periodically reinstruct all employees regarding provisions and requirements of this lockout procedure
- Reference: OSHA 1910 and 1926
- Supervisor will monitor and enforce compliance with the Lockout/Tag out (LOTO) procedure including the use of progressive disciplinary action when necessary
- Supervisor will assure that locks and devices required for compliance with LOTO are provided to employees
- Prior to setting up, adjusting, repairing, servicing, installing, or performing maintenance work on equipment, machinery, tools, or processes, the supervisor will determine and instruct employees of the steps to be taken to prevent exposure to injury due to the unintended machine start-up, motion or release of energy. Examples include: compressor, generator, pressure washer, mixer, mobile and telescoping equipment, etc.

- **Forms of energy include**:
- Hydraulic
- Pneumatic
- Electric
- Mechanical
- Chemical
- Kinetic (flywheels, etc.)
- Potential/stored
  - Thermal /cold
  - Employees must understand the characteristics of the energy sources and equipment they are dealing with. Safety training or JHA's must address safe work practices for the machines, tools or processes used on the job
  - A good starting point is to review the machine or tool Operators Manual for specifics. These Manuals should be available on the job site, or research on-line. Translate the Manual sections as needed for employee comprehension
  - Refueling of vehicles machinery and equipment is included in this safety practice. Follow the instructions given in the Operators Manual for the piece of equipment you are refueling

EMPLOYEE RESPONSIBILITY

- Comply with this lockout procedure and all applicable safety rules.
- Contact your supervisor or other management if you are unsure about how to proceed or have a question about this procedure.
- Keep the locks and tags and other LOTO devices on the job site, ready to use. Keep them protected when not in use.

GENERAL LOTO PROCEDURES:

All power and energy sources covered under this Standard will be locked out by each employee doing the work. This involves the use of gang lock devices and individually issued and uniquely keyed locks.

- Sources of energy, such as springs, compressed gas, air and hydraulic will be evaluated in advance to determine whether to retain or relieve the pressure prior to starting the work.
- LOTO padlocks are for the personal protection of employees and must only be used for locking out equipment such as switches or valves. They are not 'security' locks.
- Locks, adapters, LOTO Tags, tie wraps, indelible ink pens and other hardware will be provided by FRMG supervisor.
- The LOTO padlock and adaptor is to protect the equipment during periods of time when work has been suspended or interrupted.
- Personally issued LOTO pad locks will be identified with employees' name.
- Employees must request assistance immediately if they are unsure of where or how to lockout equipment.
- Any questions concerning this lockout procedure should be directed to a FRMG supervisor.

LOCKING OUT AND ISOLATING ENERGY AND POWER SOURCES

- For powered equipment, machines, or processes, the main disconnect switch(s) will be turned to the off positioned and locked in the off position only after the power is shut off at the point of operator control and energy is dissipated from the machine or system.
- Equipment connected to 110 volt source of power and higher by a plug-in cord will have a locking device applied to the plug attached to the cord leading to the machine.
- Equipment connected to a 110 volt source of power only (such as small tools and equipment) by a plug-in cord will be considered locked out if the plug is disconnected and tagged with a "Do not start tag" and the plug remains under the supervision and control of the person working on the equipment.
- After locking out the power source, the employee will attempt to operate the equipment, machine, or process controls to ensure no unintended motion will occur; or otherwise test the equipment, machine or process using appropriate test equipment to determine that all energy in the system has been dissipated and isolation of the equipment has been achieved.
- This is an important step because 'residual' system energy has caused numerous incidents.
- When two or more employees work on the same equipment, each is responsible for attaching their own lock.
- Locks and adapters are to be fitted on control levers, switches, valves, etc. in the non-operative (off) position.

An employee who is assigned to a job and upon arrival finds an "Equipment Lock," "Adaptor," and "Danger Tag" affixed to the equipment will take the following action:

- Affix their own personal LOTO lock to the gang lock device
- Determine who initially placed the equipment out of service and contact all parties. The names should be on the tag affixed to the original lock
- Confirm with these other persons who have locks on the equipment to determine if the work assignment to be performed will affect their safety. The work will proceed only when confirmed it is safe to do so with all parties involved
- Try to operate the control(s) to ensure that no unintended motion will occur before starting work
- In some cases on complex systems, it may be necessary to have qualified personnel test the equipment, machine, or process using appropriate test equipment to determine that energy isolation has been achieved. (Testing equipment is only to be employed by qualified personnel. Check with FRMG management)

PERFORMING TESTS AND ADJUSTMENTS DURING LOCKOUT

Machine power may be turned on when it is required to perform tests or adjustments.

- All of the rules pertaining to removing locks and restoring power will be followed. The equipment or process will again be locked out if it is necessary to continue work after completing the test or adjustments.

Upon completion of the work, each employee will remove their lock, rendering the machine operable when the last lock is removed.

Before removing the last lock, the employee will assure that all guards have been replaced, tools and materials are recovered, the equipment, machine, or process is safe for start- up and operation, and personnel notified that power is being restored.

Hazards of Non-Routine Tasks

Because the nature of our work may include unusual or unexpected exposures to a wide range of energy sources, supervisors and employees must be alert for hidden or concealed forms of energy.

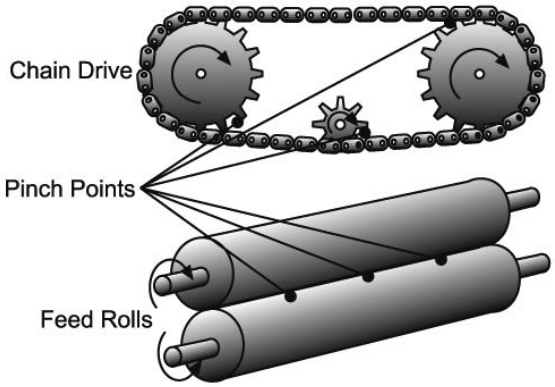
Examples include: working on and around pipes, pipelines, hoses, conduits, cables, containers, vessels, structures, vaults, etc. that are part of highway, industrial or transportation or urban infrastructure. We must assume there is a hazard associated with any unknown Element, until we can positively determine it is safe to work on.

There have been many accidents resulting from the failure to adequately apply LOTO measures in advance of 'going to work'. Check. Verify. Confirm. If you have questions, STOP, call your supervisor. Do not proceed until you are sure it is safe to do so.

EMERGENCY SAFETY LOCK REMOVAL

- The FRMG site superintendent, or other person designated by FRMG management, is authorized to remove an employee's lock once they verify the reason the original person cannot remove their lock/tag. Investigate the reason and determine corrective action to avoid recurrence.

See Appendix: LOTO Training Module



Common LOTO Failures

- Working on earthmoving machinery that still has some form of 'energy' in it.
- Such as:
  - Hydraulically and mechanically raised buckets, forks, grapples, blades, etc.
  - The 'thumb' attachment on certain buckets
  - Hydraulics generally
  - Antique or older model or restored machines – they may not be equipped with the latest controls or safety features
- Working with electrical appliances, such as generators, welders, rental equipment, etc.
  - Most rental shops do a good job with maintaining their equipment in a safe condition.
  - This does not relieve FRMG of the requirement to inspect and/or test the safety features of certain equipment before we use it.
- Valves, switch, electrical breakers, other forms of energy controls:
  - All of this hardware is subject to a simple inspection or trial in advance of actual use.
  - Reliance on others to protect you, such as: not chocking wheels; not removing a key; not applying a lock or tag; human error, negligence, carelessness, etc.
  - Mechanics, helpers, Operators attempting to make repairs themselves; others – who may skip the LOTO process for expediency; typical excuses include:
    - It wasn't going to take but a minute
    - I was just checking it
    - I thought the machine was in 'Park'
    - I had to have the engine running to diagnose the problem
  - In other words TAKE NO CHANCES when it comes to SAFETY!

This is a picture of a lockable steering wheel cover. Many accidents have occurred due to improper 'disabling' of a vehicle being worked on. This also applies to earthmoving machinery. Use positive means to disable the machine.

Ergonomics –Manual and Mechanical Materials Handling

Employees will receive instruction on proper handling practices for the materials they will be using. Examples include: handling lumber, pipe, rebar, etc. Also bagged materials of dense volume such as sand, concrete, liquids and coatings, sheet materials such as ply wood, etc.

- Supervision will demonstrate and explain the characteristics of safe handling in order to avoid employee injury
- Bending with the knees to lower the body to the lifting level (Raising the load mechanically with simple leverage is preferred)
- Avoid reaching over the shoulder – this can easily cause a strain
- Avoid twisting while carrying a load. This can cause a bad strain
- Get help with heavy or awkward loads. PLAN the move and take your time
- Use of a hand truck or other assistance device
- Check the path of travel and clearances along the route. Clear trip hazards in advance
- Check your footwear and ground conditions
- Make sure you have a good grip on the object. Avoid strain; avoid pinch point
- Try to have the heavy materials delivered close to where you will need them to minimize handling

- Try to keep heavy objects elevated so you do not have to bend or stoop down to lift them
- Use the right glove to protect your hands and for best grip

Remember your Ergonomics training:

Force –Repetition - POSTURE

JHA

Also called a JSA or AHA

Before we begin work, we should complete a JHA to plan and provide for safety measures associated with a specific task.

The JHA is normally done for a specific task, not the entire job. For example, “Concrete repair” is too broad a term. Shot-Crete application would be more appropriate.

JHA – OSHA Tutorial

https://www.osha.gov/Publications/osha3071.pdf?utm_source=rss&utm_medium=rss&utm_campaign=job-hazard-analysis-13

14) Safety Requirements for Hand & Powered Tools

Purpose

Many workers are injured and sometimes killed every year due to improper use of hand and portable powered tools. These kinds of accidents are all preventable. Injury or death can result from electrocution, amputation, laceration, eye and face injuries and a host of other causes.

We have implemented this part of our safety plan in accordance with OSHA Regulation 29 CFR 1910.221-224 and OSHA 1926 to prevent accidents and meet OSHA compliance requirements.

FRMG supervisory staff must ensure that tool hazards are evaluated as part of their job planning.

This Section addresses:

- Evaluating and identifying proper tool selection and safe use by employees
- Evaluating potential hazards associated with the tool or process
- Communicating information concerning these hazards
- Establishing safety procedures and sufficient protective measures for employees

Responsibility

FRMG supervisors are responsible for assuring the safe condition of tools and equipment. We will develop hand and powered tool operational procedures through the use of this plan. After tool selection and evaluation, tools will be used and maintained in a safe condition.

Tool Selection, Evaluation and Condition

The greatest hazards posed by tools usually result from misuse and improper maintenance. Employees and Supervisors will consider the following when selecting tools:

- Is the tool correct for the type work to be performed? Is it the right size? Use the smallest tool possible to minimize hazard exposure.
- Are tool guards present, installed properly and in good condition? Can they be repositioned to allow access to the work?
- Are grounding methods sufficient when working in wet conditions? GFCI's on electric sources. Use double insulated or battery powered tools when available.
- Does the tool create sparks or heat? Has this been considered when working around flammable substances? Do not block the air vents on any tool. It could overheat.
- Inspect all impact tools such as chisels, wedges, or drift pins for mushroomed heads. The heads can shatter on impact, sending sharp fragments flying. Trim the mushroom back carefully with a grinder to extend the life of the tool.
- Inspect wooden handled tools for loose or splintered handles. This can result hand or eye injury.
- Keep cutting edges and tools sharp. A dull tool can be hazardous.
- Use the tool on the proper working surface. For example a dirty or wet surface can create a multitude of hazards.
- Store tools and equipment properly when not in actual use. Most tools are damaged in transit and storage.
- All blades, knives, axes, cutting tools, etc. should be stored with edges protected in a sheath or cover.
- Make sure there is sufficient clearance for tools requiring swinging motions such as hammers, axes, picks.
- Anyone working in or near the area where the tool is being used must wear the same complement of PPE as the tool user.

Power Tool Precautions

Power tools can be hazardous when improperly used. FRMG uses several types. These types are based on the power source they use: Electric, liquid fuel, hydraulic,

pneumatic, and powder-actuated. The following precautions will be taken to prevent injury.

- Power tools will be operated within their design limitations
- Eye protection, gloves and safety footwear are required during use
- On some tools such as drills or rotary hammers, gloves may create a snag hazard. Use appropriate caution. Remove the cuffs from gloves to minimize the snag hazard
- Store tools in an appropriate location when not in use
- Protect from abuse in transit and storage. Use a tool carrier, or box or other protective cover
- Work only in well illuminated locations. Use spot lighting or task lighting if needed. Plan for sufficient light levels during night operations
- Support and carry tools properly. Do not carry by the cord or hose
- Plug-in and unplug cords or hoses properly. Do not pull on the plug to disconnect the tool. This will damage the plug and receptacle and you could receive an electric shock
- Cords and hoses will be kept away from heat, oils, and sharp edges or any other source that could result in damage
- Tools will be disconnected when not in use, before servicing, and when changing accessories such as blades, bits and cutters
- Observers will be kept at a safe distance at all times from the work area
- Work will be secured with clamps or a vice where possible to free both hands to operate tools
- To prevent accidental starting, employees should be continually aware not to hold the start button while carrying a plugged in tool
- Tools will be maintained in a clean manner, and properly maintained in accordance with the manufacturers' guidelines
- Ensure that proper work boots are worn and that the work area is kept clean to maintain proper footing and good balance
- Ensure that proper apparel is worn. Loose clothing, long hair or jewelry can become caught in moving parts
- Damaged or defective tools must be removed from service immediately and tagged "Do Not Use". They will be reported and turned in for repair or replacement
- Saw blades and wheels: broken, cracked or otherwise defective saw blades will be removed from service. Inspect new blades closely before installation. Handle and store blades, wheels carefully to prevent damage
- Grounding: portable electric powered tools will meet the requirements of OSHA 29 CFR 1910.331 – 335 and have UL or ANSI approval
- Compressed air will not be used for cleaning purposes **except** where reduced to less than 30 p.s.i. and then only with PPE

Methods of Guarding

- One or more methods of guarding will be used to protect the operator and employees in the work area from hazards such as those created by point of operation, in running nip points, rotating parts, flying chips and sparks.
- Examples of guarding methods are: barrier guards, full or partial blade enClosures, two-hand tripping devices, electronic safety devices, etc.

- The guard will be such that it does not offer an accident hazard in itself. Employees will:
    - Visually inspect the tool you are using before each use. Guards must be present.
    - If it is evident that a guard is missing, tag out the tool and get a replacement.
    - Electric tools will not be energized during inspection. Unplug it.
    - Inspect tools having guards for proper operation and maintenance prior to use. Tools will not be energized during inspection.
    - Never remove a guard during tool or machine use.

Portable Circular Saws

May be used to cut dimensional lumber and wood primarily. Some saws can be equipped with blades designed to cut metal or masonry. Make sure you have the right blade for the material and that it is sharp and properly mounted.

Portable circular saws will be equipped with guards above and below the base plate or shoe. The following conditions must be met:

- An upper guard must cover the entire blade of the saw.
- A retractable lower guard must cover the teeth of the saw.
- Except when it makes contact with the work material, the lower guard must automatically return to the covering position when the tool is withdrawn from the work.
- Check your tool and guard function before use, while it is not plugged in or motor is off.
- Wear gloves when inspecting tool or changing blades or wheels. They can cause a cut.
- Unplug and place the tool on a secure surface to inspect or change blade or adjust guard.

Powered Abrasive Grinding or Cutting Wheels

Before being mounted, wheels and blades must be inspected closely and ring-tested to be sure that it is free from cracks or defects. To test, wheels should be tapped gently with a light non-metallic instrument. If they sound cracked or dead, they could fly apart

in operation and so must not be used. A sound and undamaged wheel will give a clear metallic tone or ring.

Employees will not stand directly in front of the wheel as it accelerates to operating speed.

- Always use eye and face protection.
- Turnoff power or disconnect the tool when not in use.
- Mounting and inspection of abrasive wheels.
    - Immediately before mounting, wheels will be inspected and sounded by the user using the ring test to make sure they have not been damaged in transit, storage, or otherwise.
    - The spindle speed of the machine will be checked before mounting of the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel.
    - Grinding or cutting wheels must fit properly on the spindle and remain free under work conditions.
    - Contact surfaces of wheels, blotters, and flanges will be flat and free of foreign matter.
    - When a bushing is used in the wheel hole, it will not exceed the width of the wheel and will not contact the flanges.

Portable Grinders, Angle Grinders and Cutting Wheels

These tools are very safe when used properly. READ the safety literature that comes with the tool.

- Wear the Proper PPE for the tool or process – primary eye protection AND secondary face protection; gloves, no long hair exposed, no jewelry, etc. Prevent snags
- Rotary tools must have a guard in place
- Do not remove a guard from a tool, except for service or changing a wheel
- Replace the guard immediately after service or wheel change
- If the guard interferes with your access to the work, contact your supervisor. Either you are not using the tool correctly or it is the wrong tool. Try to adjust the guard for better clearance. DO NOT REMOVE THE GUARD
- Do not hold or carry a tool by the cord
- Coil cords separately from the tool
- Use a protective carrying and storage case. Most tool damage is from improper transport and storage. Protect from water exposures

Safety guards on grinders will have a maximum exposure angle of 180 degrees, and will be located so as to be between the operator and the wheel during use.

Adjustment of the guard will be such that pieces of an accidentally broken wheel will be deflected away from the operator. (See 29 CFR 1910.243, Figure P-4.)

DO NOT REMOVE A GUARD without approval from your Supervisor. Reinstall the guard when task in finished.

- Bench grinders. The upper peripheral guard (tongue guard) will be adjusted downward to **within** 1/4 inch of the wheel, and the tool rest kept adjusted closely to the wheel with a maximum clearance of 1/8 inch (29 CFR 1910.215).

Compressed Air Powered Tools and Hoses

Employees must be familiar with work safety practices in accordance with the manufacturer's instructions. The following safety practices must be followed:

- Use tool retainer. Retainer will be installed on equipment which, without such a retainer, may eject the tool. This is also called a Tether – basically a rope or cable or chain to keep the tool from falling when used in an elevated position, such as when working from an aerial lift.
- Air hoses. Hose and all connections must be compatible with the pressure and service for the job. Do not use improvised fittings. Use a proper retainer on couplings to prevent hose whip.
- Use safety clips on Ohio type and other connection fittings. Check Ohio Washer and replace if worn or damaged. Use cable restraint to prevent hose whip in case of fitting separation.
- Do not use an open compressed air line for general cleaning. This is not only dangerous abut also may create a large cloud of dust. Use a pressure reducer nozzle- 30 psi recommended.
- Wear eye protection and face protection when using air tools – air born particles can become lodged in facial area, brows or hair.

Circular Saws, Chain Saws and Percussion Tools

- Hand-held gasoline powered chain saws and chop saws (concrete cut off saws) must be equipped with a constant pressure throttle control that will shut off the power to the tool when the pressure is released.
- NEVER attempt to 'lock' the trigger open.
- Wear proper PPE for the job. Wear hearing protection.

New Employee Orientation Safety Training

New Employee Safety Orientation Training will be conducted prior to job assignment. A Competent or Qualified Person will provide this training to ensure that OSHA required safety knowledge is understood.

The training will include, as a minimum, the following:

- Haz Com/ GHS / SDS / Labels/ Etc.
- PPE including Respirators – Selection, inspection, Use, Maintenance
- High Visibility Apparel requirements, ANSI Class III and Class E for night work
- Industrial Hygiene, Blood Borne Pathogen Awareness; heat exhaustion; environmental stress
- LOTO & Machine Safeguarding
- Fall Protection – all types; use of harness & lanyard; Rescue

- Safety requirements around heavy equipment, machinery, vehicles, etc.
- Safe use of Lull; Fork Lift (PIT); Bob Cat, Aerial Lifts; other equipment
- Hoisting and Materials Handling Safety – Use of Hand Signals
- Safety characteristics of tools – gasoline, air, hydraulic, etc.
- Recognition of hazards associated with the work to be completed
- Electrical Safety – generators, cords, GFCI's, etc.
- Fire Safety – how to use an extinguisher
- **Basic Safety Inspection** of work area; tools, materials, etc.
- **OSHA Focus Four**- Falls, Struck By, Electrocution, Caught in or Between
- **Backing Safety** Standard
- **Traffic Controls** – Work Area Protection Manual compliance, as applicable
- Tool identification: FRMG name or other identifying mark must be placed on tools and equipment to aid in recovery in case of theft. Use an appropriate method to mark tools.
- Foremen or Safety Director will certify that training has been accomplished and is being kept up-to-date.

Refresher Training

Refresher training content will be similar to initial training. Refresher training will be conducted on an annual basis or:

- Whenever there is a change in job assignment, a change in the type of tool used, or when a known hazard is added to the work environment.
- Retraining will be conducted if a periodically, or when we have reason to believe there are deviations from or inadequacies in the employee's safety performance.
- Retraining will reestablish employee proficiency and introduce new or revised methods and procedures as applicable.
- We will certify that employee training has been accomplished and is being kept up-to-date. The certification will contain each employee's name and dates of training.

15) Trade Specific Safety & Health Practices

Concrete pouring & finishing

Masonry & concrete pouring & finishing; form work
Hot Work – Fire Watch; fire safety, hot work Permit
Pick & Shovel – hand digging; digging bar; pry bar & leverage, etc.

16) Underground Utility Protection

As part of our pre-work assessment, FRMG will make a positive determination for the location, identity and protection of any underground or concealed utility lines in ourwork area.

This determination could include calling a locator service such as Dig Safe or Miss Utility. This is more commonly the responsibility of our client – the General Contractor however we must be absolutely clear that it has been done.

- In all cases, a positive determination must be in effect, such as clear and unambiguous Contract Language, as to the responsibility for locating and protecting the utility lines
- FRMG will use appropriate caution when working near marked out areas to avoid contact with or disruption to utility lines. This includes working near overhead power lines
- The minimum protective distance for overhead power lines on this Project is **20 Ft**
- Use a conservative estimate when planning for work near any utility installation or structure. Allow ample clearances in all directions. Consider the effect of using long handled tools, scaffolding exposures, telescoping lifts, hoisting of materials such as with a Lull or basket lift, etc.
- Hand dig in sensitive areas to determine the location of a buried utility line
- Support or protect lines as needed
- Be alert for leaks, seepage, unusual noises, large concentrations of rust or corrosion and any other unusual situation. When lines are uncovered or disturbed, there could be issues associated with the disturbance
- According to US DOT requirements for buried pipelines and other types of transmission cables, they are supposed to have WARNING MARKERS placed wherever the buried line crosses another transportation corridor, such as a road or railroad. This is an indicator for our employees to use as a verification tool. However, it is not 100% reliable, and we need to positively determine the presence of a line before we dig

17) Ergonomics & Back Injury Prevention

Employees will receive instruction on safe Manual materials handling practice. Muscle-Skeletal Disorders and soft tissue injury are among the leading injuries in our line of work. Most are preventable.

This ongoing education will include demonstrating the use of correct body posture to prevent back and muscle injury such as strain or sprain.

- Bend with the legs, not the back
- Lift with the legs – they have more powerful muscles than the back
- Use two hands when lifting a heavy object
- Get assistance with heavy loads
- Break heavy loads down into smaller units when possible. I.e. transfer 80 lb. bags of materials into two 5 gal buckets of 40 lbs. Or use a hand truck
- Avoid hand injury by using the correct glove, such as for sharp edges or puncture hazards. For example, guard railings are hot-dipped galvanized coated, resulting in numerous razor sharp protrusions
- Avoid the use of 'back-belts'
- If your body will come into contact with a hard surface, such as kneeling on concrete, use KNEE PADS or other cushioning material to prevent direct bone-to-surface contact
- Be aware of your posture. Avoid prolonged awkward postures. Move around – stand up- walk- periodically
- Elbow pads and other forms of protective cushioning are available depending on your assignment
- Plan the job to minimize the need and carrying distances for materials handling

Correct ergonomics includes many elements, such as diet, seasonal, hydration, fatigue and sleep cycles. We will make this information available to employees during periodic safety meetings.

Heat Stress Awareness:

Prolonged outdoor work in high temperatures in high humidity can create heat stress, possibly affecting employees in the form of:

- Heat Cramps or Rash
- Heat Exhaustion
- Heat Stroke

Supervisors must monitor the heat exposure of employees and be alert to the following:

- Configure jobs to work in shaded or covered areas whenever possible, i.e. start earlier in the day, finish earlier during hottest time of day; coordinate work to maximize shaded area work activity, etc.

- Install temporary sun protective devices (canopy or umbrella) when feasible
- Provide artificial ventilation to help cool workers, i.e. large volume fans, air movers, misting fans, etc.
- Limit the time of direct sun exposure
- Provide sources of drinking water for hydration
- Provide adequate number and sufficient length of rest breaks
- Be aware of the signs of overexposure and take immediate protective action
- Excessive exposure to heat can cause a range of heat-related illnesses, from heat rash and heat cramps to heat exhaustion and heat stroke. Heat stroke can result in death and requires **immediate medical attention**
- Exposure to heat can also increase the risk of injuries because of sweaty palms, fogged-up safety glasses, dizziness, etc.
- If an employee STOPS SWEATING
- Check the daily HEAT INDEX using a cell phone app. If the heat index is predicted to be over 100 to 105, work schedules may need to be adjusted
- Include Heat Stress Awareness in your safety meetings and discuss in JHA review
- Review the 1st Aid precautions for Heat Stress overexposure
    - Remove the person to a cooler, shaded, ventilated environment
    - Try to cool them down using available means – ice, cool water, fans, air conditioning, etc.
    - Give water to sip, drink slowly
    - Elevate feet to level higher the heart
    - Remove work boots
    - If they are unresponsive, unconscious, call 911
- Consult the OSHA Table below for action levels

Heat Index	Risk Level	Protective Measures
Less than 91°F	Lower (Caution)	Basic heat safety and planning
91°F to 103°F	Moderate	Implement precautions and heighten awareness
103°F to 115°F	**High**	Additional precautions to protect workers

Greater than 115°F	**Very High to Extreme**	**Triggers even more aggressive protective measures; consider limiting or discontinuing work activity; moving to shaded or cooler area if possible**

More information on Heat Stress Prevention can be found at:

https://www.osha.gov/SLTC/heatstress/index.html#hazard

18. Fleet Safety Program – Project Vehicle Use Policy

Project vehicles are for the use of FRMG and its employees in the course of authorized Project business only.

Project vehicles are NOT to be driven for personal or other unapproved use.

The operation of a Project vehicle while under the influence of alcohol or illegal drugs is clearly prohibited and any deviation from this prohibition will result in immediate suspension and termination of employment. Periodic/random and Post Incident drug & alcohol testing will be done as part of the drivers' vehicle use agreement.

FRMG Project Vehicle Policy:

- Employees who operate a Project vehicle must possess and maintain a valid driver's license.
- Employees are expected to follow applicable laws and safety rules such as adherence to posted speed limits, directional signage, use of turn signals, and avoidance of confrontational or offensive behavior while driving.
- All passengers in the vehicle must wear seat belts at all times while inside the vehicle, including when parked in a work zone.

Care & Maintenance of Project Vehicles

Drivers must inspect their vehicle at the beginning of each work day.

- Check oil, engine coolant levels, tires, exhaust system, windshield wipers etc.
- Check headlights, turn signals, brake lights.
- Check for loose wheel nuts, broken bead in sidewall, even tread wear, other defects or air leaks.
- Check all glass and mirrors: keep clean inside and out, mirrors adjusted. Use glass cleaner.

- Check for safety equipment assigned to your vehicle – extinguisher, first aid kit, warning kit.
- Check instruments, air and/or hydraulic pressure.
- Keep the vehicle clean of trash and debris that might impede safe operation.
  - Large items such as tool boxes and fire extinguishers, tools and sheet materials should be properly secured.
  - Items on the truck bed or in the passenger compartment must be safety secured. In a hard brake they could become unstable and hurt you.

Passenger & Cargo Safety:

- Carry no more than two passengers in the front seat only if equipped with center seatbelt.
  - No persons are permitted to ride on running boards, fenders, tailgates, bumpers or in any other location on the vehicle. They must be in a proper seat with a seatbelt.
- All equipment and materials must be properly secured on the vehicle before transporting.
  - This includes ladders, pipe, sheet materials, etc. Secure against wind displacement or shifting loads. Use proper securing straps or rope. Do not use extension cords to tie down gear.
- Clean off any mud, rock, or other loose debris that may fall off during transit.

<u>Securing the Vehicle:</u>

- Drivers are responsible for ensuring that the vehicle is parked and locked in as secure a place as possible when unattended during the work day and at your parking place overnight and at any other time.
- Make certain the vehicle will not move and the ignition key is removed when it is unattended.
  - Set emergency brake securely before shifting into the Park position. Use extra caution when parking on gradients. Use wheel chocks if needed.
- Lock, chain, or secure in some fashion all equipment, tools or parts left on the vehicle overnight.
  - Park in lighted areas when available.

Accident and Incident Reporting:

- Accidents, theft, vandalism or other damage to the vehicle must be reported to the Project Manager immediately upon occurrence or discovery.
- If needed use the form in the Insurance Claim Kit in the glove box of your vehicle OR use the Incident Reporting form in Appendix 1 of this Manual OR use a sheet of paper to record details of the incident.
- Obtain other drivers information including name, address, phone number (work & home) insurance information (policy number, their company name, phone number and contact) type of vehicle, description of the accident, exact location, time, date, witnesses, weather, etc.
- Report the accident to local police and ask that a police report be filed for the incident.
- Do not admit to fault or liability at the scene. Cooperate with law enforcement during their investigation.
- If you damage a parked car or other object, try to locate the owner/operator. If you are unable to locate anyone, leave a note in a conspicuous place on the vehicle or object. List your name, address and the phone number of FRMG. Attempt to locate a police officer if possible, to examine the damage and file a report. Inform the Project Manager of the incident immediately.
- Employees must report any moving or parking violations received while driving on Project business and/or in a Project vehicle.

Hold Harmless Agreement:

- As a condition of employment and acceptance of responsibility for use of a Project vehicle, you agree to follow and abide by the rules and behaviors outlined in this Manual. You understand that the vehicle is not to be used for personal purposes and that if any damage occurs in violation of these rules you agree to Hold Harmless and Indemnify FRMG for such damage.

I have read and understand the information in this Policy for Use and Care Of Vehicles.

Employee Signature: _____
Date_____

Fleet Safety Protocols:

The purpose of this Section is to ensure the safety of individuals who operate Project vehicles and their passengers and to provide guidance on the proper use of vehicles.

Vehicle accidents are costly to our Project, but more important they may result in injury to you or others. It is the driver's responsibility to operate the vehicle in a safe manner and to drive defensively at all times to prevent injuries and property damage.

- FRMG requires that all applicable motor vehicle regulations be understood and followed relating to driver safety conduct and responsibility.
- Vehicle drivers are required to drive in a safe and courteous manner at all times.
- We will periodically update our fleet safety policy. Drivers are expected as a condition of employment to be aware of and observe these and all safety practices.
- The attitude you take when behind the wheel is the single most important factor in safe driving.

Our fleet safety program will periodically review our motor vehicle accident and incident performance to determine areas of increased emphasis. We will also review drivers DMV - MVR records to determine if there should be changes in policy or procedure such as driver re-education.

- Driving privileges may be suspended or revoked for certain offenses such as accidents (regardless of fault), reckless driving, DUI, repeated infractions, and other indicators of poor driving practice.
- Project vehicles are to be driven by authorized employees only.
- An employee who has their driver's license revoked or suspended will immediately notify FRMG management. They will immediately discontinue operation of the vehicle.
- Any accident involving a Project vehicle, regardless of severity, must be reported to the local police authority for an investigation and report. This reporting is required by Project policy and also by our insurance company. False or erroneous or malicious reports may result in prosecution.
- A drug & alcohol test must be taken immediately following any incident.
- No distinction is made for accidents with or without injury. All incidents must be reported to FRMG immediately.
- Failing to stop after an accident and/or failure to report an accident may result in disciplinary action, up to and including termination of employment.
- Drivers must report ticket violations received during the operation of a Project vehicle, or while driving a personal vehicle on Project business.
- DMV records will be obtained by FRMG and/or our insurance company for drivers, prior to their employment and periodically thereafter, typically every six months.
- A driving record that fails to meet the criteria stated in this policy, or is considered to be in violation of the intent of this policy, may result in loss of driving privilege.
- Project business is defined as driving at the direction of or for the benefit of FRMG .

Driver Criteria & Fleet Safety Administration

- Employee entrusted with a Project vehicle must have and maintain a valid and current operators' license.
- Employees are expected to drive in a safe and responsible manner and to maintain a good driving record.
- FRMG and/or our insurance company will periodically review driver MVR's, including accidents, moving violations, etc., to determine if an employee's driving record indicates a pattern of unsafe or irresponsible driving.
- We may install GPS tracking units on fleet vehicles to assist with Fleet Safety Management. These units can provide data on location, speed, hard brake events, and other information. We will review and use this information to make a determination on overall driver suitability.

Criteria that may indicate an unacceptable record includes, but is not limited to:

- Two moving violations within a 12 month period
- Two accidents within a 12 month period
- Any combination of accidents and/moving violations
  - Other indicators such as unexplained damage to vehicle or property, excessive repair or maintenance, other negative indicators.

FRMG Driver Safety Requirements

- Any DUI, alcohol abuse (such as finding evidence of alcohol consumption on a job site or in a Project vehicle) or illegal drug use will result in immediate suspension pending investigation of the circumstance by FRMG . A drug and alcohol test will be required immediately for the vehicle driver and possibly the entire crew on the job, depending on the circumstance.
- Cell phone use while driving should be kept to the absolute minimum. Drivers need to be aware that cell phone use is a distraction from safe driving.
- If you must make or engage in an extended phone call pull off the road to continue the conversation. Or plan a time to call back when not driving.
- When possible, drivers should make calls while the vehicle is safely parked.
- Use hands free mode when possible. Let calls go to voice mail if you are in heavy traffic or otherwise concentrated on driving. Or have a co-worker take the call.
- Attention to the road and defensive driving should always take precedence over conducting business over the phone.
- No driver will operate a Project vehicle when their ability to do so safely has been impaired by illness, fatigue, injury, prescription medication or any other factor. Do not hesitate to speak up if you feel impaired to drive. We will make whatever arrangement is necessary for your safety. Do not try to 'push it' and risk an accident.
- All drivers and passengers in a Project vehicle must wear seat belts. This is also a LAW in Colorado.
- Unauthorized persons i.e. hitchhikers, etc. are not permitted in Project vehicles.
- Drivers are responsible for the security of vehicles assigned to them.

- Ignition keys must be removed and doors locked whenever the vehicle is left unattended. (Certain exceptions are permitted on jobsites and work zones when the vehicle is subject to frequent movement and is closely attended.)
- Day Time Running Lights (DRL's) are required on all Project vehicles. If your vehicle is not equipped with automatic DRL's, drivers must manually turn on headlights when vehicle is in operation. Remember to turn headlights off when parked. Carry jumper cables.
- All State and local traffic regulations, signs and signals must be followed.

Defensive Driving Requirements:

• Drivers of Project vehicles are expected to use good judgement and caution at all times. We are entrusting you with our vehicle and the safety of your co-workers.

- The leading cause of all motor vehicle accidents is FOLLOWING TOO CLOSE. We require that our drivers maintain a FOUR SECOND following distance from the vehicle ahead of them at all times.
- Depending on road conditions, this distance may need to be increased, such as rain, fog, snow, ice, on bridge decks, standing water on roads, etc.
- Drivers must yield the right-of-way at traffic control signals and yield signs.
- Drivers should also be prepared to yield their right-of-way for safety at any time.
- Be alert for other drivers' display of Road Rage or other offensive behavior. Avoid confrontations with courtesy.
- Pedestrians, bicycles, motorcycles and others using the roadway may be unpredictable. Give extra room. Pedestrians and bicycles have the right-of-way.
- Observe highway posted speed limits. In adverse driving conditions, reduce your speed to safe operating speed consistent with the condition of the road, such as for darkness and weather, volume of traffic, etc.
- Tires can hydroplane on wet pavement at speeds as low as 40 mph. Use appropriate caution.
- Older roads or poorly maintained roads including interstates may have poor drainage, resulting in standing water and ice when temperature drops.
- Radar Detectors are prohibited in Project vehicles.
- Drivers should keep a steady speed with the flow of traffic but not exceed the posted speed limit.
- Plan your route to avoid congested areas and rush hours. Stay out of traffic jams.
- Repeated stopping and starting in a line of vehicles can result in a rear end crash to you or vehicle behind you. Avoid becoming a sitting duck.
- Turn signals must be used when making a lane change or turn.
- When passing or changing lanes, make certain that you can see the entire vehicle you passed in your rear view mirror before pulling back into that lane. Do not 'crowd' the other driver. If they are distracted, you could cause a collision.
- Most accidents occur in and around intersections of all types, including interstate entrance and exit ramps. Use extra caution when in and around intersections of all types.
- Slow down well before entering an intersection. NEVER accelerate into an intersection. Be prepared for errant vehicles or drivers running a traffic signal. Hover the brake pedal for quick reaction.

- Be alert for pedestrians and bicyclists when approaching intersections. Look for crosswalks and scan for pedestrians. They have the right-of-way in crosswalks.
- Never speed through an intersection on a caution light.
- When the traffic signal turns green, WAIT a second for clearance. Drivers may be running the light from other direction. Turn your head and LOOK both ways for oncoming traffic before proceeding. Do not rely on peripheral vision to detect oncoming vehicles. They may be obscured.
- When waiting to make a left turn, keep your wheels facing straight ahead. If you are struck from behind, you will not be pushed into oncoming traffic.
- When stopping behind another vehicle, leave at least one car length of distance. This is a protective space for you and other drivers. It also allows room to go around the vehicle if necessary.

Defensive Parking and Backing

- Select the safest parking area available to you. This may not be the closest to your destination
- Park well away from other vehicles when possible
- When available, place a traffic cone at the rear of your vehicle to signify you are a work vehicle and subject to move. This helps keep other drivers away from your vehicle and also reminds you to check your rear before moving
- Park in a manner to avoid backing when possible, such as in a 'drive-thru' double parking space
- Avoid backing where possible, but when necessary, back into a parking space when you first arrive. This allows you to verify the space is clear
- If there are passengers in your vehicle, one of the passengers should GET OUT and act as a spotter to guide you while backing
- Keep the distance you back to a minimum even if you have to make a corrected front and back movement for clearance
- Always check behind your vehicle before backing or starting out
- When possible, back to the drivers' side for best visibility. Do not back around a corner or into an area of no visibility

Procedures to Follow in Case of Accident:

- In an attempt to minimize the effects of an accident, drivers should attempt to prevent further damages or injury, such as by moving the vehicle to a safe location out of the travel lane.
- Use spray paint or chalk or other marker to note the location of tires and direction of the vehicles involved, if it is safe to do so before moving them.
- If possible, take pictures of the scene from all directions.
- Call 911 / EMS if necessary.
- Provide 1st aid to injured persons only if you are capable and trained.

- EMS will typically be available very quickly. Make sure you give an accurate location for their response. This may be difficult in work zones with no clear street address. Ask a co-worker or other person to watch for and guide EMS to minimize chance of mistaken location.
- If no injury, you must still notify local police or law enforcement to make a report. Our Project safety policy and our insurance company requires that a report be made to local law enforcement. Obtain details of when the police investigation report will be available.

• Record as much information as possible about the other driver, passengers, contact numbers, insurance information, witness information, date, time, exact location, etc.

- Include the other vehicle license plate number; other party insurance company name and policy number, make of vehicle(s), model, and year; note the road and weather conditions and any other factors, such as darkness, street lighting, impairments, etc.
- Do not discuss the accident with anyone at the scene except the police.
- Do not accept or admit responsibility for the accident.
- Do not argue or fight or dispute the incident or details with anyone on the scene.
- Record the facts of the incident as accurately as possible. Take measurements if applicable, such as skid marks, impact marks; use your cell phone to take pictures of the damage.
- FRMG will conduct a review of every incident to determine the root cause and what preventive measures need to be implemented. It is important to record as much factual information as possible in your initial report.
- FRMG will report the claim, if needed, to our insurance agent or carrier. It is not necessary for you to contact our insurance company.

General Fleet Safety Requirements

- Employee will operate their vehicle with reasonable prudence to conserve fuel and maintain the vehicle for the best operational efficiency. Speeding, rapid acceleration, hard braking or chronic driving at higher then posted speeds will waste fuel and lead to early part failure, such as brakes wearing down, decreased engine life, etc.
- Driver will shutdown their engines when they expect to sit idle for more than a few minutes. This is called a **'No Idle'** policy and we will provide additional details to fleet drivers at their time of hire. This is an energy conservation and anti-pollution measure
- Daily visual and periodic under the hood inspection:
    - Check for proper fluid levels – oil, brake, power steering, washer, etc.
    - Check tire pressures using a gauge. Most tires will show under-inflation at some point. This can decrease the tire life by up to 50% and also cause poor steering and braking. This can be especially dangerous when traveling with a loaded vehicle and passengers. Or in snow/ice or rain.

  - Periodically check the spare tire for proper inflation.
  - Make sure the vehicle jack and lug wrench are properly secured on the vehicle.
  - Schedule the vehicle for repair, service or other maintenance as needed.
  - Treat the vehicle as you would care for your own.

Project vehicle gas/credit cards are for Project business related use only. They are not permitted for employee personal use.

- Use regular unleaded or correct grade of diesel fuel in the vehicle.
- Use self-service pumps when available.
- Exercise caution when re-fueling your vehicle. Remain close to the pump nozzle in case you need to shut it off. Auto-shut off devices have been known to fail.
- Avoid spilling fuel. Do not try to top off the tank. This can cause an improper gauge reading and cause problems with emissions control systems.
- Replace gas cap securely.
- Fuel receipts must contain the following information:
  - Date and time, # of gallons, price per gallon, total sale price.
  - Employee signs the receipt to verify transaction.
- Project vehicles must not be taken out of state without prior approval of FRMG management.
- Provide the Project office with a copy of your current driver's license. I.e. upon renewal.
- Minimum required vehicle paperwork:
  - Vehicle Registration
  - Insurance Certificate
  - Vehicle Accident Report Packet
  - Vehicle Operators Manual
- Additional vehicle equipment may include:
  - Set of jumper cables
  - Fire extinguisher
  - First Aid kit
  - Advance warning kit- flares or triangles or cones
  - Flashlight

Vehicle Maintenance

- Proper maintenance is a basic Element of any fleet safety program. This will ensure a safe and roadworthy vehicle, and avoid costly repair expenses.

• Weekly under the hood inspections must include:

- Brakes fluid check- if you need to add fluid more than TWICE in six months, have the brakes checked. The pads may be worn thin and need replacements
- Walk around the vehicle or have an assistant co-worker observe all light functions- headlights, turn signals, emergency flashers, brake lights, fog lights, warning strobe, etc. Watch for signs of a weak bulb, such as slow to illuminate, indicates needs replacement or a bad ground
- Use a tire gauge to check pressure. Look for signs of uneven tread wear which may indicate need for alignment. Look for broken beads in sidewalls (bulges). Look for cracks or curb cut damage in sidewall, dry rot, other defects. Because we carry significant weight on our trucks, the tires must be right
- Wipers – check wiper blades and arms. Clean the edges on wiper blades periodically with a solvent such as isopropyl alcohol to remove sludge from blade edges. This can cause smudging on the glass vs. clean wiping. Make sure the windshield glass is CLEAN
- Top off washer reservoir

•Oil change and tire rotation is done every 5,000 miles or manufacturer specific interval.

• Keep your vehicle CLEAN and presentable. This reflects your professionalism and pride and also FRMG Project image to our clients and the public.

Personal & Authorized Drivers of Vehicles

Project vehicles are to be driven by authorized employees only.

- Spouses, other family members, or non-employees are not authorized to drive a Project vehicles unless in case of an actual emergency. This does not include 'convenience' or simple utility.
- Passengers are generally limited to those individuals who need to ride in the vehicle to conduct employer business, such as clients, other employees, vendor representatives, retailers, etc.
- Approval for personal use of a Project must be obtained in advance.

19. Work Zone Traffic Control

Work Zone Safety is an **extremely** important part of our Safety Program. We will comply with the provisions of CO Dept. of Transportation or the USDOT Manual On Uniform Traffic Control Devices (MUTCD), as appropriate.

We need to be aware of the safety issues associated with working in or around vehicular traffic.

The main elements of a Work Zone are:

- **Approach**
  - Upstream Warning must be in place to adviser/warn motorists of approaching work zone
  - This can be portable signs and/or Overhead Programmable Message Boards
  - In an emergency, warning flares may be used for short-term notice
- **Taper zone**
- **Work Area**
- Blue Light law enforcement is recommended on interstate highways
- Deployment of Warning Signs, Merge instruction graphics, Traffic Control Devices (TCD's), and End of Work Zone signage.
  - Extensive specifications are contained in the WAPM and MUTCD Manuals addressing the type and design of TCD's, signage, distances, buffer zones, lane taper lengths and other details.
- TMA's large crash cushion vehicles strategically placed before the work zone
- Work vehicle positioning – inside the work zone. Allow proper clearances and line of sight
- High Visibility Apparel – required to be worn by all FRMG employees
  - ANSI approved, Class III minimum for daytime work
  - Class E (Full Body) required for night operations
  - Supplement the high viz apparel by the use of accessories including hard hat striping, arm bands, etc. with retro-reflective coating
  - Rain gear must have high visibility properties, day and night equivalent
  - Personal warning Lights such as cap mounted strobe lights are generally not permitted
- Maintenance of TCD's
  - Periodic drive-through of the work zone must be done by a responsible person to confirm that TCD's remain on station, i.e. cones and/or barrels with weighted bases may be displaced by traffic collision or wind turbulence
- Vehicles inside a work zone must have a strobe or LED or other amber color warning light visible in all directions.

  - Vehicles should also have high visibility DOT Conspicuity Tape or other marking on rear-facing surfaces (i.e. tail gate) since rear end collisions are among the most frequent vehicle crash events.
  - Entering and leaving a work zone are the most dangerous vehicle maneuvers.
  - A Spotter is recommended to be used. Allow sufficient acceleration distance when exiting a work zone.
  - Do not cause an oncoming vehicle to have to brake. This can cause a chain wreck.
  - Plan for line of sight clearance when entering or exiting a work zone.
- Night Work
  - Portable generator light towers may be placed on jobs for illumination during night hours.
  - Make certain that these lights are positioned and aimed properly so as not to cause glare or blind spots to motorists from any direction.
  - Reposition as necessary to provide illumination as your work areas move. Use caution when repositioning. Be aware of pinch points and tip over hazard.

APPENDIX 1

Chop Saw & Chain Saw Safety Tutorial & Tool Box Talk

Basic Safety Practices

Refer to the Saw Manual for More Information

English & Spanish

- Wear your PPE when handling any tool, especially this saw
- Read the Manual for the saw. Understand the safety symbols and warnings in the Manual
- Make sure you have the correct type of blade for the material you are cutting- masonry or metal. Not WOOD!!
- Use extreme caution when cutting heavy and dense materials such as concrete pipe. These materials can cause the saw to bind suddenly and kick back at you
- NEVER stand directly behind the saw when cutting. Stay to one side
- Wear grip gloves for a firm grasp on the handles
- ALWAYS use TWO HANDS-on the saw
- ALWAYS wear a face shield and safety glasses
- ALWAYS wear cut resistant chaps, and steel toe boots. Most injuries from these tools are from the waist down, lower leg and foot
- Use WATER to cool the blade and reduce dust
- Make sure you do not SLIP when this water is flying around. Use only enough flow to cool the saw, not a flood

- Have a co-worker spray a hose if needed, such as if the water nozzle on the saw is not working
- **NEVER** raise the saw above your shoulders. Try to keep it LOW, below your waist if possible
- CLAMP or otherwise SECURE the material you are cutting.
- PLAN for a safe cut- such as where will the piece you are cutting will fall

Español Translación

- Use su PPE al manipular cualquier herramienta

• Lea el manual de la sierra . Entender los símbolos de seguridad y advertencias en el Manual

• Asegúrese de que tiene el tipo correcto de la hoja para el material que se está cortando
• Tenga mucho cuidado al cortar materiales pesados y densos, como tubos de hormigón . Ellos pueden hacer que la sierra se unen repente y relajarse

• NUNCA se pare directamente detrás de la sierra durante el corte. Manténgase a un lado. Use guantes de agarre para un control firme sobre los mangos
• Son necesarias dos manos en la sierra
• Siempre use una careta y gafas de seguridad

• Muy Importante: Use siempre cortar caps resistentes y botas con punta de acero . La mayoría de las lesiones de estas herramientas son de cintura para abajo , inferior de la pierna y el pie

• Use agua para enfriar la hoja y reducir el polvo. O ventilación

• Asegúrese de que no se resbalen cuando esta agua está volando alrededor. Use sólo lo suficiente para enfriar el flujo de la sierra, no una inundación

• Haga que un compañero de trabajo rociar una manguera si es necesario, por ejemplo, si la boquilla de agua en la sierra no está funcionando

• NUNCA elevar la sierra por encima de sus hombros . Trate de mantener baja, por debajo de su cintura, si es posible

• Sujete o asegure el material que se está cortando

• Plan para un corte seguro, por ejemplo, donde será la pieza que se está cortando a CAÍDA??

Seguridad La práctica siempre

Project incident report

Date_____Time_____Location

_____

Who is involved:

_____

What happened – be specific- use additional sheet if needed.

_____

_____

_____

_____

Injury or damage – describe

Police or EMS Involved?

Witnesses: (Name and Phone)

Photograph or Measure the scene

If applicable, protect evidence or materials involved

Drug & Alcohol Test is required: _____

Corrective Actions: describe – Immediate_____Long Term_____

Responsible Person for Corrections_____

Person Completing This Report_____Date_____

Client notification:

Notes:

Use separate sheet if needed:

Silica Control and Fugitive Dust - Safe Work Plan

PURPOSE:

Crystalline silica is a basic component of soil, sand, granite, and many other minerals. Quartz is the most common form of crystalline silica. Cristobalite and tridymite are two other forms of crystalline silica. All three forms may become respirable size particles when workers chip, cut, drill, or grind objects that contain crystalline silica to eliminate or reduce the exposure level to silica in the work place that could cause silicosis. To increase awareness of the hazards of silica and fugitive dust in the work place

We intend to reduce the exposure levels by the following control measures:

- Dust Suppression (Wet Methods, Surfactants, etc. ;.) will be implemented whenever feasible.
- Vacuum Dust Collection Vacuum Dust collection systems will be used when using tools requiring electrical power.
- Operator isolation from the source.
- Respiratory Protection half face respirators with high efficiency particulate air (HEPA) filters approved by NIOSH (99.97 efficient) if respirator protection is required.
- Awareness Training to all employees on the construction site to stay out of the areas that generate dust.

SCOPE

During the demolition of existing concrete structures at various locations our employees and Subcontractors may possibly be exposed to respirable crystalline silica and fugitive dust. We intend to reduce this exposure and protect our employees as described in this plan.

Work that will generate silica or fugitive dust includes but is not limited to:

- Cutting concrete deck and beams to facilitate removal
- Demolition of deck & beams
- Cutting concrete pile to the required height in support of the new construction
- Sweeping of the streets and construction debris

Activities resulting in total respirable concentrations above the OSHA PEL for silica (0.1 mg/m3) and FUGITIVE (5 mg/m3), will be reviewed to determine if administrative or engineering controls can decrease the exposure, or if further protections are required.

RESPONSIBILITIES

The FRMG Project Manager or their designee has overall responsibility for establishing and ensuring compliance with this procedure. Our field supervisors are responsible for implementing and/or monitoring activities associated with this procedure. It is the responsibility of all management staff to enforce this procedure and for each employee to follow it.

TRAINING

Employees engaged in dust producing work will receive training and will implement engineering or administrative controls, where feasible, such as wet methods, local exhaust ventilation, where

necessary to reduce exposures below the PEL, and apply other protective equipment or protective measures. Use all available work practices to control dust exposures, such as water sprays, positioning oneself up wind from any generated dust.

Employees exposed will:

- Wear a half face NIOSH respirator, equipped with HEPA filters approved by NIOSH (99.97 efficient) if respirator protection is required.
- Do not alter the respirator. Do not wear a tight-fitting respirator with a beard or mustache that prevents a good seal between the respirator and the face. Medical evaluations and fit testing will be conducted for anyone that uses a respirator.
- Wear disposable or washable work clothes. Vacuum the dust from your clothes or change into clean clothing before leaving the work site.
- Participate in training, exposure monitoring, and health screening and surveillance programs to monitor any adverse health effects caused by crystalline silica exposures.
- Be aware of the operations and job tasks creating crystalline silica exposures in the workplace environment and know how to protect yourself.
- Be aware of the health hazards related to exposures to crystalline silica. Smoking adds to the lung damage caused by silica exposures.
- Do not eat, drink, smoke, or apply cosmetics in areas where crystalline silica dust is present. Wash your hands and face outside of dusty areas before performing any of these activities.

Silicosis is classified into three types: chronic/classic, accelerated, and acute. Chronic/classic silicosis, the most common, occurs after 15-20 years of moderate to low exposures to respirable crystalline silica. Symptoms associated with chronic silicosis may or may not be obvious; therefore, workers need to have a chest x-ray to determine if there is lung damage.

As the disease progresses, a person may experience shortness of breath upon exercising and have clinical signs of poor oxygen/carbon dioxide exchange. In the later stages, the worker may experience fatigue, extreme shortness of breath, chest pain, or respiratory failure.

Accelerated silicosis can occur after 5-10 years of high exposures to respirable crystalline silica. Symptoms include severe shortness of breath, weakness, and weight loss. The onset of symptoms takes longer than in acute silicosis.

Acute silicosis occurs after a few months or as long as 2 years following exposures to extremely high concentrations of respirable crystalline silica. Symptoms of acute silicosis include severe disabling shortness of breath, weakness, and weight loss, which often leads to death.

AVAILABILITY OF AIR AND MEDICAL SURVEILLANCE DATA TO WORKERS

Affected employees will be informed of the results of air samples taken and the control plan adjusted accordingly if necessary.

RESPIRATORY PROTECTION PROGRAM

Where exposures to respirable crystalline silica and fugitive exceed the Permissible Exposure Limit (of mg/m3 based on an 8-hour time-weighted), workers will be provided, as a minimum, with personally issued and marked respirators equipped with HEPA filters approved by NIOSH (99.97% efficient) to be worn in the designated work area. Sufficient filters will be provided for replacement as required by the workers or applicable regulations.

Disposable respirators will not be used for this work activity.

We will comply with OSHA 29 CFR Part 1926.134, and ANSI Standard Z88.2-1990, Practices for Respiratory Protection.

Workers will not be exposed to levels greater than 0.1 mg/m3 respirable crystalline silica nor 5 mg/m3 of fugitive as determined by the protection factor of the respirator worn and the work airborne area respirable crystalline silica levels.

SILICA AND FUGITIVE AIR SAMPLING AND EVALUATION

a. We may conduct air sampling of workers and other Subcontractors working within the defined work zone if deemed necessary. To determine employee exposures to respirable silica and fugitive, personal samples should be collected in the worker's breathing zone. Air samples for respirable silica are taken using personal sampling pumps to draw air through ten (10) millimeter nylon cyclone pre-selectors and five micron (µ), pre-weighed, polyvinyl chloride filters. Cyclone pre-selectors must be used to collect respirable dust samples. A sampling flow rate of 1.7 liters per minute should be used with the 10 mm nylon cyclone. Sample air volumes of 400 to 800 liters are recommended (4 hours minimum). The sampling equipment must be properly calibrated before and after each day of sampling. Samples should be submitted to and analyzed by a laboratory accredited by the American Industrial Hygiene Association. Lab analysis consists of weighing (gravimetric) for total respirable particulate and X-ray diffraction for % silica.

b. Multiple samples may be necessary to evaluate exposures of different materials at the same location, since varying crystalline silica content of the materials may produce a wide range of airborne exposure levels. Air sampling to determine exposures under different environmental conditions may be needed to effectively control exposures. Summer (hot and dry) conditions may create higher silica exposures, and additional controls may be required.

c. Results of area air samples collected by the Project or the Subcontractors performing this work will be submitted within 48 hours after sample collection.

Activities resulting in total respirable concentrations above the OSHA PEL for silica (0.1 mg/m3) and FUGITIVE (5 mg/m3), will be reviewed to determine if administration or engineering controls can decrease the exposure, or if further protections are required.

RECORD KEEPING: If they are taken, we will maintain for at least 30 years, a record of the Silica dust exposures on the Project. The record will include the following information: The starting and completion dates of the Project.

a. A copy of analytical results.

b. Copies of negative pressure documentation records (as required).

c. The name and address of the analytical laboratory used for silica analyzes.

d. The name, address, and social security number of all persons who were engaged in the concrete demolition activities.

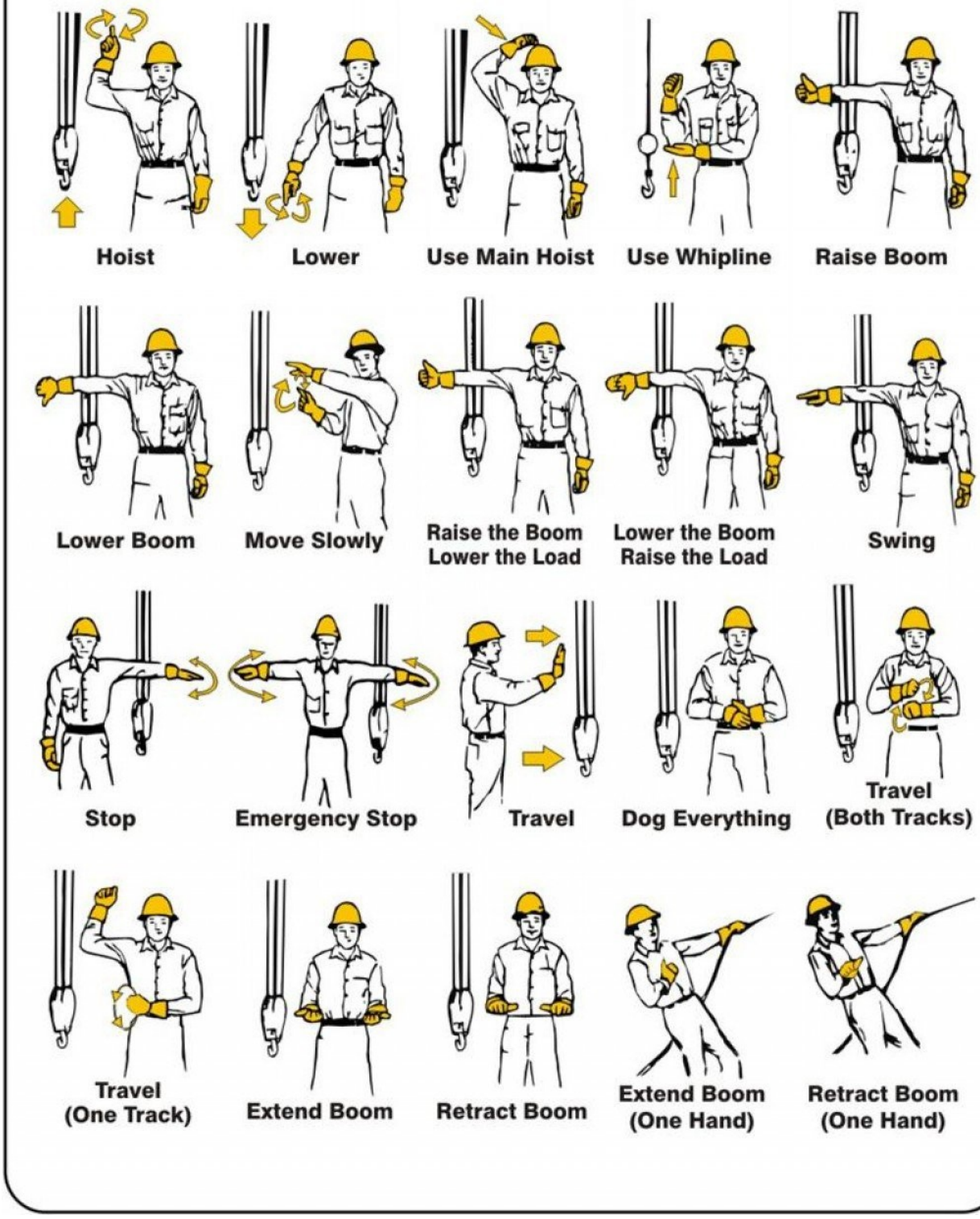
HOUSEKEEPING PROGRAM

Housekeeping in various forms appropriate to the job situation will be performed as needed to eliminate or minimize the generation of dust.

In accordance with good Industrial Hygiene practice, employees will not stand downwind while sweeping operations are taking place. Wet sweeping methods will be used when possible. Other engineering and administrative controls will be used to minimize dust exposures as appropriate to the circumstance.

End- Silica Dust Exposure Control Plan

Mobile Crane Hand Signals



REVERSE SIGNAL OPERATION (Safe Backing)

SAFETY REQUIREMENTS FOR MOTOR VEHICLES, MACHINERY & EQUIPMENT

Applicability.

This safety practice **applies to vehicles, machinery or equipment** capable of operating in reverse and **with an obstructed view to the rear** (hereafter referred to as "covered vehicles"), whether intended for operation in off-roadwork zones or over the road transportation or hauling.

Definitions.

"Obstructed view to the rear" means anything that interferes with the overall view of the operator of the vehicle to the rear of the vehicle at ground level, and includes, but is not limited to, such obstacles as any part of the vehicle (e.g., structural members); its load (e.g., gravel, dirt, machinery parts); its height relative to ground level viewing; damage to windows or side mirrors, etc., used for rearview movement of the vehicle; restricted visibility due to weather conditions (e.g., heavy fog, heavy snow); or work being done after dark without proper lighting.

Covered vehicle requirements.

A. No person will operate any covered vehicle in reverse unless:

1. The covered vehicle has a **reverse signal alarm** audible above the surrounding noise level, **and**

2. a. The covered vehicle is operated in reverse **only when a designated observer or ground guide (Spotter)** signals that it is safe to do so; **or**

2. b. Before operating the covered vehicle in reverse, the **driver visually determines that no employee is in their path**. (Get out and LOOK)

B. Covered vehicles that were not equipped with a reverse signal alarm upon manufacture or were not later retrofitted with an alarm are exempt.

C. Where immediate correction is not feasible, covered vehicles equipped with a reverse signal alarm that is not operational or is not functioning properly will be either:

1. Operated in reverse only when a designated observer or ground guide signals that it is safe to do so; or

2. Removed from service until the reverse signal alarm is repaired.

D. Covered vehicles with operable video or similar technological capability used by the driver and capable of providing the driver with a full view behind the vehicle are **exempt**

Responsibilities while engaged in reverse signal operation activities.

A. While an employee is functioning as the designated observer/ground guide during reverse signaling activities (e.g., collecting tickets from drivers, giving verbal instructions to drivers, signaling to drivers once reverse operation of the covered vehicle has begun), the designated observer/ground guide will:

1. Not engage in any activities other than those related to the covered vehicle being signaled;

2. Not use personal cellular phones, personal head phones or similar items that could pose a distraction for the designated observer/ground guide;

3. Be provided with and wear during daytime operations a safety vest or jacket in orange, yellow, strong yellow green or fluorescent versions of these colors;

4. Be provided with and wear during nighttime operations a safety vest or jacket with retro-reflective material in orange, yellow, white, silver, strong yellow green or a fluorescent version of these colors and will be visible at a minimum distance of 1,000 feet;

5. Not cross behind in close proximity to a covered vehicle while it is operating in reverse;

6. Always maintain visual contact with the driver of the covered vehicle while it is operating in reverse.

7. Maintain a safe working distance from the covered vehicle.

B. When using a designated observer/ground guide, no driver of a covered vehicle will operate in reverse unless they maintain **constant visual contact with the designated observer/ground guide. If visual contact is lost, the driver will immediately stop** the vehicle until visual contact is regained and a positive indication is received from the designated observer/ground guide to restart reverse operations.

C. Except as provided for in subdivisions A. and B. of 16VAC25-97-40, employees will not enter or cross the path in close proximity to a covered vehicle while it is operating in reverse.

Training.

A. Prior to permitting an employee to engage in any covered activity under this chapter, the employer will ensure that each driver of a covered vehicle and each designated observer/ground guide is trained in the requirements of this chapter.

B. Refresher training will be provided by the employer for any driver of a covered vehicle or any designated observer/ground guide when the driver or designated observer/ground guide has:

1. Been observed to violate the requirements of this chapter;

2. Been involved in an accident or near miss accident; or

3. Received an evaluation that reveals that the driver or designated observer/ground guide is not operating under this chapter in a safe manner.

JHA

Also Known as AHA

Or Job Safety Analysis (JSA)

https://www.osha.gov/Publications/osha3071.pdf

From the OSHA Handbook:

What is a hazard? A hazard is the potential for harm. If left uncontrolled, can result in an injury.

Identifying hazards and eliminating or controlling them will help prevent injury.

What is a JHA? A technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. When we identify uncontrolled hazards, we will take steps to eliminate or reduce them to an acceptable risk level.

Why Is JHA Important?

We can help prevent workplace injuries and illnesses by looking at our workplace operations, establishing proper job procedures, and ensuring that employees are trained properly.

One of the best ways to determine and establish proper work procedures is to conduct a JHA.

What Is the Value of a JHA?

We can use the findings of a JHA to eliminate and prevent hazards. This will result in preventing injuries and illnesses; safer, more effective work methods; reduced workers' compensation costs; and increased worker productivity.

The JSA is also a valuable tool for training new employees in the steps required to perform their jobs safely.

What Jobs Are Appropriate for a JHA?

A JHA can be conducted on many jobs in the workplace. Priority should go to the following types of jobs:

• Jobs with the highest injury or illness rates;

• Jobs with the potential to cause severe or disabling injuries or illness, even if there is no history of previous accidents;

• Jobs in which one simple human error could lead to a severe accident or injury;

• Jobs that are new to us or have undergone changes in processes and procedures.

• Jobs complex enough to require written instructions.

Conduct a Preliminary Job Review.

Discuss with employees the hazards they know exist in their current work and surroundings. Brainstorm with them for ideas to eliminate or control those hazards. If any hazards exist that pose an immediate danger to an employee's life or health, take immediate action to protect the worker. Any problems that can be corrected easily should be corrected as soon as possible.

Outline the Steps or Tasks.

- Nearly every job can be broken down into job tasks or steps.
- When beginning a JHA, observe the employee perform the job and list each step as the worker takes it.
- Record enough information to describe each job action without getting overly detailed.
- Avoid making the breakdown of steps so detailed that it becomes unnecessarily long or so broad that it does not include basic steps.
- Review the job steps with the employee to make sure you have not omitted something.
- Point out that you are evaluating the job itself, not the employee's job performance. Include the employee in all phases of the analysis—from reviewing the job steps and procedures to discussing uncontrolled hazards and recommended solutions.

How Do I Identify Workplace Hazards?

A JHA is an exercise in detective work. Your goal is to discover the following:

• What can go wrong on this job?

• What is the severity of consequence? I.e. first aid or worse?

• Under what conditions can this arise?

• What are other contributing factors?

• How likely is it that the hazard will occur? Along with Severity of Consequence, this is a key determinant

Document the answers to these questions clearly, in a consistent manner. It does not have to be an encyclopedia.

Proper analysis of hazard scenarios will describe:

• Where it this work happening (environment),

• Who or what it is happening to (exposure),

• What can precipitate the hazard (trigger),

• The outcome that would occur should it happen (consequence), and

• Any other contributing factors.

Be aware, many contributing factors tend to line up in a certain way to create the hazard.

To perform a JHA, you would ask:

• What can go wrong?

• What are the consequences?

• How could it happen?

• What are other contributing factors?

Hazards may occur very quickly. This may not give a worker much opportunity to recover or prevent it.

Determine the severity and likelihood of an accident when selecting appropriate hazard controls.

Unfortunately, experience has shown that training is not 100% effective in hazard control when triggering events happen quickly because humans tend to react differently.

Ask Yourself: How Likely Is It That the Hazard Will Occur?

This determination requires some judgement.

If there have been "near-misses" or actual cases, then the likelihood of a recurrence would be considered high.

Hazard Prevention; Hazard Correction

After reviewing the list of hazards with employees, decide what control methods will eliminate or reduce them.

The most effective controls are engineering controls that physically change a machine or work environment to prevent employee exposure to the hazard. The more reliable or less likely a hazard control can be circumvented, the better.

If this is not feasible, administrative controls may be appropriate. This may involve changing how employees do their jobs, warning signs, additional training, etc.

The least desirable control is using PPE. While this is an acceptable control, it requires that training, PPE selection, fit, suitability and other factors be in place.

Discuss the findings with employees who perform the job and confirm their understanding.

If we must introduce new or modified job procedures, be sure employees understand what they are required to do and the reasons for the changes.

The last line of hazard defense is PPE. If we must rely on PPE for protection, make certain we are using the best and most effective gear available. Typically, PPE is reasonably priced and therefore cost considerations are irrelevant when we select this option.

This is a sample JSA/ JHA/ AHA form. The intent is to capture the applicable hazards and specify appropriate controls. There are numerous versions of this form. The process of analysis is the same.

FRMG Customer or client	**Job Safety Analysis (JSA)**	Date :
JOB/ACTIVITY NAME: i.e. Pressure Washing Concrete Barrier Wall		JSA #:
Project Name / #	LOCATION:	OTHER INFORMATION:

REQUIRED PERSONAL PROTECTIVE EQUIPMENT FOR THIS JOB

☐ safety glasses ☐ safety footwear ☐ chemical resistant gloves ☐ High Visibility Apparel

☐ chemical goggles ☐ hard hat ☐ welding gloves ☐ face shield ☐ harness & lanyard

☐ leather gloves ☐ other_____ ☐ other _____

☐ welding goggles ☐ hearing protection

Job Steps	Potential Hazards	Controls
Traffic Control	Collisions, struck by vehicles	Attenuator trucks; defensive positioning; high viz apparel
Climbing – staging	Falls – Serious Injury	Wear fall protection, 100% tie-off at all times over 6 ft.
Pressure Washing	Eye, face and body injury	All required PPE - Specify
Etc.		

I understand & will adhere to the steps, hazards & controls as described in this JSA. I understand that performing steps out of sequence may pose hazards that have not been

evaluated, nor authorized. I will contact my supervisor prior to continuing work, if the scope of work changes or new hazards are introduced.
I understand I have the authority and responsibility to stop work I believe to be unsafe.

Employee Name (print)	Signature	Date
_____	_____	
_____	_____	
_____	_____	

I have reviewed the steps, hazards & controls described in this JSA with the workers listed above and authorize them to perform the work. Workers are qualified (i.e. licensed or certified, as appropriate, & in full compliance with applicable requirements) to perform this activity.

_____ _____ Date

Supervisor Signature

Links to Safety Resources:

OSHA Home Page www.OSHA.gov

NIOSH – publications library

ANSI

National Safety Council

OSHA Trench & Excavation Safety Handbook:

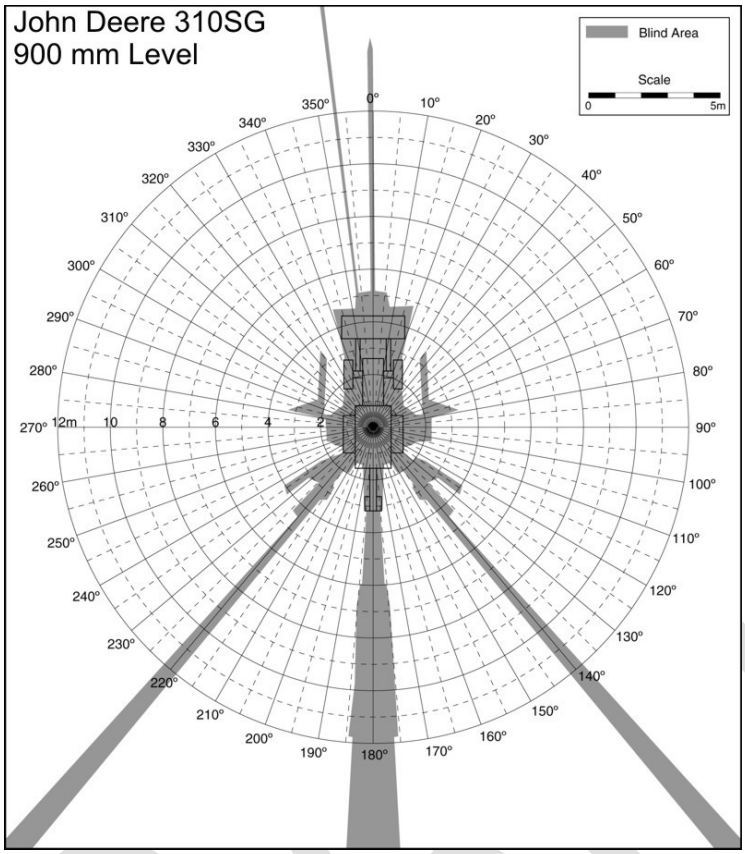
https://www.osha.gov/Publications/osha2226.pdf

Caterpillar Video – Short, highly illustrative

http://www.cat.com/en_AU/support/operations/cat-training/safety-training.html

Example of Blind Side Diagram: See NIOSH for additional machine diagrams:

https://www.cdc.gov/niosh/topics/highwayworkzones/bad/imagelookup.html



List of first aid Trained Employees

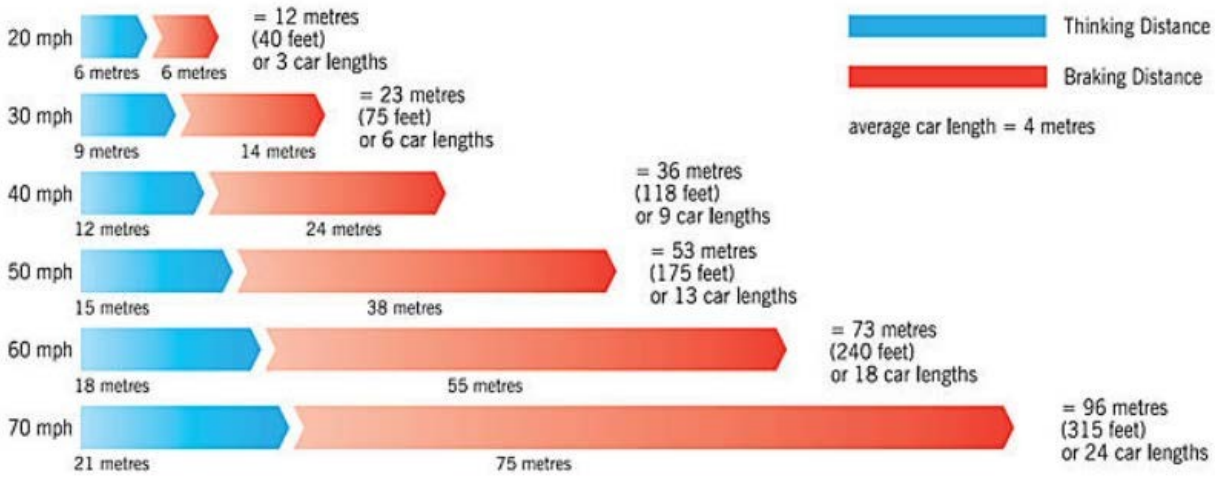
First Aid/CPR/ AED/ Universal Precautions training is available on-line from several sources. It is also provided to our employees by local Red Cross and other organizations.

Employees will carry their first aid Certification cards with them as proof of training.

1) List
2) List
3) List

Common Weights & Measures

- Water weighs about 8.5 lbs. per gallon
- Diesel fuel weighs 7.1 Lbs./gallon
- Gasoline weighs 6.2 Lbs./Gal
- Dirt = 76 Lbs./ Sq. Ft
- Stone = 175 lbs./cu. Ft.
- Iron/Steel = @ 500 lbs./ Cu. Ft.
- Concrete = 150 lbs./cu. Ft.
- Area calculation – Length x Width



IT TAKES NEARLY TWICE AS FAR TO STOP at 70mph AS IT DOES TO STOP at 50mph

End- FRMG Safety Manual

Appendix D
O&M Quality Management Plan

Front Range Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

Appendix D – O&M Quality Management Plan

a. Approach to Quality Management

The objective of the O&M Quality Management Plan (OMQMP) is to develop, implement, and update a set of policies, processes and procedures required for planning and proper execution of the O&M Work in accordance with the plans. The OMQMP will integrate various internal processes within the OMP and MMP. The OMQMP further enables FRMG to identify, measure, control and improve upon the various core business processes that will ultimately lead to improved business performance and provide the Department a means to measure the effectiveness of the OMP and MMP as well as compliance with the Project Agreement. During the Construction Period, the QMQMP will form a part of the Quality Management Plan (provided in Appendix D (Draft Stage 1 Quality Management Plan) and Appendix E (Draft Stage 2 Quality Management Plan of this Proposal).

FRMG is committed to delivering a quality Project consistent with ISO 9001:2008 and in compliance with the Project Agreement. The OMQMP establishes the following processes and procedures for all quality-related activities including the following scope:

- **Project-wide**: Encompasses activities for management, design, procurement and construction specific to the Operating Period;
- **Project-specific**: Incorporates Project-specific requirements, such as testing, durability and environmental sensitivity;
- **Client-focused:** Addresses the Department's needs and key technical features, and incorporates methods for measurement and monitoring
- **Execution and monitoring-oriented:** Contains execution measures and a monitoring plan focused on service delivery; and
- **Continual improvement**: Addresses opportunities to continually improve the the OMQMP are recorded and tracked at regular management reviews; these actions are formalized as quality objectives and their implementation are monitored and verified on a continual basis.

The OMQMP will be developed to comply with the requirements stated in the Project Agreement, including but not limited to:

- Addressing Project requirements before the beginning of any activities, products, or services related to the Project Agreement
- Implementing a OMQMP that is consistent with the requirements of the ISO 9001:2008 Standard for O&M Work
- Complying with the testing, inspection and monitoring requirements and audits of the Project Quality Manager and other quality review Subcontractors including reporting and corrective action process
- Providing prompt written responses to quality audits. The Project Quality Manager will review these responses for completeness and make certain that any process changes resulting from an audit issue are fully implemented

- Providing adequate resources to meet the timely response to quality issues such that FRMG can effectively meet the Project and Project Agreement requirements of the O&M Work

The OMQMP provides the strategy and approach for implementing procedures that that will ensure that O&M Work meetings or exceeds the requirements of the Project Agreement.

The OMQMP is a dynamic document that will be updated on an annual basis or as required. It will reflect all organizational changes, lessons learned, advances in technologies, operating standards and methodologies that occur on the highway throughout the duration of the Project.

The OMQMP incorporates all requirements of the Project Agreement with particular focus on Schedule 11 and Schedule 12, CDOT Standards and Specifications, ISO, and industry best practices. The OMQMP further includes comprehensive performance evaluations and assessments of the effectiveness of operations and maintenance activities as well as management so that quality and continuous improvement of the network maintenance activities are achieved.

The OMQMP comprises four key components that ensure quality and compliance and work collectively to instigate operational improvements. The four components are described below and illustrated in Figure 1.

Self-Monitoring: The component of the OMQMP that holds the operational team responsible for the quality of all O&M Work and self-assessment of the effectiveness of the OMP and MMP.

Quality Control (QC): The component of the OMQMP that focuses on the consistent quality compliances of daily operational activities and verify the accuracy of self-assessment. Specific individuals trained in QC reviews perform the QC at the operational level.

Quality Assurance (QA): The component of the OMQMP that reviews and analyzes the effectiveness of the operational and maintenance activities that comprise the O&M Work. The QA function aids improving these program units to maximize level of service. This function is independent of the daily operational team and reports directly to the Developer executive management.

Management Review: The component of the OMQMP that focuses on the verification of the effectiveness of the plan and implementing continuous program improvements. The O&M Manager as an executive leader will perform these management reviews on a

periodic basis in coordination with the Developer, Project Manager and the executive management/boards of the Lead Operator and/or the Developer.

b. Quality Improvement Process

FRMG will analyze data from a variety of sources to determine the suitability and effectiveness of the OMQMP and to identify areas for improvement. FRMG will collect and analyze appropriate performance measurement data to demonstrate the suitability and effectiveness of the OMQMP and to measure conformance to requirements. This will include data generated as a result of monitoring and measurement of FRMG's performance as well as the performance of its suppliers, subcontractors and other relevant sources

The analysis of data will provide information relating to:

- conformity to product and performance requirements;
- characteristics and trends of processes and products including opportunities for improvement and preventative action; and
- supplier contribution such as subcontractor's services.

Where opportunities for improvement are indicated through analysis of data collected, preventative or corrective actions will be initiated. Management reviews are performed at regular intervals to evaluate adequacy of the OMQMP.

FRMG will undertake improvement activities in order to improve internal effectiveness and efficiency, as well as. FRMG will perform corrective or preventive action to eliminate the root cause of actual or potential nonconformities. All corrective actions will be completed within the timeframe specified for each Non-Conformity Report as per the process for Non-Conformity Reports described in this document. We will take corrective and preventive actions on existing and potential problems based on the analysis of the root cause and identification of symptoms. FRMG will seek to resolve the root cause of nonconformities in order to prevent recurrence. Corrective actions will be appropriate to the effects of the nonconformities encountered. Procedures are in place to:

- Review nonconformities;
- Determine the root causes of nonconformities;
- Follow up on Non-Conformity Reports;
- Follow up on internal audit reports;
- React to outputs from data analysis;
- Evaluate the need for action to ensure that nonconformities do not recur;
- Implement action needed;
- Review corrective/preventative action taken; and
- Learn from past experiences.

FRMG will ensure that corrective action is used as a tool for improvement. Corrective action includes evaluation of the significance of problems, and the potential impact on operating costs, costs of nonconformity, service performance, dependability and the safety and satisfaction of the Concessionaire and other stakeholders The purpose of the corrective and preventive action

process is to establish and maintain documented procedures for implementing corrective/preventive actions and to ensure that the root cause of the actual or potential nonconformity is identified and appropriate action is taken to prevent recurrence of the problem. This procedure applies to long term corrective actions taken on problems related to shortcomings and complaints, whether caused internally or externally, including quality deficiencies identified by internal audits.

Corrective/Preventive Action: action taken to eliminate the root cause of an undesirable condition or nonconformity and to prevent recurrence.

- Corrective action is taken to eliminate the root cause of an existing nonconformity, defect or other undesirable situation to prevent recurrence.
- Preventive action is taken to eliminate the root cause of a potential nonconformity, defect or other undesirable situation to prevent occurrence and recurrence.

The Corrective/Preventive Action: procedure is as follows

- Investigate the problem and identify its root cause(s);
- Set a time frame for completion of the required actions;
- Take the required actions; and
- Report the corrective actions to be taken

The PQM will follow-up on the corrective/preventive action taken to verify its effectiveness. Follow-up includes, but is not limited to the following:

- Monitoring activities;
- Verifying work procedures, processes or products; and
- Reviewing inspection records

When the corrective/preventive action warrants procedural changes, the appropriate changes will be made. All corrective and preventive actions will be logged and tracked through the Maintenance Management Information System (MMIS).

c. Approach to Reporting Relationships

During the Operating Period, the responsibility for quality management extends throughout all levels of FRMG's organization, including between the Developer and the Lead Operator. The following describes the reporting relationships and quality roles of select leadership positions during the Operating Period.

The O&M Manager:

- Reports directly to the Project Manager/CEO for all matters regarding the O&M Work during the Operating Period
- Provides the planning and direction for the successful inventory and use management for road de-icing salt,
- Represents FRMG for matters related to engineering and administrative pertaining to the successful progress of and compliance with our established schedules and specifications related to O&M Work,

- liaise with other disciplines and team members on Project including regarding design, construction, traffic and environmental management

The Project Quality Manager:

- Provides the planning, organization, direction, coordination, and control to ensure that the quality and environmental requirements are followed
- Ensures that services are monitored and inspections are performed in accordance with this OMQMP during the Operating Period
- Ensures timely performance of management review meetings
- Reports directly to the Developer's executive management for all related quality matters
- Ensures that quality system requirements are audited in accordance with planned schedule.

The Health & Safety/Operations Superintendent and Maintenance Superintendent:

- Reports directly to the O&M Manager,
- Oversees the Work for all activities associated with the performance in the field during the Operating Period,
- Ensures that work done within the contract meets all quality standards

Figure 2 illustrates the Operating Period QMP Organization.

Department Oversight

The FRMG management team facilitates continuous, frequent, and open communication between the Department, other stakeholders, and their Project team counterparts at all levels of the Project.

FRMG will provide training to all design and construction personnel interfacing with the Department and their advisors. Training will be aimed at understanding:

- The Department's role,
- Purpose of Department audits,
- Interpreting audit findings and severity levels
- Expectations for cooperation with the Department,
- Response to Department audits, and
- How to use the Department's quality oversight database.

Reporting

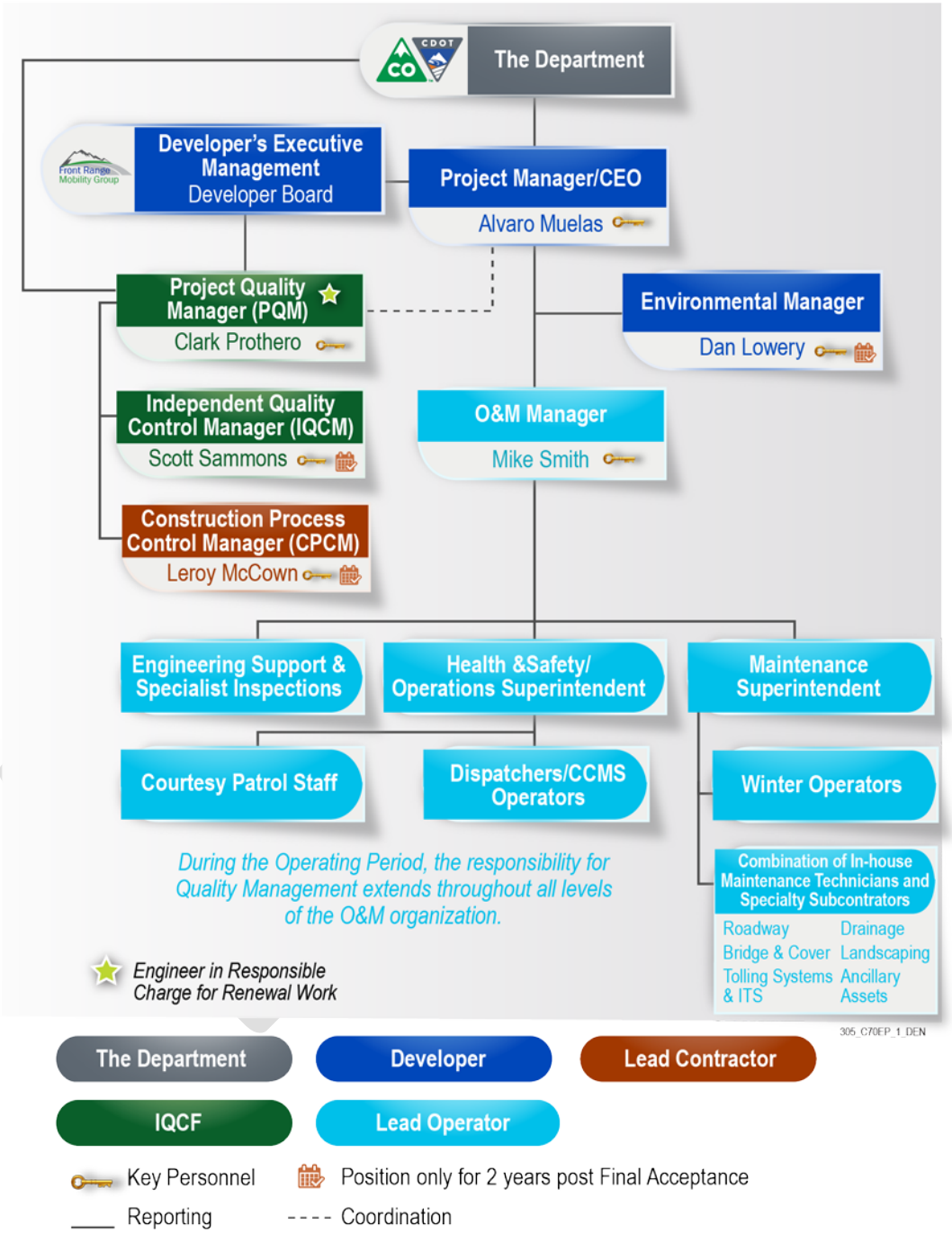
The summary of reporting compliance ensuring adherence to the requirements of the OMQMP will include the summary of information provided in **Table 1**.

Table 1. OMQMP Compliance Reporting Summary.

Type of Audit (In Process, End Product, Third-Party)	Auditable Process (QMS, EMS, Safety)	Audit Number	Audit Date	Audit Activity Description	Findings
Internal	QMS		04/12/17	Mowing	

Figure 2. Operating Period QMP Organization.

OPERATING PERIOD QMP ORGANIZATION



In addition, a schedule of completed audits and planned audits for the Contract Year will be included to provide results of audits, planned actions in response to audits and a look ahead for the Department.

A summary of Inspections will also be completed to ensure all activities are being covered and that an appropriate percentage are being completed when compared against the quantity of the respective work activity. A sample of this summary is included in **Table 2**.

Table 2. Sample QA/QC Inspection Summary.

Activity Number	Description	Number of QC's	Number of QA's
TOTAL			

d. Approach to Developer Self-Monitoring/Self Performance

Identifying Compliance Requirements

Knowing activity compliances and the measures to which they must meet is the first step in the self-monitoring process. There are two components to compliances: (1) the Department and (2) FRMG. The sources for determining compliance criteria are:

- The Project Agreement, including Operations and Maintenance Requirements with particular focus on the Performance and Measurement Criteria (Appendix A-2)
- Federal, state, or agency standards, specifications, policies, procedures, manuals, guidelines etc.
- Internal company procedure/policies
- Industry best practices

FRMG is responsible for collecting and compiling all requirements and presenting this information to the Project staff in a comprehensive and concise manner.

Identifying Work Methods that Ensure Compliance

Work methods will vary for each maintenance or operational activity performed, however specific resources can be used to standardize work practices to ensure the best and most effective work methods are utilized. The following formats and resources have proven successful in the self-monitoring process.

- **Routine Customer and Internal Progress Meetings:** a format used to cooperatively identify completed, current and future work actions and discuss the achievements and areas of improvement in the routine maintenance works as well as Renewal Work.
- **Generation of routine maintenance service requests**: Periodic inspections identify maintenance needs and identify O&M Work to be performed.
- **Detailed Activity Checklist**: Activity checklists provide a series of conformance

indicators that are required to be met to successfully complete O&M Work.

- **MMIS**: A software application that plans, monitors, tracks, and records all maintenance activities and inspections performed. It accounts for all resources used to perform maintenance work, generates plan information for each activity, and provides key performance and compliance indicators.

Internal progress meetings provide a forum to discuss planned maintenance and operational activities as well as results from methods employed to complete these activities. This feedback to field crews and other Project staff ensure the most effective work methods are used.

Detailed activity checklists are activity specific forms that provide the key standards and guidance to work crews for the repair or maintenance work of an asset in order to ensure compliance. Extensive lists of the most common maintenance and repair activities associated with an asset maintenance contract have been developed. The utilization of these checklists during a work activity aims at eliminating noncompliance with maintenance standards, requirements and specifications. See a draft guardrail repair checklist example in **Table 3**.

Table 3. Draft Guardrail Repair Checklist.

#	GUARDRAIL MAINTENANCE/ REPAIR Checklist	OP's	QC	QA	COMMENTS:
		√ or X	√ or X	√ or X	
1	Is the guardrail height for single panel, double rail or standard thrie-beam installed between 20-inches and 24-inches high at center of rail?				
2	Is the guardrail height for rail with rubrail, and modified thrie-beam installed between 23-inches and27-inches high at center of rail?				
3	Is the rubrail installed 12-inches from center of panel?				
4	Is the post spacing to 6'-feet, 3-inches?				
5	Are all posts in good condition, function as intended, and aligned? (i.e.- not twisted, damaged, split)				
6	Are all panels lapped according to traffic flow, and in good condition? (i.e. no perforations, sever pancake)				
7	Are the offset blocks intact and function as intended? (i.e. not split, cracked)				
8	Are offset blocks secured with 16D-galvanized nails?				
9	Are the object markers spaced properly and correct type utilized? (Make sure the set of the first object marker is allowing visibility for driving lane)				

10	Is all connecting hardware utilized correctly and in accordance with CDOT Specifications?				
11	Is work area clear of all debris and excess material?				

e. Approach to Preparing and Reviewing

Self-Monitoring

FMRG will perform periodic internal audits to evaluate the FRMG's quality system, and to demonstrate the integrity of its OMQMP. These audits will follow the procedure below. In addition, process audits will be performed at least twice a year by the Project Quality Manager based on a planned checklist that covers the quality system requirements.

There are two types of internal audits typically used in the Maintenance Field to assure that the OMQMP is operating effectively, Internal Process Audits and Task Audits.

Process Audits

FRMG will establish an effective internal audit process to assess the strengths and weaknesses of the OMQMP. The internal audit process will provide an independent evaluation to determine if the requirements are being met, and evaluate the effectiveness and efficiency of the OMQMP. Process audits will be conducted a minimum of two times per year. Auditors will not carry out audits on work that they are directly responsible for.

Examples of subjects for internal auditing include but are not limited to:

- Effective implementation of processes;
- Opportunities for continual improvement;
- Capability of processes;
- Use of information technology;
- Analysis of quality cost data;
- Effective and efficient use of resources;
- Process and service performance results and expectation
- Adequacy and accuracy of performance measurement;
- Improvement activities; and
- Relationships with stakeholders.

Task Audits

Task audits focus on specific tasks, following through the processes related to that specific task. Task audits will be performed more frequently, seasonally or as the activities being audited occur, compared to process audits. Task audits will be carried out by the O&M Manager and/or the PQM. Task audits will verify reported quantities as well as conformance to requirements.

Examples of tasks to be audited are:

- Surface Maintenance;
- Drainage Maintenance;
- Winter Maintenance;

- Roadside Maintenance;
- Traffic Maintenance; and
- Bridge and Structure Maintenance;

FRMG will review Task Audit results and ensure that improvement actions are taken in response to internal audit findings. Scheduling for internal audits is flexible in order to permit changes in emphasis based on findings and objective evidence obtained during audits. Relevant input from areas audited, as well as from other interested parties, is considered in the development of internal audit plans.

Audit Planning

Based on the review of the prior audit reports, the PQM will update the audit checklist covering the requirements of the ISO 9001 standard, the requirements of the OMQMP and the areas that may require additional monitoring.

The PQM shall develop an audit schedule at the beginning of each calendar year. The audit schedule may be updated periodically throughout the year to meet the needs of the OMR Quality Management Plan. The audit schedule identifies:

- the program element to be audited;
- the type of audit to be performed, i.e. process, or task;
- the frequency of audits for the next 12 months;
- the manager/supervisor responsible for the area to be audited (auditee); and
- the auditor(s).

The PQM will choose the internal auditor(s) independent of the Work to be audited. The frequency of the audits and order of the audits on the audit schedule will depend on where the biggest or critical problems are occurring.

Prior to the audit, the auditor will:

- review the documentation and work procedures pertaining to the OMQMP to become familiar with them and to ensure they are complete and acceptable;
- add any additional requirements to the audit checklists;
- determine whether there are any outstanding corrective action from previous audits; and
- confirm the audit dates with the auditee, to ensure their readiness.

Prior to performing the audit, the auditor will conduct a pre-audit meeting with the manager/supervisor responsible for the area (the auditee), to explain the scope of the audits and the methods to be used. The meeting will cover, as applicable:

- the purpose of the meeting;
- the objective and scope of the audit;
- the methods that will be used to perform the audit; and
- the methods for handling any nonconformities, as well as any recommendations that may be made.

Auditing Procedure

FRMG's internal audit process uses the following approach:

- Internal process audits will be performed at least twice per year, based on a planned checklist that covers the requirements of the OMQMP.
- A minimum of one task Audit will be carried out per month
- Competent personnel will carry out audits. Auditors will be trained either by internal or external instruction. Only those with certificates from recognized QMS Auditor / Lead Auditor courses, or equivalent, and previous experience in conducting audits will be qualified to train others internally.
- Audits are scheduled and performed based on the status and importance of the activity to be audited.
- The results of the audit will be reported and brought to the attention of the staff having responsibility for the area audited for timely corrective actions on the deficiencies found during the audit. Internal audit reporting will include evidence of excellent performance when it has been identified, in order to provide opportunities for recognition by management and for motivation of people.
- Follow up audits will be performed within an agreed time period to verify the effectiveness of the corrective action taken.
- Corrective Actions arising from audits will be verified by the Quality Manager.

Quality Control/Quality Assurance

FRMG performs and documents the required activities necessary to control the O&M Work. These are captured electronically and in real time within the MMIS.

The objective of QC Inspections is to demonstrate O&M Work has been performed to meet the requirements set out in the Project Agreement, QC Inspections will be performed by the technician performing the work and/or the superintendent reviewing the work. The quantity and intervals of QC Inspections are based on the risk and performance of the activity at hand and will follow a QC inspection schedule produced by the PQM. The objective of QA inspections is to provide a second level of assurance that the maintenance activities have been performed to meet the requirements set out in the PA, inspections will be performed by a superintendent or the O&M Manager. The quantity and intervals of QA inspections are based on the risk and performance of the activity at hand.

Management Review

The final component of the OMQMP is management review. The management review is designed to accomplish two key objectives: (1) Verification that the OMQMP is achieving its objectives; and (2) Implementation of critical procedural and operational changes resulting from the QA review.

Regular FRMG management reviews shall be performed in accordance with the "Management Review Procedure" below to ensure its continuing suitability, adequacy and effectiveness, and to make appropriate changes, as needed, for continuous improvement of processes.

Management reviews are conducted to ensure that services are delivered in compliance with the Project's needs and expectations. The outcome of the management reviews must include: improvement of services and allocation of resources needed to improve the effectiveness of the OMQMP.

The PQM will schedule the management review at a minimum semi-annually to consider the need for changes to the policies, objectives and other elements of the OMQMP due to audit results and changing circumstances. If changes are needed appropriate measures must be taken to implement the changes.

Management Review Procedure

FRMG will review the organization's OMQMP, a minimum of two times per year. This review will include assessing opportunities for improvement and the need for changes to the OMQMP, including the quality policy and quality objectives. In addition, internal audit findings, the Departments audit findings, external audit findings, any nonconformities, OMQMP performance measurement data, corrective and preventive action plans will be assessed and appropriate improvement initiatives will be assigned to competent personnel as required.

- Records from management reviews will be maintained and shall include:
- Status on follow-up actions from previous management reviews;
- Evaluation of the effectiveness in meeting the approach to quality and OMQMP;
- Evaluating the realization of quality objective targets;
- Reviewing FRMG's quality audit findings;
- Reviewing other customer/stakeholder concerns;
- Reviewing Non-Conformity Reports;
- Reviewing the effectiveness of corrective/preventive actions that were initiated;
- Reviewing supplier/subcontractor performance;
- Planning of internal audits;
- Reviewing changes that could affect the OMQMP;
- Reviewing the adequacy of resources.

Management Reviews may include, but are not limited to the analysis of the following information:

- Follow-up actions from previous management reviews;
- Effectiveness in meeting the OMQMP;
- Department objectives;
- Customer/stakeholder concerns;
- Non-Conformity Reports;
- Corrective/preventive action requests;
- Supplier/subcontractor performance;
- Audit planning and audit reports;
- Changes that could affect the OMQMP;
- Identification of resource requirements

- Recommendations for improvement

f. Approach to Training

Training will also be provided to by Project Quality Manager to ensure personnel understand the QMS and ensure its effective implementation on-site. All staff will be required to undertake a quality orientation to bring them up to speed on all quality requirements specific to the Project.

To reinforce avoidance of potential Nonconformances or Noncompliance Events, scheduled toolbox meetings conducted by the Safety Team, will include a quality component, managed by the Project Quality Manager, to deliver lessons learned to the field personnel. Quality discussions included in various toolbox meetings will become part of our documented records and will be available for auditing purposes and management reviews to ensure effective implementation on-site and continuous improvement of our overall QA/QC practices. In addition, the Project Quality Manager will introduce new personnel to Project quality on-site.

The FRMG management team determines and endorses the necessary competence of the staff responsible for delivery of design and construction services in accordance with the Project Agreement. Individuals will not be assigned to perform services without possessing contractually required certifications and qualifications.

All personnel who have responsibilities in the execution of OMQMP procedures will be identified and assessed for proper training and certification needs. They will receive training regarding these procedures for achievement of the expected results in accordance with CQP-0140 Quality Training procedure, which includes the training of personnel implementing the OMQMP. This training will serve to gain active participation of the FRMG work force to achieve a quality Project.

FRMG's quality management team during the Operating Period consists of the PQM, the IQCF (only as required per the Project Agreement), the O&M Manager and Health & Safety/Operations and Maintenance Superintendents, and are collectively tasked with ensuring the effectiveness of training through supervisory oversight, evaluations of the training itself, and in some cases through the administration of appropriate certification or licensing exams.

Training needs and the effectiveness of training are routinely reviewed by the quality management team through the management review process. Additional training may be required to address changes and revisions to the OMQMP. Training on OMQMP revisions may be communicated through weekly construction meetings, quality task force meetings, staff meetings, readiness review meetings, toolbox talks, and other scheduled meetings, as needed.

Project staff are made aware of the relevance and importance of their activities as they relate to quality through OMQMP orientation training, the communication of quality objectives, training on specific OMQMP procedures and familiarization with the Quality Policy. The Department is included in OMQMP orientation training.

g. Records and Document Management System

Record control will be handled through a documented procedure in the OMQMP and will include preservation and archiving as required. Quality records will be maintained and available in electronic and paper format for review, inspection and auditing. FRMG will use a document control software platform, to coordinate and manage Project documents and provide access to all stakeholders as required. The system will be an interactive software system, which allows both internal and external users to manage and monitor their activities for several projects. Each user will have customized permission settings, which will be managed through a directory. This software will be highly secure, and has unlimited storage space. This platform can be managed from any web connected mobile device, tablet, laptop or desktop. There are many benefits to using this software including: users' ability to create, edit, and share Project information that is tailored to the permissions granted by their level of access; and the benefit of users being automatically updated as documents are added, closed, or changed. All QC/ QA records will be uploaded progressively to our document management site for review by the Department. In addition, document control will maintain hard copies on-site.

FRMG ensures that controlled documents and quality records are maintained in an efficient way to ensure currency of documents and availability of records to demonstrate conformance to the Performance Requirements. The PQM will regularly audit documented procedures and processes to ensure that they comply with the requirements of the ISO-9001 Standard. Audit reports will be submitted to the O&M Manager and analyzed by the PQM and corrective actions will be taken to rectify any deficiencies encountered. Controlled documents include the following:

- Quality Management System documents;
- Internal documents used for consistency of work;
- Documents of external origin such as regulation and guidelines.

The PQM is responsible for the development, monitoring, and verification of the QMS documentation. Superintendents will ensure that applicable documents within their areas of responsibility are maintained and controlled in compliance with the requirements of this procedure. Controlled documents are reviewed for accuracy and approved prior to issue. Documentation control ensures that:

- Documents are uniquely identified, including: title, document number and revision date;
- Pertinent documents are available at their point of use;
- Obsolete documents are promptly removed from all points of issue or use, identified as obsolete, and replaced with revised ones;
- Systems for controlling and documenting the changes are in place;
- Revisions and approval of documents are performed and identified; and
- Approval of documentation includes evaluation of content, completeness and clarity of document.

FRMG's quality procedures are reviewed at regular intervals, to confirm their adequacy and conformance to the applicable standards, regulatory requirements, and current organization

needs. Prior revisions of controlled documents that are required to be maintained for legal or information purposes are identified as obsolete, dated, and maintained in a separate file. Issue status is recorded in the document and the revision status of each section is identified on every page of the plan. Form numbers and their latest revision date will identify forms. An example of documents that will be controlled includes:

- Quality Assurance and Quality Control forms;
- Audit documents;
- Purchasing documents;
- External documents (e.g. manuals, standards).

The PQM ensures that controlled documents are maintained in compliance with requirements of this procedure. The audit documents contain the audit schedule and audit checklist. The audit schedule is used to inform the areas to be audited and the audit checklist is used as a tool for performing audits. FRMG is responsible for maintaining the revision and distribution of its own purchasing documents. Purchasing documents include all documents that are related to the purchase of products or services. Controlled purchasing documents include purchase orders and purchasing contract documents. External documents including specifications and guidelines that are subject to revision are maintained by the O&M Manager, where required. All controlled documents are identified by their title, number, revision date, and must be approved for issue. The responsible staff ensures that the following actions are taken, prior to issue of a controlled document:

- Review the document for adequacy and accuracy;
- Ensure that the revision is in compliance with the specific requirements;
- Ensure that the reviewers and approvers have signed and dated the documents for approval; Update the pertinent revision record, as applicable
- Issue the document to the applicable location(s);
- Identify and remove the obsolete documents from all points of issue or use; and
- Destroy the suspended documents, or identify them as “Obsolete”.

A revision control system is maintained to identify the current revision status of documents, and is readily available to preclude the use of invalid and/or obsolete documents. Changes to the controlled documents are performed as follows:

- Checked to see if the revision of the document is subject to the review procedure or the consent procedure;
- Review the requested change and consult with the responsible personnel;
- Review the background information of the document;
- Update the revision number and revision date of the document;
- Check if the document has been approved;
- Record or reference the nature of change that is made to the document, on the document or on the applicable revision record; and
- Remove the superseded document from point of use.

- The identification of the latest revision, review, and approval of documents and the applicable dates will be present on the document

Appendix E
O&M Limits

Front Range
Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

Appendix E – O&M Limits

The drawings delineating the O&M Limits during Construction and O&M Limits after Construction provided in Reference Document 29.11.01 will be the basis of the O&M Limits during Construction with applicable adjustments to reflect the final approved FRMG design while respecting applicable agreements and the intent of the reference drawings.

The final O&M Limits during Construction drawings will be submitted and FRMG will obtain Acceptance thereof from, the Department prior to the issuance of NTP2. The final O&M Limits During Construction drawings produced by FRMG will (a) include the Site for the entire Project, (b) reference the O&M Limits Reference Drawings, and (c) comply with the requirements of Section 2 of Schedule 11 and other provisions of Schedule 11 that apply during the O&M Work During Construction Period. The drawings will clearly detail Developer's responsibilities and interface of operations and maintenance activities performed by others, and will be presented in both detailed plans and cross-section drawings. The drawings will be consistent with FRMG's design, and will additionally be updated for Approval as required during the Construction Period to reflect changes to the as-built Project.

FRMG will submit O&M Limits After Construction Drawings to, and obtain the Acceptance thereof from, the Department prior to Substantial Completion. The O&M Limits After Construction drawings produced by FRMG will (a) include the Site for the entire Project, (b) reference the O&M Limits Reference Drawings, and (c) comply with the requirements of Section 3 and other provisions of Schedule 11 that apply during the Operating Period. The drawings will clearly detail FRMG's responsibilities and interface of operations and maintenance activities performed by others, and will be presented in both detailed plans and cross-section drawings. The drawings will reflect the as-built condition and will be updated if the as-built condition changes.

Front Range
Mobility Group

APPENDIX I
DRAFT MAINTENANCE MANAGEMENT PLAN

VOLUME 2 – TECHNICAL SUBMISSIONS
Binder 14 of 18

CENTRAL 70 PROJECT
PUBLIC DISCLOSURE
Administrative and Technical Proposal:

Front Range Mobility Group

THE EXTRA MILE

APPENDIX J
DRAFT STRATEGIC COMMUNICATIONS PLAN

CONNECTING COMMUNITIES

Front Range
Mobility Group

Draft

Strategic Communications Plan

For

Central 70 Project

Prepared By:
Front Range Mobility Group

Front Range Mobility Group	Central 70 Project Draft Strategic Communications Plan	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Table of Contents

List of Attachments

Construction Period Communications Plan

ATTACHMENT A Sample Cover Sheet
ATTACHMENT B Sample Business Coupons
ATTACHMENT C Sample Employee Email

Acronyms and Abbreviations

Apps	Applications
CCC	Crisis Command Center
CCD	City and County of Denver
CCP	Crisis Communications Plan
CDOT	Colorado Department of Transportation's
CPCP	Construction Period Communications Plan
CTMC	Colorado Transportation Management Center
DBE	Disadvantaged Business Enterprise
ECWP	Environmental Compliance Work Plan
EIS	Environmental Impact Statement
ESB	Emerging Small Business
FRMG	Front Range Mobility Group
HOV	High Occupancy Vehicle
HTPE	High-Performance Transportation Enterprise
ITS	Information Technology System
LEP	Limited English Proficient
MOCP	Maintenance and Operations Communications Plan
MOT	Maintenance of Traffic
MUTCD	Manual on Uniform Traffic Control Devices
NDCC	North Denver Cornerstone Collaborative
NTP	Notice to Proceed
NWC	National Western Center
O&M	Operation and Maintenance
P3	Public Private Partnerships
PCM	Project Communications Manager
PI	Public Involvement
RTD	Regional Transportation District
SCP	Strategic Communications Plan
VMS	Variable Message Signs

1. General

1.1. General Requirements

1.1.1 Introduction

Front Range Mobility Group (FRMG) fully understands the communication and outreach commitments made by the Department during the I-70 East Environmental Impact Statement process and our supporting role within CDOT's already established communications team. We have studied CDOT's 13-year history of extensive outreach and community engagement — including the numerous neighborhood meetings, working groups, topic-specific meetings, public hearings, community leader meetings, telephone town halls, and other comprehensive outreach that has already taken place — and formed our communications plan around these discussions, commitments, and existing relationships.

Our draft Strategic Communications Plan (SCP) incorporates the required individual plans of the Construction Period Communications Plan, Maintenance and Operations Communications Plan, and Crisis Communication Plan, addressing both public information and strategic communications management. Each plan will be submitted to the Department for Approval, as well as updates for Acceptance annually, or whenever conditions require modifications.

FRMG will work collaboratively with the Department to continue and expand upon the already robust and coordinated communications approach. Specifically, we will integrate our communication team into the Department's to further develop, monitor, and assure the effectiveness of the plans as we move into the Construction Period. Additionally, the SCP proposes new communication methods for early and consistent communication of construction activities. The SCP follows Schedule 14 requirements and includes additional commitments above and beyond the requirements in the Project Agreement.

Through our involvement with this Project, both prior to and during the procurement process, we have learned about stakeholder concerns about street traffic, noise, and air quality, and we will be sensitive to the "fatigue" from the important components for the long EIS process. Success of this SCP will be understood as minimizing community anxiety by further building on the trust the Department has already established, along with continuing to help build Project support and acceptance within the community. We will work with the Department on specific strategies such as how to best establish and maintain two-way communication with residents in the Elyria and Swansea neighborhoods, local businesses, schools, community leaders, and others likely to be impacted by the construction and long-term maintenance of the Central 70 Project

A cornerstone of our SCP is to continue to offer information in multiple formats so that each stakeholder can access the information they need in the format they prefer, provided in both English and Spanish. Our approach creates opportunities for open dialogue between FRMG, the Department, and the stakeholders; involves the community by finding context-sensitive solutions; uses tactical key messaging for public information sharing; accommodates non-motorized travelers (pedestrians, bicyclists, persons with disabilities); ensures stakeholders are updated on progress, risks and possible issues; and solicits feedback to improve

communication tools and strategies, and builds trust that FRMG and the Department are delivering to expectations.

1.1.2 Issue Awareness

FRMG will document our communication strategies with a full awareness and understanding of the issues surrounding this Project. Effective communication doesn't just convey facts; it enables stakeholders to better understand their role in the Project and engages everyone who has an interface with the Project. Our understanding of the current situation and issues surrounding this Project include the following:

- *Communication and outreach commitments made in the I-70 East EIS*: Throughout the extensive EIS process, discussions have been ongoing between CDOT and residents, community leaders, businesses, and other stakeholders. Upon execution of the Program Agreement, our communications team will coordinate with CDOT's existing team to make sure we fully understand the existing commitments made over the past 13 years. We also will undertake an additional review of the existing materials, meeting notes, and other collateral CDOT has been using to communicate to stakeholders and discuss these with the Department to enhance our understanding of the history of these efforts.
- *Presence of an environmental justice community with limited English-proficient residents and business owners:* Because of the environmental justice history, as well as the bilingual needs of the stakeholders, we have added both a bilingual Community Liaison and a bilingual Business Liaison, with capabilities to translate spoken messages and printed materials. Additionally, Kathy Berumen, FRMG's Project Communications Manager, is bilingual and is intimately familiar with the Metro Denver area, its neighborhoods, residents, and bilingual stakeholders.
- *Community "fatigue" based on the long EIS process***:** We are sensible to the "fatigue" from the extensive EIS and will work with the Department on ways to inform and engage with the community.
- *Diversity of stakeholders including local residents, local governments, commuters, small and local businesses, and major national/international corporations:* Stakeholder diversity requires the SCP to incorporate a variety of tactics to engage a broad spectrum of audiences. Relevant stakeholders on the Project include, but are not necessarily limited to: property owners and property management companies, Local and regional business owners, employees and customers, Registered Neighborhood Organizations and neighborhood associations, special interest groups, Local churches, police and fire personnel, local governments, residents, and commuters.
- *Large, separate infrastructure projects near the Project area including the redevelopment of the National Western Center:* The existence of other significant projects in the area, such as the National Western Center redevelopment, requires specific understanding and synchronization. Our plan proposes coordinating communications with these other teams when these stakeholder groups overlap.
- *Use of a public-private partnership to deliver this Project***:** As local companies, we understand the challenges faced in Colorado on P3 projects issues (i.e., transparency). We will work with the Department to use lessons learned from our past P3 projects to

ensure we maintain transparency among stakeholders, specifically using the media and communicating with elected officials and other leaders on the benefits the P3 approach offers to the Central 70 Project.

2. Staff Requirements

2.1 General Requirements

2.1.1 Project Communications Manager

Kathy Berumen will serve as FRMG's full-time Project Communications Manager (PCM), meeting the requirements in Schedule 14 Strategic Communications and Schedule 27 Key Personnel. She will be responsible for leading the FRMG communications team in assisting the Department to maintain positive relationships for government Local Agencies, businesses, residents, the general public, and other stakeholders; she will oversee all communication efforts during the Term. The PCM will work in close Partnership with Project Manager Alvaro Muelas, and she will coordinate (during Construction) with Design-Build Manager Jan Bohn and (during the Operating Period) with O&M Manager Mike Smith.

2.1.2 Community Liaison

Jaime Moreno will serve as FRMG's full-time Spanish/English bilingual Community Liaison, meeting the requirements in Schedule 14 Strategic Communications. Jaime will coordinate closely with the Department and is responsible for ensuring that local residents, businesses, and nonprofit groups are informed about the Project and have a single point of contact for all questions and concerns during the Term. As required in Schedule 14, the Community Liaison will be housed at 3600 East 46th Avenue a minimum of three days per week (or at a frequency mutually agreed upon by FRMG and the Department) until the Project License Start Date in respect thereof (or any later date that is a reasonable period (as agreed by the Department and FRMG prior to the date that FRMG proposes to demolish such property).

2.1.3 Developer's Communication Team

FRMG and the Department will jointly determine which members of FRMG's communication team will be housed at the Developer's Project office or at the 3600 East 46th Avenue property and at what times in the period prior to the Project License Start Date. Our communications team — including Kathy Berumen, Jaime Moreno, our Business Liaison, and other key positions — will reside in the Denver Metro area and be immediately available to co-locate with the Department, or as needed by the Department. The FRMG communication team will be housed with the O&M team during the Operating Period. The communication team is discussed further in Section 3.1.1 Developer's Communication Team.

3. Staff Coordination

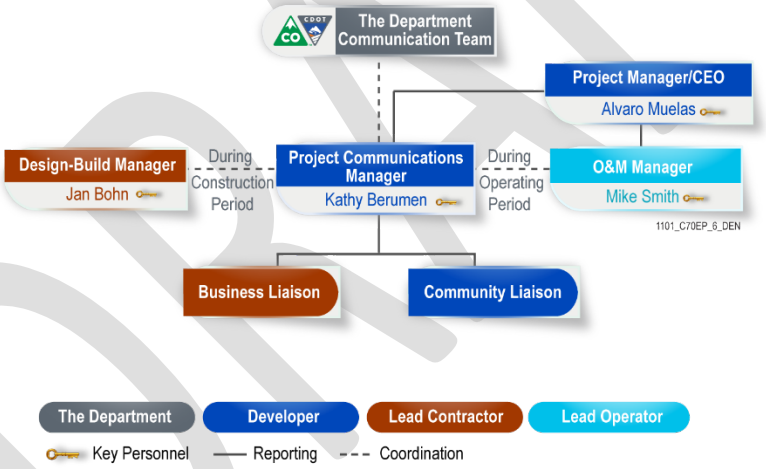
3.1 General Requirements

3.1.1 Developer's Communication Team

Prior to issuance of Notice to Proceed 1 (NTP1), FRMG will submit to the Department the names and full resumes of all members of our Communication Team, with assigned roles and responsibilities. We also will provide a staff availability list covering all the days and hours during the Construction Period. FRMG will update this information quarterly during the Construction Period and annually thereafter throughout the Term, or as needed to ensure the information remains up to date.

Figure 1 displays a Proposed Communication Team Organizational Chart, showing the relationships among the FRMG Communication Team during both the Construction Period and Operating Period. Solid lines show authoring and direct reporting, while dotted lines show coordination and communication relationships.

Figure 1. Communication Team Organizational Chart.



The Project Communications Team also will coordinate with the Civil Rights Program Manager and the ESB/DBE/Workforce Development Team, especially during the Construction Period, to support FRMG's ESB/DBE/Workforce Development efforts.

3.1.2 Meetings

FRMG will host meetings listed below, with a variety of participants. The meetings will be held weekly, biweekly, monthly, quarterly, or annually; they will vary depending on whether we are in the Construction Period or Operating Period, and will meet the needs of the Department and the

Project team to communicate with stakeholders and the community at large. **Table 1** provides a summary of all the meetings throughout the Term, including attendees, frequency, and whether or not the meeting occurs only during Construction Period, Operating Period, or both. Following Table 1 is a more detailed description of the meetings.

Table 1. Communication Meetings.

Meeting	Attendees	Frequency	Construction Period	Operating Period
Strategic Communications Meetings	Department Communications Team FRMG Communication Team Key FRMG Construction and O&M personnel	Weekly	✓	✓
Project Stakeholder Meetings	Department Communication Team FRMG Communication Team Key FRMG Operational personnel stakeholders	Monthly/Quarterly	✓	✓
Strategic Communications Task Force Meeting	Department Communication Team FRMG Communication Team Key FRMG Operational personnel Emergency Responders	Quarterly	✓	
MOT Task Force Meeting	Department CCD PCM Key FRMG Operational Personnel MOT Task Force Lead RTD Denver Police Department – Traffic Unit Colorado State Patrol and Local Agencies	Monthly	✓	
Public Meetings	Department Communications Team FRMG Communications Team Community stakeholders Business stakeholders Construction Manager and other needed project staff	Monthly/As Needed	✓	✓

Strategic Communications Meetings: FRMG will host weekly Strategic Communications meetings throughout the Term. These meetings will be hosted at the Project Office and will include the Department's Communication Team, FRMG's Communication Team, key FRMG construction, and O&M personnel. The meetings will be used to discuss weekly communication issues and provide details for upcoming media advisories, press releases, community meetings, Lane Closure Reports, website updates, any Emergencies or Incidents that have occurred on the Project, and information line recordings. The PCM will develop an agenda for each meeting and submit it to the Department in advance.

Project Stakeholder Meetings: FRMG's Communications Team will work very closely with local Emergency response providers, such as the Colorado State Highway Patrol, Denver Police Department, Denver Fire Department, Denver Sheriff Department, Aurora Police Department, Aurora Fire Department, Commerce City Police Department, Commerce City Fire

Department, ambulance service providers, and local hospitals. Representatives from each agency will be invited to attend the monthly Project Stakeholder meeting during the Construction Period. As the transition to the Operating Period is completed, the frequency of these meetings will be reduced, most likely to a quarterly basis. This meeting is designed to provide all stakeholders a forum to voice their thoughts on the Project, jointly resolve any issues, and ensure their concerns are heard and understood by FRMG.

Strategic Communications Task Force Meetings: FRMG will create a working Strategic Communications Task Force that meets quarterly during the Construction Period to discuss plans and Permits review, Project progress, Utility coordination, and construction engineering and inspection. The core team members included in all Strategic Communications Task Force Meetings are the Department, City and County of Denver (CCD), and depending on the particular topic of discussion, others will be invited as well, such as other Governmental Authorities, regulatory agencies, Utility Owners, and Railroads. This meeting is designed to discuss the Baseline Schedule upcoming activities and provide all stakeholders a partnering forum to have a voice, jointly resolve any issues, and ensure their concerns are heard and understood by FRMG.

Public Meetings: FRMG will host and facilitate one in-person public meeting within one month after the issuance of the NTP2 to introduce FRMG and seek input on defining community values. FRMG also will hold a public meeting prior to major construction activities (e.g., a major traffic shift, removing the viaduct, the start of a major phase) to discuss with the community what to expect during these activities, including detours, Closures, and other impacts. These meetings will be interactive in nature, and FRMG will present the information to the community through PowerPoint presentations, wall maps (allowing the community to walk around and study the map), and other mediums, to help convey the message. These meetings will let the community ask questions and voice their concerns, in addition to learning about new opportunities to be involved on the Project.

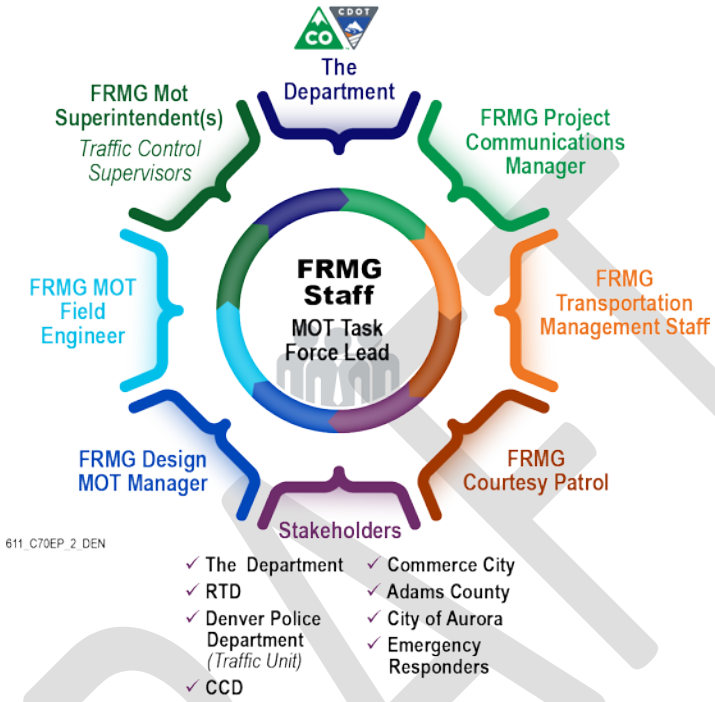
Agendas will be submitted to the Department for Acceptance two weeks prior to the meeting date; they will be publicized through multiple means, including (but not limited to) local media, paid advertisements in newspapers, email, inserts in local newsletters, door-to-door flyers, and mailers.

In addition to general community Public Meetings, FRMG will hold public meetings focused on local and regional business impacts at designated Project phases. At least two of these will be within two months after the issuance of NTP2. This will be a workshop-style public meeting to yield a better outcome on how the FRMG can improve communications, listen to the community, and continue to highlight the project benefits the Department has communicated. FRMG also will coordinate with the Department to respond to all feasible requests to attend regular community and stakeholder meetings/events.

Maintenance of Traffic (MOT) Task Force Meeting: As described in the Transportation Management Plan (TMP), the MOT Task Force will meet weekly during the design development process and throughout the Construction Period. MOT Task Force meetings will be scheduled and chaired by the MOT Construction Lead. The purpose of these meetings is to ensure proper coordination with the affected agencies. Agendas will include furthering the development and refinement of traffic control plans; reviewing upcoming lane Closures; discussing pertinent

information that must be disseminated to the general public; and obtaining input from (and sharing information with) meeting attendees. **Figure 2** below from the TMP shows the attendees proposed to be invited to this meeting.

Figure 2. MOT Task Force Meeting



These meetings also can be used to discuss lessons learned and feedback collected from stakeholders and the public on the FRMG Communication Strategies. This discussion can be used to ensure the effectiveness of the Project's communication, ensure the Department's communication goals are being met, and improve any communication tools or strategies being implemented by the team.

3.1.3 Public Involvement Services Contact Sheet

FRMG will prepare a Public Involvement (PI) Services Contact Sheet containing the names and contact information for the key stakeholders for the Project. This list will include names, addresses, phone numbers, and email addresses for the organizations involved. This Contact Sheet will be submitted to the Department prior to the issuance of NTP1 and updated annually throughout the Term or as needed to ensure it remains up to date. The PI Contact Sheet will include the following:

FRMG and the Department's

- Project Director;
- HPTE Director;
- Project Communications Manager;
- Project website administrator;

- Community Liaison

Project Colorado Transportation Management Center (CTMC) contact City and County of Denver

- Mayor's Office
- Public Works
- PI Office
- Chamber of Commerce
- Fire/Rescue
- Police Department

City of Aurora

- City Manager's Office
- Public Works
- PI Office
- Chamber of Commerce
- Fire/Rescue
- Police Department

City of Commerce City

- City Manager's Office
- Public Works
- PI Office
- Chamber of Commerce
- Fire/Rescue
- Police Department

Local State Patrol Office

Local Hospitals

Key Stakeholders

- Local schools and School Districts
- Businesses
- Community Centers
- Visitor/Tourist Destinations
- Churches
- Registered Neighborhood Organizations and Associations

Railroads

Airports

Utility Owners

Commercial Vehicle Operators (Airport taxi and shuttle companies)

Others as defined by the Department

4. Draft Strategic Communications Plan

4.1 General Requirements

4.1.1 Overall Strategic Communications Plan

FRMG developed and will maintain an overall Strategic Communications Plan (SCP) consisting of the following individual plans to manage and coordinate two-way communications during each phase of the Project. These three plans include planned strategies, primary stakeholder communication lists, and the identification of Public Involvement issues and proposed outreach strategies:

1. Construction Period Communications Plan (CPCP), Section 5 of the SCP
2. Maintenance and Operations Communications Plan (MOCP), Section 6 of the SCP
3. Crisis Communications Plan (CCP), Section 7 of the SCP

The SCP highlights the formal communication channels, face-to-face opportunities, Project communication, and the use of feedback to determine the effectiveness of the communication plan and improve the strategies and tools. Our SCP ensures we have a shared vision with the Department, clarifies the organizational structure and partnerships with the Communication Teams, focuses on collaborative communication tools, and ensures our structure and tools are aligned for effective communication with the public and stakeholders.

FRMG will use traditional communication methods (print and broadcast media, print collateral, website), along with effective use of new techniques (e-Newsletters, texting, mobile apps, social media, interactive media, bilingual communications, etc.) to provide information that is timely, easily accessible, and addresses the needs of a culturally diverse population.

FRMG will partner with the Department to further develop key messages, provide timelines and advanced information about construction activities, and help disseminate this information by utilizing a variety of communication tools. **Our proposed guiding principles to guarantee no surprises, build trust, and ensure success include the following:**

- Build on relationships and work that have already been established over the past 13 years.
- Enlist the media as a partner, so it can help get out the word on the Project, report what's new, and communicate how people can get involved during each phase.
- Keep the legislature in the know by educating Local Agencies about the Project.
- Leverage existing relationships. Build on the Department's long history of engaging the community. Continue to keep local officials, community members, and others informed and engaged, and enlist them in reaching to their communities and constituents.
- Use existing community resources. Capitalize on local community resources (e.g., websites, newsletters, newspapers, meetings) to bring greater exposure to this Project.
- Leverage other ongoing communication efforts. Capitalize on ongoing projects in the area (e.g., National Western Center) to bring greater exposure to this Project.
- Manage expectations. Educate the public about the Project, including its benefits and merits.

- Use easy-to-understand language, graphics and media. Tell the Project story in a way people clearly understand. Keep it simple and consistent. Ensure key messages are consistent with the Department's messaging, communication standards, and initiatives.
- Measure and use data and Project successes to tell our story. Use Department and Project data, traffic forecasts/patterns, and other information to support the Project.
- Use innovative and effective outreach tactics to go above and beyond. Make every effort go above and beyond required Public Involvement by being creative and finding effective ways to engage stakeholders and the public.
- Identify potential communication risks and develop communication strategies to mitigate those risks. Develop strategies to address concerns and issues to ensure they do not negatively impact the Project or Communication Goals and Strategies.

Table 2 describes the proposed goals, objectives, stakeholders, and engagement tools of the SCP:

Table 2. Strategic Communication Plan Summary.

The Goals of these Plans Include:
• Provide two-way communications • Provide timely and accurate information for construction activities, including lane Closures, detours, and other activities • Increase online visibility of Construction Work and O&M Work activities • Minimize impacts • Ensure a Shared Vision with the Department • Provide an organizational structure and partnership roles and responsibilities • Provide collaborative communication tools
The Measurable Objectives of the Plans are to:
• Develop clean, consistent messages delivered in "one clear voice," and convey those messages at the appropriate time to the appropriate audiences • Generate positive media coverage • Increase awareness and involvement of specific targeted groups of individuals and generate support from them • Meet the audience directly in a collaborative and approachable manner • Provide advanced notice for activities that will affect stakeholder's daily lives • Plan, employ and measure effectiveness of mitigation strategies • Manage stakeholder expectations • Provide feedback mechanisms for stakeholders • Provide timely response to stakeholder concerns
The Plans' Stakeholders include:
• Local Area Residents • Local/Regional Business Owners, Employees, and Customers • Registered Neighborhood and Local Associations/Organizations • Property Owners and Property Management Companies • Local Schools, Universities, and Colleges • Local Churches and Community Organizations • Taxi, Shuttle, and Rental Car Companies • Delivery and Courier Services • Transportation Management and Advocacy Organizations • Chambers of Commerce • Commercial Vehicle Operators and Ports of Entry

- Denver Permit Office and Colorado Motor Carriers Association
- Tourist Destinations and Organizations
- Commuters and the Traveling Public, including Pedestrians, Bicyclists, and Persons with Disabilities
- CDOT employees, Headquarters, and Office of Communications and Public Relations
- Denver International Airport
- National Western Center
- Regional Transportation District (RTD)
- Local, Regional, and State Government Officials and Offices of Public Information
- Emergency Response Agencies (fire rescue, police, state patrol, hospitals)
- Disadvantaged Business Enterprises and Emerging Small Businesses
- Utility Owners
- Railroads
- News Media (radio, print, and television)

The Plans' Engagement Tools include:

- Phone/Emails
- Meetings (community, person-to-person, one-on-one, local government, door-to-door [if needed] with interpreters)
- Social Media (Facebook, Twitter, Instagram)/Mobile Technology and Apps
- Stakeholder Distribution List
- Tours and Communication Events
- Lane Closure Reports, Traffic Alerts
- Project Website; page on CDOT Website
- Project Newsletters
- Classroom Educational Sessions
- Language Assistance for Limited English Proficient Persons
- Public Communications Collateral (flyers, factsheets, brochures, presentations, memoranda, posters)
- Photos and Videos
- Project Identification Signage
- Feedback System (comment cards, website comments, 24-hour hotline)
- News Releases and Public Service Announcements

4.1.2 Planned Communication Strategies

Each of the plans provided in this document includes deliberate communication strategies, primary stakeholder communication lists, and identification of possible public information issues and proposed outreach. FRMG will submit each plan to the Department for Approval according to the timelines provided in this schedule. FRMG will monitor and improve the effectiveness of each plan and resubmit for Acceptance annually upon the anniversary of initial Approval by the Department, or whenever the following conditions exist:

- A plan or procedure no longer adequately addresses the matters it was originally intended to address
- A plan or procedure does not conform to the requirements of the Project Agreement
- An audit by FRMG or the Department identifies a deficiency requiring an update
- Organizational structure changes require revision to a plan

Our SCP is a living document, designed to be adaptable and expected to change over time to accommodate shifts and changes in PI, opinion, the Department's needs and goals, and Project performance. Our planned communication strategies are designed to take into account the way our stakeholders receive, process, and express information so we can provide the best possible communication strategies to achieve communication success.

4.1.3 Cover Sheet

FRMG has included a cover sheet in **Attachment A** that clearly identifies what changes were made in each update to expedite the Department's review, as well as a redline and final copy for all plan resubmittals.

4.1.4 FRMG and Department Roles and Responsibilities

FRMG will collaborate with the Department to execute the Strategic Communication Plan. The Department will have final Approval of all communication strategies, tactics and messaging. **Table 3** reflects the basic roles and responsibilities for the Department and FRMG. The roles and responsibilities of the FRMG Communication Team is provided in **Table 4**.

Table 3. Roles and Responsibilities for Department and Contractor.

Roles and Responsibilities	FRMG	The Department	Joint Responsibility
Annually monitor and improve Strategic Communications Plan.	●	❍	❍
Communicate overall vision of the Project, why it is needed, what work will be done, how the Project will benefit customers, how the Project fits into broader transportation plans.	❍	●	❍
Communicate the overall purpose of, implementation of, and education on how to use the Tolled Express Lanes.	❍	●	❍
Communicate coping information during the Construction Period and the Operating Period, including details about the Traffic Management Plan, and other activities that affect residents and businesses.	●	❍	❍
Develop key messages related to Construction Work and O&M Work activities. The Department will have final Approval before the messages are disseminated.	❍	❍	●
Governmental relations	❍	❍	●
Daily inquiries. FRMG will handle all calls pertaining to traffic, incidents, and daily occurrences along the Corridor.	●	❍	❍
Crisis management/incidents. FRMG will be the on-site, immediate responders to an incident, with support from the Department.	❍	❍	●
Media Requests. All communication requests from Government Authorities or the media will be referred to the Department. FRMG will provide information and participate in meetings or site visits, as directed by the Department. FRMG will provide experts available to the Department for assistance in media requests. FRMG also will assist in media site visits and adhere to necessary media deadlines, as requested by the Department.	❍	❍	●
Tracking and reporting phone inquiries	●	❍	❍
Tracking and reporting on Limited English Proficiency (LEP) requests and services	●	❍	❍

Note: ❍ = Primary Responsibility ● = Secondary Responsibility

Table 4. FRMG Communication Team Roles and Responsibilities.

Title	Responsibilities and Authorities
Project Communications Manager (Kathy Berumen)	• Reports to the Project Manager • Point of contact for the Department's communications team • Responsible for the overall management of the FRMG Communications Team • Manage the flow of information from the FRMG Project team to the Department • Liaison between construction and operations teams and the Department's communication team *For crisis-related information* • Attend MOT Task force meetings and serve as on-site liaison with Design-Build Manager, MOT Manager, and Safety Manager • Answer calls and requests for information from Project employees as directed by the Department • As Approved by the Department, provide updates to internal audiences, including applicable Project team contractors • If a CCC is set up, will support CCC staff and serve as liaison between CCC and on-site personnel
Community Liaison (Jaime Moreno)	• Provide bilingual communication, both spoken and written • Responsible for drafting all written materials, including news releases, briefing documents and statements to be Approved by the Department in English and Spanish *For crisis-related information:* • Compile post-crisis report on crisis incident information; social media usage; and community, business and government requests and responses • Provide information for messages posted on the Project website, CDOT or Project Facebook pages, and CDOT or Project Twitter pages, and other appropriate social media tools • Provide information as it becomes available for the Department to provide for incoming community, business, and government stakeholder calls • Participate in regular stakeholder meetings • Record caller information and responses for the PI hotline • If a CCC is set up: - Take notes at news conferences and briefings - Ensure all relevant information is provided for electronic, print, and online media coverage for use by the Department
Business Liaison	• Coordinate with the PCM on construction activities that will impact businesses • Provide businesses early notification and coping strategies • Work with businesses to find available resources to help them manage their business during construction and to incorporate the Project into their advertising and marketing efforts • Select one business to highlight each month in the Project Newsletter • Be in constant communication with businesses about pending construction shortly after award, and how to best utilizing the tools, signage

Construction Period Communications Plan

Front Range Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

5 Construction Period Communications Plan

5.1 General Requirements

5.1.1 Prepare and Maintain a Construction Period Communication Plan

This draft Construction Period Communications Plan (CPCP) provides the foundation and guidelines for two-way communications of Project information with the public. FRMG will use this CPCP throughout the duration of the Construction Period to manage and implement the public information process. FRMG's CPCP will be submitted to the Department for Approval prior to the issuance of NTP 1. The CPCP will be included in the Public Information Toolbox referred to in Section 5.2 Public Information and Outreach Tools.

5.1.2 Construction Period Communication Plan Contents

5.1.2.a Community, Government and Business Stakeholders

One of the most critical aspects of public information is to develop and manage relationships with the stakeholders the Project impacts. FRMG's Communications Team will meet with the Department's Communications Team to make sure we understand each existing stakeholder group's relationship to the Project, history of communication, and concerns, letting us best plan communications and messaging during the Construction Period. To manage these relationships, FRMG's public information approaches and tools will be tailored to stakeholder needs, ensuring they have accurate information about the Project schedule, progress, and construction impacts as they arise.

FRMG's Communications Team will work with the Department's Communication Team to develop coping messages, thus creating a unified partnership to deliver consistent and accurate information to community, government and business stakeholders. We understand that constructive stakeholder relationships improve risk management and provide better outcomes. We also understand that each individual stakeholder has their own set of requirements for Project information, and each prefers different ways of receiving communications. We have defined unique sets of communications and communication vehicles for individualized stakeholders. This plan identifies the different categories of stakeholders and defines the required information and communication methods that best suit each group. The following is a Construction Plan Primary Stakeholder Communications List:

- Local Area Residents
- Local/Regional Business Owners, Employees, and Customers
- Registered Neighborhood and Local Associations and Organizations
- Property Owners and Property Management Companies
- Local Schools, Universities, and Colleges

- Local Churches and Community Organizations
- Taxi, Shuttle, and Rental Car Companies
- Delivery and Courier Services
- Transportation Management and Advocacy Organizations
- Chambers of Commerce
- Commercial Vehicle Operators and Ports of Entry
- Denver Permit Office and Colorado Motor Carriers Association
- Tourist Destinations and Organizations
- Commuters and the Traveling Public, including Pedestrians, Bicyclists, and Persons with Disabilities
- CDOT employees, Headquarters, and Office of Communications and Public Relations
- Denver International Airport
- National Western Center
- Regional Transportation District (RTD)
- Local, Regional, and State Government Officials and Offices of Public Information
- Emergency Response Agencies (fire rescue, police, state patrol, hospitals)
- Disadvantaged Business Enterprises (DBE) and Emerging Small Businesses (ESB)
- Utility Owners
- Railroads
- News Media (radio, print, and television)

Community Stakeholders

We will participate in CDOT's Community Leader meetings, identify other existing community meetings for participation, and plan specifically targeted neighborhood meetings customized to fit the audience. Participation in community functions will be paramount to our outreach efforts, and we will include Project updates in both the Department's and the community's existing communication avenues (e.g., newsletters, website). All print and web materials will be approved by the Department and provided in English and Spanish. Bilingual staff will be available at events and meetings.

We have grouped community stakeholders into the following groups, since similar communication approaches will be used for these groups as outlined in the **Table 5.**

Table 5. Community Stakeholder Groupings.

Stakeholders	Communication Approach	Primary Tools
• Area residents • Registered Neighborhood Organizations and neighborhood associations • Property owners and property management companies • Churches • Local Businesses	• Direct one-on-one conversations, with the Community Liaison • Information booths at community events, at the request of the Department • Communicate early understanding of construction related traffic impacts	• Public Meetings • 24-hour public information telephone • Bilingual Community Liaison including participation at information booths at community events • Broadcast approved communications and through mobile technology, such as the Department's existing app, Colorado Roads

Stakeholders	Communication Approach	Primary Tools
	• Communicate alternative routes to encourage motorists to think ahead • Communicate progress information • Communicate route changes, detours, and coping strategies	• Door hangers and mailers • Email messaging notification and correspondence • Intelligent Transportation Systems (ITS) applications, Variable Message Signs (VMS) signage • Print and web materials in Spanish and English • Project Fact Sheets • Approved messaging to the Department for social media account updates • Project updates provided to the Department for the Project website • Signage and billboards • Community surveys
• Local Schools	• Communicate possible classroom disruptions • Communicate any impacts to the bus drop-off/pick-up process • Communicate safety guidelines • Communicate impacts to the parent drop-off/pick-up process • Classroom sessions providing engineering and safety education	• Project-Specific Outreach Program • Community Liaison participation at School Outreach events • Project management team participation in classroom sessions • FRMG School Safety Program
• Commuters • Delivery and courier services • Transportation management/advocacy organizations • Traveling public • Taxis, shuttles, and rental car companies • Commercial vehicle operators, Ports of Entry and Denver Permit Office, and Colorado Motor Carriers Association	• Communicate early understanding of construction related traffic impacts • Reduce congestion Encourage motorists to think ahead • Improve driver and worker safety • Communicate routing changes and detours	• ITS applications, VMS Signage • Project-specific social media accounts • Broadcast communications, mobile technology • Email notification and correspondence • Media partnerships, news releases, traffic releases • Project website • Partner with local transportation groups • On-call towing and recovery services • Signage/billboards
• Denver International Airport, National Western Center, RTD	• Establish a clear chain of communications for the distribution of information • Post detours • Provide routing changes to RTD	• Project update presentations and brochures • Joint events during peak seasons • Bimonthly Briefing • Post detours and routing changes at RTD bus/train stops and Denver International Airport • Task Force Meetings

Stakeholders	Communication Approach	Primary Tools
	• Create opportunities for joint events during peak seasons • Invite representative to monthly Project Stakeholder meeting	
• Emergency response/police and fire agencies, such as the Colorado State Patrol, Denver Fire Department, Denver Sheriff Department, Aurora Police Department, Aurora Fire Department, Commerce City Police Department, Commerce City Fire Department; and ambulance service providers and hospitals	• Project Stakeholder Meeting to discuss concerns and impacts the Project will have on the community and the Emergency response agencies ability to respond in a timely manner, due to these impacts • Create and maintain a contact list identifying who and how we communication with each agency, and will integrate the Emergency contact list with the PI Services Contact Sheet • General construction notifications for internal dissemination and representative from each	• PI Contact Sheet • Task Force Meetings • Email notifications • Signage along corridor
• Tourist destinations and organizations	• Communicate early understanding of construction related traffic impacts • Suggest alternate routes and times	• Email notification and correspondence • Project update presentations and brochures • Signage along corridor
• CDOT employees and other internal team members, including CDOT Headquarters, the Office of Communications, and the Government Relations office	• Establish a clear chain of communication for the distribution of information • Maintain open dialogue to aid in Project execution and delivery	• Task Force Meetings • Email notification and correspondence • Project update presentations and brochures
• Utility Owners	• Communicate early understanding of construction related traffic impacts	• Task Force Meeting • Email notification and correspondence • One-on-one meetings as needed
• Railroads	• Communicate early understanding of construction related traffic impacts	• Task Force Meeting • Email notification and correspondence • One-on-one meetings as needed

FRMG's goals for communicating with community stakeholders and the primary tools used are summarized in **Table 6**.

Table 6. Goals for Communicating with Community Stakeholders and Primary Tools Used.

Goals	Tools
• Build trust and positive relationships	• 24-hour hotline • Broadcast communications/mobile technology
• Communicate early understanding of construction related traffic impacts	• Bilingual Community and Business Outreach Liaisons • Bilingual staff manning information booths at community events • Print and web materials in Spanish
• Communicate possible classroom disruptions/bus schedule impacts and drop-off/pick-up traffic impacts	• Project-Specific School Outreach plan • Bilingual Community Liaison
• Communicate route changes and detour	• Courtesy Patrol/on-call towing and recovery services
• Communicate safety guidelines	• Direct one-on-one conversations
• Encourage motorists to think ahead	• Door hangers and mailers • Email notification and correspondence • Project Fact Sheets • Project Newsletter • Signage/billboards
• Encourage pedestrians, bicyclists, and persons with disabilities to think ahead	• Project-Specific social media accounts updates • Project update presentations and brochures • Project website updates
• Improve driver and worker safety	• ITS applications, VMS signage
• Minimize disruptions during construction	• Project Business Outreach Program/Bilingual Business Liaison
• Reduce congestion	• Media partnerships, news releases, traffic alerts/releases

FRMG's Communications Team will work very closely with local Emergency response providers such as the Colorado State Highway Patrol, Denver Police Department, Denver Fire Department, Denver Sheriff Department, Aurora Police Department, Aurora Fire Department, Commerce City Police Department, Commerce City Fire Department, ambulance service providers, and local hospitals. We will create and maintain a contact list that identifies all agencies and how we communicate with them. General construction notifications will be sent to them for internal dissemination, and representatives from each agency will be invited to attend the monthly Project Stakeholder meeting. This meeting is designed to provide all stakeholders a forum to have a voice, jointly resolve any issues, and ensure their concerns are heard and understood by FRMG.

FRMG will create a working Strategic Communications Task Force that meets quarterly to address the concerns and impacts the Project will have on the community and their ability to respond in a timely manner. The Strategic Communication Task Force provides a forum for FRMG, the Department, Emergency responders, and stakeholders to have a voice, jointly resolve any issues, monitor the status of the SCP, implement any improvements, and ensure concerns are heard and understood by FRMG.

FRMG's Communications Team will establish a clear chain of communications for the distribution of information to the RTD, NWC, and Denver International Airport. We will create and maintain a contact list identifying the agencies and how we communicate with them, and our staff will be available to present Project updates. We will post detours and routing changes at RTD bus and train stops. FRMG will work with these entities to create opportunities for joint

events during peak seasons, and representatives from all will be invited to attend the monthly Project Stakeholder meeting.

FRMG's Communications Team will develop relationships with utility owners and railroad representatives to ensure they are informed and included in necessary communications. We will maintain open dialogue to aid in Project execution and delivery, and their representatives will be invited to attend the Strategic Communication Task Force meeting, as needed.

To communicate with the traveling public and commuters, FRMG's Communications Team will develop tailored messages for the Department to use for existing mobile technology (apps), including ***Colorado Roads***, and we will utilize other available technology, such as ***Powerline***, to provide time-sensitive updates to the community.

Colorado Roads App ***Powerline App***

FRMG understands the environmental justice designation surrounding this Project, where Limited English Proficient residents and business owners are within close proximity. More than half of the population in the Globeville, Elyria, and Swansea neighborhoods identify or have been identified as Hispanic, and approximately 70% speak Spanish at home. As the Project progresses to removing the viaduct and replacing it with a depressed roadway segment in this area, construction impacts will be significantly greater than those further east of Colorado Boulevard. **However, FRMG will perform this Work in a single phase, minimizing the impacts to the community.** We will develop key messages specifically for that phase of construction and will hold a Public Meeting prior to that construction phase to keep the community informed of specific construction activities and when they will be happening.

To contribute to the community development needs of the Globeville, Elyria, and Swansea neighborhoods and continue to maintain a positive relationship between local communities, **FRMG has partnered with Entravision, owners and operators of four local Spanish language TV stations and three local Spanish language radio stations.** Project and coping information will be represented in the media outlets most accessible to these distinct neighborhoods, enabling each to modify their travel behavior, minimizing public inconvenience. FRMG also will engage with Entravision's partners in the area to create community development programs that enrich neighborhoods and promote opportunity. Their partners include, but are not limited to, the National Western Center, Colorado Rapids, and Clinica Tepeyac.

We will work with the Department to create, upon Approval from the Department, a news segment on the Project for Entravision's ***Univision Colorado*** (Channel 50). This will appear once a week (and potentially more if activities so require) on both the 5 p.m. and 10 p.m. newscasts. FRMG's Community Liaison will work with the Design-Build Manager to gather information on the Project's current status, impacts, detours, etc., and will provide this information to the Department's representative, if that person chooses to be interviewed. The

segment will be an on-site interview of about 30 seconds. It will be taped earlier (i.e., not a live spot), so the Department's representative will not need to be present during broadcasts. The Community Liaison will be available to attend these newscasts to provide additional information if needed.

FRMG also will work with the Department on a bimonthly feature on Channel 50's ***Despierta Colorado*** ("Wake Up Colorado") TV program. ***Despierta Colorado*** is a two-minute window in Univision's national programming, ***Despierta America,*** and is shown between 7:30 a.m. and 8 a.m. Monday through Friday. ***Despierta Colorado*** promotes Colorado community-based Hispanic organizations and initiatives. FRMG's Community Liaison will perform a similar role for this feature as above for the Univision Colorado feature. In addition to the upcoming activities and schedule, we will highlight unique features of the Project that fit the current scope of work, spotlight community organizations or businesses affected by construction, promote Project events, and so on. The program is pre-taped and pre-produced, and it will feature graphics and photos/videos Approved by the Department.

FRMG will work with the Department on developing messages for Entravision Communication Corporation (Entravision) to engage or communicate with the Project community via promotions, radio remotes, and television spotlights in the neighborhoods; all Project press/traffic releases will be featured on both radio and TV. When FRMG hosts job fairs for the Workforce Development program, Entravision will sponsor and promote them, along with DBE/ESB Outreach events, Public Meetings, and other events hosted by FRMG. The events will be publicized on radio and TV with the Approval from the Department.

Government Stakeholders

FRMG will assist the Department's comprehensive government relations program by providing timely information to the Department regarding construction activities, and will support and participate in meetings as requested. When referencing government stakeholders for the purpose of this document, this means Local Agencies.

FRMG will develop messaging to provide the Department for Local Agency distribution; such messaging will contain detour information that may impact local roadways and provide coping messages for the users of those roadways.

Throughout the Work, all communication requests received by FRMG from Local Agencies (not including those requests related to Project management or coordination for Local Agency Permits) will be immediately referred to the Department.

FRMG's PCM will be the Department's main point of contact to provide the requested information. An internal process will be established within the FRMG Project team to route all inquiries from government and media stakeholders to the appropriate communications team member. Planned communications will be discussed during the weekly Strategic Communications meetings with the Department, as well as during the MOT Task Force meetings on site. FRMG will support the Department for Project tour and event needs. The point persons for unplanned events will be assigned at the beginning of the Project to streamline communications, and this person will follow the processes outlined in the Crisis Communications Plan.

The PCM coordinates with the Design-Build Manager and O&M Manager to get the information requested in a timely manner. We understand the responsibility Local Agencies have to their constituents and will provide timely and accurate information to the Department for distribution to elected government officials and offices, enabling them to provide the same information to their citizens. FRMG will provide information to the Department and collaborate with them on a variety of delivery mediums (as shown in Table 7) to host the key messages, letting the information be delivered consistently not only by Project officials but also by local, state, regional, and federal elected officials.

Table 7 describes FRMG's communication approaches and tools to the identified Government stakeholders:

Table 7. Government Stakeholder Communication Approaches and Tools.

Stakeholders	Communiction Approach	Primary Tools
• **Local, regional, and state governement officials, such as the City and County of Denver, City of Aurora, and City of Commerce City, etc.**	• Establish a clear chain of communication for the distribution of information • Maintain open dialogue with the Department to aid in Project execution and delivery	• Email notification and correspondence • Official government tours hosted by the Deparment • Partnering sessions

Business Stakeholders

FRMG will maintain business access at all times unless otherwise Approved by the Department. FRMG recognizes the Project may impact access to many local small businesses, and we will provide regular updates to them to help cope with road Closures and construction impacts. We will work with them to help avoid impacting regular customer routines and to minimize disruptions to truck deliveries. We have completed a comprehensive inventory of all access points in the Project area, including business access points, and are committed to maintaining access to the local street system for these businesses.

The large business owners, Utility Owners, and Railroads (such as Union Pacific Railroad, BNSF Railway, and Denver Rock Island Railroad) will be invited to attend Strategic Communications Task Force meetings, in particular, when a major phase of construction is beginning. Small business owners who will be impacted will be invited to a Public Meeting that will detail their individual impacts and how FRMG can help eliminate those impacts.

FRMG's Business Liaison will work closely with the PCM to determine and understand imminent construction activities that will impact businesses. FRMG's Business Liaison will then provide the businesses with early notification and coping strategies by meeting one-on-one with them to discuss their particular impacts. **Table 8** provides communication approaches and primary tools will be used to communicate with the below identified Business Stakeholders:

Table 8. Business Communication Approaches and Primary Tools.

Stakeholder	Communication Approach	Primary Tools
• **Local and regional business owners, employees and customers** • **Disadvantaged Business Enterprises and Emerging Small Businesses**	• Communicate early understanding of construction-related impacts • Minimize inconveniences to employees and customer • Provide tools to get customers and employees safely through construction	• Create a project-specific Business Outreach Program • Create a safety and information campaign through media partnerships and promotions, Approved by the Department • Provide a bilingual Business Liaison

To address impacted businesses, FRMG's Communications Team will institute a comprehensive Business Outreach approach. We will ensure all adversely affected businesses are aware of the approach and have the opportunity to participate. The approach will include information small businesses need to understand what impacts they can expect during construction. These might include access route changes, altered visibility, businesses located along a portion of a street that has limited access due to construction activities, and other matters affected by construction operations.

FRMG's Business Liaison will work with businesses to find available resources to help them manage their business during construction and show them how to incorporate the Project into their advertising and marketing efforts. As outlined in Section 7 Crisis Communication Plan, FRMG will work with the Denver Foundation to apply for, or secure funding for, these businesses.

The Business Outreach approach also will help promote businesses affected by construction operations. With the Department's Approval, the FRMG Business Liaison will select one business to highlight each month. Participating businesses will be featured in the Project newsletter, where FRMG will write a short article promoting their business. The article, business logo, and current promotions also will be posted on the Business Page of the Project website.

The selected business of the month will be able to provide a special promotional coupon or flyer to be included in construction notice door hanger bags distributed that month. (See **Attachment B** for sample coupons.) Finally, Project employees will be reminded and encouraged to frequent the affected business whenever possible. (Sample employee notices are included in **Attachment C**.)

5.1.2.b Key Communication Topics

FRMG will hold a weekly Strategic Communications meeting at the Project office that will include the Department's Communications Team. During these meetings, we will discuss the following:

- Safety topic review
- Weekly communication issues
- Provide details for upcoming media advisories/press releases

- Stakeholder meetings
- Lane Closure Reports
- Project website updates
- Information line recordings
- Outreach strategies
- Lessons learned/Stakeholder feedback
- Construction and schedule updates

5.1.2.b.i.A Coping Strategies

During the weekly Strategic Communications meeting, FRMG will discuss developed community and business relations strategies that communicate coping messages to stakeholders for implementation on the Project for the upcoming activities. We understand the Project will impact the lives of the community and traveling public, and we will work with the Department to create key messaging that is communicated frequently. Messages will focus on providing stakeholders detailed detour routes, traffic shifts, and other information (included in the table below) needed to make short-term and long-term decisions about how they cope with the Construction and O&M Work with as little disruption as possible. **Table 9** shows a checklist of items that will be covered in the weekly meetings, with information populated from detailed information provided during the MOT Task Force meeting.

Table 9. MOT Activities

Check	MOT Item	Information to be Provided	Advance Information, Acceptance, or Approval
	Lane Closures on I-70 (mainline, ramps)	Limits of Closure Duration of Closure Days and hours of work	7 days
	Lane Closures on all other streets	Limits of Closure Duration of Closure Days and hours of work	7 days
	Roadway Closures on I-70 (mainline, ramps)	Limits of Closure Duration of Closure Description of detour	7 days
	Roadway Closures on all other streets	Limits of Closure Duration of Closure Description of detour	7 days
	Major Roadway Shifts	Limits of shift Duration of shift	14 days

Check	MOT Item	Information to be Provided	Advance Information, Acceptance, or Approval
	Bridge Demolitions	Roadways affected Day and hours of work Description of detours	14 days
	Trail Detours	Closure points Duration of Closure Description of detour	14 days
	Other Types of Construction	Roadways affected Day and hours of work	7 days

FRMG's Communications Team will communicate construction impacts via the public information Tools highlighted in Section 5.1.2.a Community, Government and Business Stakeholders. The coping messaging will provide the following information:

- Safety is the most important message to convey to drivers, bicyclists, or pedestrians. FRMG will encourage drivers to take safety precautions by adhering to posted speed limits and to stay alert in work zones to prevent crashes.
- Plan ahead to minimize delay and frustration caused by work zones. If drivers know what to expect they will be less frustrated about delays. Thinking ahead about the timing of travel, route, mode, and destination will be conveyed in key messages.
- The Department cares. Drivers are more willing to cope with disruptions and cooperate with directions when they feel necessary steps have been taken to advise the public.

5.1.2.b.i.B Environmental Information

FRMG's plan for coordinating any environmental mitigation requirements provided in Schedule 17 (Environmental Requirements) involves weekly Environmental Task Force meetings in which Environmental Status Reports are discussed. Environmental Status Reports will provide the primary means of identifying environmental mitigation where stakeholders need to be aware of, and participate in, those areas. The PCM will work with the Environmental Manager on the best approach to communicating those environmental mitigations with the stakeholders.

FRMG will make the Environmental Compliance Work Plan (ECWP) updates available through the Project website monthly, in accordance with Schedule 17 Environmental Requirements. It will ensure the public is aware of, and participates in, those areas as they pertain to the public and where their input is required. Along with the updates to the ECWP, FRMG also will make the results of all PM10 monitors to the Project website in accordance with Schedule 17 Environmental Requirements.

5.1.2.b.i.C Noise

FRMG's Communication Team will get information from the MOT Task Force meetings on scheduled high noise events and temporary and permanent noise wall construction. FRMG's Communication Team will then go door-to-door to inform individual property owners of these impacts and provide them with a door hanger that outlines the times of these high noise events. The team also will request an email address from the property owner if the person wishes to receive a notification the day prior to the high noise activities starting. When the Public Meetings are at the start of major construction activities, FRMG will address all high noise activities with the impacted communities and provide handouts that show the times of such activities, which will be in accordance with all Local Agency noise ordinance. FRMG's Communications Team will post an update on the Project website, along with the information provided on the door hangers and handouts. All information for high noise events will be provided in English and Spanish.

5.1.2.i.D Coordination with Local Schools

FRMG's Community Liaison will begin integration with Denver Public Schools to build trust with all schools within close proximity of the Project, including Swansea Elementary School, Garden Place Academy, and Bruce Randolph School. Relationships and communication also will be established at additional schools that may be impacted, including Howell K-8 School and High Tech Elementary School. We will work with each school administrator to develop an activity calendar to meet the individual needs of each school, including the following activities:

- An initial safety training for students, parents, faculty, and employees
- A series of meetings with Swansea Elementary School (Friday morning Muffins with Munoz) and with Focus Points (these have been successful at engaging local schools in the area)
- Gatherings at Perry Valdez Library and local recreation centers during summer months, providing an alternative to the challenge of accessing schools in the summertime

We anticipate regular communications between the school coordinators and the FRMG Community Liaison to ensure a clear understanding of the construction process, schedule, and impacts. The ability for students and parents to attend meetings, and their comfort level with doing so, relies on trust in language translation, location of meetings, time of day, and availability of childcare. The Community Liaison will attend regular departmental and whole staff meetings as needed and will attend PTA and school board meetings to provide an opportunity for open dialogue and feedback from school administration and parents.

In addition, FRMG will focus on community building throughout the planned School Outreach approach to engage educators and to inform faculty, parents, and students about construction impacts and construction zone safety. This Project will enhance the neighborhood and has the opportunity to integrate hands-on science, technology, engineering, and math (STEM skills) through real-world projects. The engineering considerations of constructing the Cover could be discussed at a Swansea Elementary classroom. Educational materials and a steady flow of communications will be shared as construction progresses.

At a minimum, FRMG will communicate with the following schools:

- Swansea Elementary School: 4650 Columbine Street, Denver, CO 80216
- Garden Place Academy, 4425 Lincoln Street, Denver, CO 80216
- Bruce Randolph School, 3955 Steele Street, Denver, CO 80205
- Howell K-8 School, 14250 Albrook Drive, Denver, CO 80239
- High Tech Elementary School, 8499 Stroll Place, Denver, CO 80238

FRMG's School Outreach approach emphasizes safety, education, and partnerships. We will concentrate our efforts on maintaining pedestrian, bus, and vehicle access to impacted schools during the Construction Period, as described in FRMG's Draft Transportation Management Plan. We also will initiate a program that develops a foundational relationship between nearby schools, the Department, FRMG, and Project staff. FRMG will provide safety training for students, parents, faculty, and employees that includes site visits, and it will create interactive events for students to participate in during construction. Whenever possible, FRMG will delay impactful work during major school events and will sponsor and/or participate in the events.

5.1.2i.E Access to Transit and Pedestrian and Bicycle Routes

FRMG is committed to communicating time-sensitive information of all significant impacts to stakeholders who utilize mass transit, ride bicycles and walk, and with stakeholders who have handicap mobility issues. As conditions change throughout the Project, impacts to multimodal connectivity will be updated on the Project website and pushed out via email and the Department's social media platforms. Transportation impacts and detours also will be clearly marked and signed for stakeholders who do not have access to electronic communication or might not have been aware of impacts. Project identification billboards will be strategically placed in affected areas to alert stakeholders that they are entering a construction area and may have to use alternative routes.

FRMG will develop and provide a shuttle service program for students of Swansea Elementary School in coordination with Denver Public Schools (DPS). Once this program is in place, FRMG's Communication Team, in coordination with the Department, will work with DPS on the messaging needed to inform parents and faculty about this program. Flaggers also will be provided before and after school to assist in the control of potential unsafe pedestrian crossing at York St. FRMG's Community Liaison will facilitate introductions of the Flaggers with School administrators and faculty and will have a meeting to discuss the process of safe crossing at York St.

Finally, FRMG's Communications Team will coordinate with the Regional Transportation District (RTD) on bus route changes, particularly to Routes 44 and 48, within the Project area. This will include having our Work Zone Safety Brochures available inside the buses affected by the route change to facilitate efficient, safe travel through the construction area. We also will enact communication campaigns that effectively reflect the changing routes. Representatives from RTD will be invited to participate in the Project's monthly stakeholder meeting to facilitate our shared communication objectives and find viable strategies to best meet the demands of their customers.

5.1.2.i.F National Western Center Construction Coordination

The National Western Center (NWC) redevelopment will overlap with the Project. That project is directed under the CCD Mayor's Office of the National Western Center (NWCO). As such, we propose continued coordination with the Department and the appropriate NWCO team, specifically Erika Martinez, NWCO's Director of Communications. Such coordination would occur monthly or as otherwise needed to identify any common stakeholders, potential traffic, or common stakeholder impacts; and also to identify opportunities to capitalize on existing, ongoing communications programs. We also can coordinate various print communications, including cross-promotions in each project's newsletters, flyers, and other notifications. These meetings will serve as an opportunity to coordinate communications where it makes sense.

It is imperative that joint measures are taken to ensure impacts and delays in this area are reduced. FRMG's PCM will coordinate communication efforts with the NWCO's communications team. We are cognizant of the possible impacts on roads in and around the NWC, including I-70 Mainline and the Service Road, Brighton Blvd., Race Court, East 46th Avenue, East 47th Avenue, and East 48th Avenue. We will work in unison with the NWCO to ensure traffic mobility and safety in this area throughout the life of the Project. FRMG is also aware of the many community events the NWCO hosts throughout the year. We will work closely with the NWCO on their major events, such as the National Western Stock Show, which is held in January of each year.

FRMG's will work with NWC to host a Project booth during the National Western Stock Show and all other major events held at the NWC. FRMG staff members will provide key information about the Project at these booths.

5.1.2.i.G Cover Coordination and Outreach

Photo of "Ductworks" event.

FRMG has already engaged with the community in the development of the Cover through the "Ductworks" event hosted by the Project on October 1, 2016. FRMG held a children's Dream Park Competition where participants drew their dream neighborhood park by using markers, colored pencils, or crayons.

We will continue this engagement on the name for the Cover, as well as by identifying specific items, such as landscape and aesthetic items, where the public can provide input to the completed Cover design. We will create 3-4 options of specific items that fit within the prescribed requirements and create a venue for the community to provide input on the final design decision for those items. FRMG will host a Public Meeting for local residents to reveal these options, as well as the top five names for the Cover. Prior to this meeting, we will

coordinate with the Department and CCD on the options to present to the local residents. At that Public Meeting, we will ask local residents to vote on their favorite design option and name.

The results of the votes on the design option and name will be provided to the Department to determine how to proceed with these votes, FRMG will provide the information to be updated on the Project website once authorized by the Department.

5.2 Public Information Outreach Tools

FRMG will establish and maintain, from the issuance of NTP2 throughout the Term, a PI office housed at the Project office. This will be equipped with a phone, voicemail, and computers.

The PI Toolbox will be accessible to the internal communications and management teams and will be further divided by stakeholder type. All materials in the PI Toolbox will be provided in English and Spanish. FRMG will continually coordinate with the Department to make sure the tools employed during the Project are effective.

The PI Toolbox includes the following communication tools and materials:

- Project Fact Sheets
- Project Brochures
- Work Zone Safety Brochures
- Construction Key Messages
- Document Templates
- The latest Project update presentations
- The latest Project Newsletter

FRMG's Communications Team understands we are here to support the Department in communicating with stakeholders on this Project. The Department has tools in place that have been tested and proven, and we will continue to utilize them as directed by the Department. The joint Communications teams will work together on this Project, speaking one message with one voice. To coordinate communications, both Strategic Communications Teams will be co-located at the Project office. With the Department's guidance, FRMG's Communications Team will bridge the gap between the preconstruction outreach efforts and the transition into construction. We will work with the Department to help Project resources maintain a high degree of operational efficiency.

Above and beyond daily interaction, weekly team meetings will be implemented once the Project is awarded. During the first meeting, we will establish information-sharing protocols to use throughout construction. FRMG's Communications Team will support the Department's efforts as it relates to government officials, high-level stakeholders, local neighborhood organizations or community groups, and local businesses outlined in the map of the Project area. We will provide the Department with a four-week forecasted schedule and collaborate on the outreach tools needed to communicate the schedule to the variety of stakeholder groups affiliated with the Project.

5.2.a Phone and Email

FRMG will establish and maintain a public information office from the issuance of NTP2 throughout the Term. The office will be equipped with a telephone, voicemail, and computers. The Project Information telephone line will be the Department's current Project hotline number. The voicemail for Project information will be recorded in English and Spanish. It will provide an updated message each week (or each day if/when necessary) with relevant completion dates and forthcoming activities on the Project. It also will allow the caller to leave a message. FRMG's Communications Team will check and respond to voicemail messages throughout each day in which construction operations and lane Closures are being conducted. During times of highly impactful construction activity or extended night work as identified by the Department, FRMG will provide 24-hour coverage of the public information telephone line.

FRMG's Communications Team will track inquiries made by citizens, businesses, and government offices, including names, addresses, phone numbers, and follow-up action taken in response to inquiries. All inquiries and any follow-up action will be entered in ***Dialog***, a web-based contact- and issue-tracking database provided by the Department. FRMG will provide an automated report, generated by Dialog, to the Department and the Developer each week. FRMG will follow up on all inquiries and complaints with a return phone call or email from either the Developer and/or, when necessary (and as requested by the Developer or determined by the Department), the Department.

We will ensure that inquiries are addressed in a timely manner. FRMG will record the following information for all inquiries:

1. Date and time of call
2. Contact Information (name, phone number, street address, and email address)
3. Identify type of stakeholder (community member, business, elected official, etc.)
4. Type of comment (construction complaint, information request, meeting request, etc.)
5. Location and description of complaint and/or request
6. Response provided, including date and manner of response and whether request was relayed to the Department for response

5.2.b Public Meetings

FRMG will host and facilitate one in person public meeting within one month after the issuance of NTP2 to introduce FRMG to the local community and to seek input for defining community values. Additional public meetings will be held at key times, including:

- Prior to the removal of the viaduct
- Prior to implementation of significant long-term detours and route changes
- At noteworthy milestone accomplishments
- Yearly Project status updates
- During construction of the Cover

FRMG will prepare an agenda for all Public Meetings for Department Acceptance two weeks prior to the meeting date. With the Department's Approval, we will publicize these meetings through a number of communication means, including email, inserts in local newspapers, door-

to-door flyers, mailers, Project website updates, and Entravision Communications Corporation, as well as through developed messaging provided to the Department for Approval, to be used on social media and through other mediums used by the Department.

FRMG's Communications Team will utilize the stakeholder list issued by the Department prior to the issuance of NTP1 for meeting attendees to make sure all stakeholders are included. The public meetings will be held within the corridor boundaries; when relevant, they also will be located in the neighborhood location(s) closest to the upcoming construction or O&M work.

All public meetings will be in the open-house format and will inform attendees of Project plans and schedules, along with providing information on how to receive updates on the Project through email address lists and/or the Department's preferred email messaging system. FRMG's Communications Team will provide Project displays that communicate information on Construction Work, O&M Work, phasing, traffic impacts, etc. All Project displays and other presentation materials will be bilingual.

FRMG's Communications Team will provide professional quality by creating Project displays and presentation materials that adhere to the ***CDOT Colorado Brand Guidelines*** specifications and print standards. Our visual communications will be designed with integrity and quality, using the approved size, format, and style. Materials will be reviewed and approved by our internal Quality Assurance team before submission to the Department for Approval.

FRMG's Communications Team will ensure Project displays and other presentation materials are designed to clearly convey technical, accurate Project information to a non-technical audience. This will require intelligent simplification by analyzing in detail the key messages we need to convey and how best to communicate the information in a way the audience most easily understands it. Our Project displays and printed materials will be designed to accurately portray information in understandable terms.

FRMG's Communications Team will coordinate with the Department in responding to all feasible requests to attend regular community and stakeholder meetings or community events, such as those organized by nonprofit groups and neighborhood and business associations. We believe stakeholder outreach and communications are critical to gaining buy-in and Acceptance of the Project. The revitalization of I-70 is also a revitalization of this entire community, and it is extremely important to provide a forum for citizens to become informed about the Project. Community meetings improve information flow, foster collaboration, minimize conflicts, and help community members feel like equal partners. FRMG's Communications Team will provide appropriate public information and technical and bilingual staff for these meetings. We also will prepare required materials as requested by the Department.

5.2.c Business Meetings

In addition to the public meetings required in the previous section, FRMG's Communications Team will organize and lead at least two public meetings specifically focused on local and regional business impacts within two months after the issuance of NTP2. FRMG's Communications Team will host additional meetings focused on local and regional impacts at designated Project phases (e.g., major or extended Closures) as identified by the Department.

FRMG recognizes it is vital to the sustainability of the community to retain existing businesses, and we understand that some businesses may be impacted more than others. Our Business Liaison will be aware of these businesses and will remain in constant communication about pending construction shortly after award, utilizing the tools, signage, and other options discussed in the Business Outreach approach (Section 5.1.2.a Community, Government, and Business Stakeholders).

5.2.d Social Media

FRMG understands the importance of social media and realizes stories and information are more powerful when told through the right social channel. We also appreciate that people are drawn more to images than text. FRMG's Communications Team will provide the Department with messaging for use on CDOT's existing social media platforms, including Facebook and Twitter, and we will work with the Department to take some key metrics and rework them into infographics others can share on their personal social media pages. As required, FRMG's Communications Team will submit all social media posts to the Department for Acceptance one Working Day in advance of inclusion on social media.

FRMG's Communications Team also will use ***Facebook Retargeting ads*** to streamline important information to community members already using Facebook. By honing in on the audience we want through a zip code or neighborhood filter, we can provide up-to-date information on community meetings and/or construction information. Retargeting ads also will redirect people to the Project website.

Finally, we recognize that social media trends will shift over the Term of the Project, and FRMG will update its means of communicating through this medium to adapt to such changes and implement the most effective means of reaching stakeholders.

5.2.e Stakeholder Distribution List

FRMG's Communications Team will develop a master distribution list of contacts to be used for public information publications and informational flyers/newsletters, using the Department's database established during the ***I-70 East EIS*** as the basis for development of this list/database. This list will be submitted to the Department for Acceptance prior to issuance of NTP2 and updated annually throughout the duration of the Term from website, hotline, or public meeting requests. FRMG also will utilize the Department's preferred email messaging system and will assist the Department in supplementing the database and the email messaging system throughout the Department's data gathering process.

In addition, FRMG's Communications Team will send Project representatives to RTD bus and train stations and parking facilities along the ***RTD R Line*** and the ***RTD University of Colorado A Line*** biannually to proactively identify and add impacted citizens who are not yet on the master distribution list. FRMG will append the master distribution list on an ongoing basis to filter outdated information and add additional interested or previously unidentified stakeholders.

5.2.f Tours and Communication Events

FRMG will be available, at the request of the Department, to participate in all media, business, and government official tours of the construction areas and will participate in, and fully support,

the Department in the coordination and delivery of communication events such as groundbreakings and grand openings. With the Department as the lead for tours and events, FRMG's Communications Team will provide full cooperation. FRMG will provide appropriate PPE to tour attendees and will lead a safety briefing in accordance with our Safety Plan.

During fair-weather months, and upon Approval by the Department, FRMG's Communication Team will provide community tours and implement school field trip tours of the Project footprint. Specifically, we will reach out to impacted neighborhood schools and proactively arrange tours and activities, which may simply involve school visits and presentations. Community members will sign up for the tours on the Project website and schools will coordinate through the School Outreach Liaison. The tour leaders will call attention to "new" elements of construction, construction progress and community enhancements provided by the Project.

FRMG will create a space to serve as a Visitor Center within the Project office. The **Visitor Center will be open to the public and, in coordination with our Workforce Development Plan**, will be manned by high school interns from Arrupe Jesuit High School Monday through Friday, 10 a.m. to 4 p.m. during the summer months (holidays excluded). The center will act as a conduit for the community to the Project, providing an experience for visitors with detailed in-depth educational exhibits. These will follow the history of I-70 from the start of construction in 1961 through the future benefits of the Central 70 Project. The exhibits also will feature a model of the Cover area.

FRMG will utilize the center to facilitate Workforce Development, enabling community members to learn about job opportunities and apply on the spot at a workstation created for their benefit. DBE Outreach events, community meetings/events, and Team Partnering events also will be hosted at the Visitor Center.

Project information materials such as Project Brochures, Work Zone Safety Brochures, Fact Sheets, etc. will be accessible at the center, as will promotional materials for local businesses affected by construction (discussed previously in Table 6). The center will be an interactive information service to residents and the community at large.

5.2.g Lane Closure Reports

FRMG will, throughout the Term, submit a Lane Closure Report each Thursday as required by Schedule 10, Section 2 Maintenance of Traffic for the following week (Saturday through Friday). This report will be provided to the list of contacts as provided by the Department. In addition, FRMG will provide a version of the weekly Lane Closure Report altered to fit the informational needs and requirements of ports of call and trucking handlers.

5.2.h Traffic Alerts

FRMG's Communications Team will submit a weekly traveler alert each Thursday for distribution on the Department's preferred email system and **CoTrip** throughout the Term. The alert will include I-70 Mainline, CDOT Roadways, and Local Agency Roadways, along with any activity that might impact the traveling public. Upcoming alerts will be reviewed and discussed during weekly Strategic Communications meetings. FRMG's Communications Team also will provide weekly traveler alerts to local transportation hubs and event venues, including Denver

International Airport, NWC, and RTD. These alerts may be distributed more often, dependent upon the severity of the traffic impact.

5.2.i Web Page Updates

FRMG's Communications Team will work with the Department to develop internet web page content for a Project website developed specifically for this Project by the Enterprises and CDOT. FRMG will provide website content updates weekly, at least two days in advance for Department Acceptance; updates otherwise may occur as reasonably required with pertinent schedule information, new photos, contact information, etc. FRMG will submit all proposed update content for the Project website to the Department for Acceptance two Working Days in advance of inclusion on the website. FRMG's Communications Team will utilize the Department's web page template to provide consistent updates and all appropriate links to/from other sites (e.g., local city, county, bus service, etc.). Associated graphics (e.g., detour maps) also will be included.

Traffic alerts and Lane Closure Reports also will be added to the Project website to ensure the community at large has the most up-to-date information as they plan travel along I-70. We will analyze website hits monthly and provide this data to the Department for use and to determine what information is most important to our stakeholders. We will identify and measure audience engagement by web page and leverage future information output to their needs. As this is the Department web page, we will coordinate all activities with the Department for Acceptance and Approval.

5.2.j Project Newsletters

FRMG's Communications Team will prepare and distribute a monthly newsletter containing a summary of the Project's purpose and schedule; a list of upcoming job fairs or opportunities; the Project Information Hotline, email address, and web address; a Project map; a construction Safety Message; and any other matters reasonably requested by the Department.

The Project newsletters will serve as an internal and external informational piece. FRMG's Communications Team will organize subject matter content of interest to the stakeholder audience and highlight major Project developments. We will create headings and titles that capture the reader's attention, and some articles will provide links back to the Project website for more detailed information. The newsletter will not come across as merely a vehicle to relay content but rather a resource for insight into the Project. It will provide Emergency contact information, along with an easy way for subscribers to share the newsletter or part of its contents with friends via email or social media.

The newsletter will be available in English and Spanish. The first newsletter will be distributed within 30 Calendar Days following the issuance of NTP2 and will be submitted to the Department for Acceptance prior to distribution. The newsletter will follow the newsletter template by the Department (an example is provided in **Appendix D**) with the appropriate Project logo. FRMG's Communications Team will distribute the newsletter to the master distribution list of contacts established in Section 5.2.e Stakeholder Distribution List. The newsletter will be distributed via email once per month and distributed door-to-door to the impacted Project area, approximately 2,500 households, once per quarter.

FRMG will initiate a delivery system whereby printed copies of the monthly newsletter edition will be delivered to local recreation centers, workforce centers, libraries, schools, churches, neighborhood associations, malls, small business organizations, convenience stores, etc., within a four-block radius on either side of the limits of construction.

5.2.k Language Assistance for Limited English Proficient Persons

FRMG's bilingual Community Liaison will ensure Limited English Proficient (LEP) assistance for the Project. The Community Liaison and communications team will be responsible for providing translation during individual conversations and short communication materials such as door hangers or simple web updates. FRMG understands that the Department will provide translation of all other communication materials and interpretation services at meetings. FRMG will document all measures taken to communicate with LEP persons and record all requests for language assistance. The details of this documentation will be submitted in the CPCP quarterly report and the Maintenance and Operations Communication Plan quarterly report.

A large geographic concentration of Spanish speakers exists along the footprint of the Project. FRMG will transcreate short communication materials to ensure content not only meets the language limits but also includes cultural relevancy. We will provide ***"I Speak"*** name tags at workshops, community meetings, etc., enabling Project staff to easily identify those with LEP needs. Attendees will simply add their spoken language to the name tag and pin it on, indicating who needs interpretation service and materials outside of the English language. The cards also will be an excellent tool in identifying needs for future meetings.

FRMG will examine this plan's components annually to determine:

- How many LEP persons were encountered?
- Were their needs met?
- Have the available resources (such as technology, staff, and financial costs) changed? If so, how does that affect what we are doing?
- Were any complaints received? If so, were the complaints resolved?
- What other improvements or changes can we make based on our previous performance in this area?

5.2.l Public Communication Collateral

FRMG's bilingual Community Liaison will work with the Department to develop and determine which outreach collateral materials should be used to share information with the public as necessary for major Project milestones such as long-term Closures, impactful Construction Work, or O&M work activities. All collateral materials will adhere to the ***CDOT Colorado Brand Guidelines*** and be Approved by the Department prior to distribution. FRMG's Communications Team will not use contractor or Subcontractor logos for any public communication materials. Only Department provided branding will be used on all PI materials throughout the Project. All collateral materials will include Spanish translation, provided by the Department, for broad distribution by the Department. FRMG's objective is to send fully controlled, consistent

messages to the target audiences, and each execution will be based on the overall SCP. Collateral materials are discussed in **Table 10** below or previously listed PI Toolbox.

Table 10. Communication Collateral.

Collateral Type	Description
Construction Key Messages	• Importance of this Project • Puts a "face" on the Project • Ties to stakeholder's values, beliefs, and interests • Reflects understanding of stakeholders concerns • Is culturally relevant • Provides consistent, credible messages that convey the main points to meet the public's needs
Document Templates	Provides a variety of document templates to help with ease of writing, including: • Press Releases • Fact Sheets/Flyers • Letterhead • Presentations • Posters
Project Fact Sheets/Flyers	• Summary data and information for stakeholders • Typically posted on the website • Contains Points of Contact and location map
Project Brochures	• More in-depth information than a Fact Sheet • Provides information on FRMG • Answers Frequently Asked Questions • Educates the stakeholders on the Project aspects including milestones and phases • Provides clear explanation of the Project and the benefits of the Project to the public • Provides Project photos
Work Zone Safety Brochures	• Provides traffic and work zone safety-related information • Contains Point of Contact for safety • Guidelines for working, walking, biking, and living in a construction zone
Project Update Presentation	• Presentation with a summary of the Project, including phases, milestones, successes, issues and risks, and other relevant data or photos
News Releases; Traffic Alerts/Releases	• Provides standard information to the news media regarding the Project, successes, traffic alerts, etc.

5.2.m Photos/Videos

In addition to the obligations under Section 10 of Schedule 8 Project Administration, FRMG will take and submit photos/videos of the Work on regular intervals, outside of the obligations to take photos under Section 10 of Schedule 8 Project Administration.

Preconstruction Photographs and Video

FRMG will take a sufficient number of preconstruction photographs and a 1080p (or greater) high-definition (HD) resolution video of the site, including roadways, structures, drainage, and all necessary areas anticipated to be impacted by the Construction Work to resolve any disputes

that may arise regarding the conditions prior to and/or subsequent to construction. The preconstruction photos and video surveys will be completed and all data information will be provided to the Department prior to NTP1. If a dispute arises where insufficient photographic or video evidence of its existing condition is unavailable, the disputed area will be restored to the extent directed by the Department at no additional cost to the Department.

Progress Photographs

At a minimum, FRMG will take two 8-megapixel (or greater) resolution aerial photographs of the Construction Work and Site every three months, captured by a certified transportation Unmanned Aerial Vehicle (UAV) photographer. Aerial photographs will include all areas under construction, whether temporary or permanent, along with all other areas impacted, each time they are taken. FRMG will take one series of oblique photographs from one direction along the corridor. The Department's confirmation will be sought regarding views to be taken and the approximate time at which they will be taken;

FRMG will provide the Department one complete set of high-quality aerial photographs for unrestricted use on DVD in .jpg, .gif, or .tiff formats.

FRMG will provide interior and exterior photographs of each buried structure, just prior to burial, providing a minimum of four internal views (as applicable) and four external views of each structure. The following information will be placed on the front of digital photographs:

a. Date photograph was taken
b. Title of Project
c. Description of view shown in photograph
d. Identification of photographer
e. Sequential number of photograph

Time Lapse Photography

FRMG will provide a continuous time-lapse photo of the viaduct area of the Project from the point of NTP1 to Final Acceptance. The time-lapse camera will be positioned at a location determined by the Department, and photos will be uploaded to the Project website in real time. The resolution will be 12 megapixels (or greater), and the camera will be capable of continuous streaming of data to the web.

FRMG will submit to the Department a minimum of two digital photographs each week. These photos may include traffic control, paving, slope repair, erosion control, bridge deck and rail work and other key areas of work identified by FRMG, the Department and PCM to be used in reports to interested agencies, social media, and flyers. FRMG also will develop high resolution videos to share progress of the Project either annually or at key Project milestones (e.g., Cover completion or the traffic configuration of the detour on the East Bound I-70 Exit Ramp to Colorado Boulevard).

FRMG will develop videos as necessary to communicate key coping strategies as directed by the Department. FRMG realizes the importance of diligent focus on work zone safety for drivers, employees, and pedestrians, and it recognizes the power of video to communicate that message. Shortly after NTP1, FRMG will create a Work Zone Safety Video to post on the

Project website and for distribution to local jurisdictions. This video will provide direct guidelines for working, walking, biking, and living in a construction zone.

5.2.n Project Identification Signage

As required, FRMG will provide one large Project identification sign for each direction of travel along the I-70 Mainline at the Project limits. We also will provide signage at staged positions along I-25, I-225, and I-270. FRMG will submit sign layout and position to the Department for Acceptance prior to installation. Project identification signs will be installed within 14 Calendar Days following the issuance of NTP2. The Project identification signs will be MUTCD compliant and will contain the following information:

1. Project Logo
2. Project start and estimated completion dates
3. Developer name and PI hotline number

5.2.2 Response and Deliverables Protocol

FRMG is committed to providing a timely response for all communications, and our communications team will comply with **Table 11** in responding to communications from stakeholders and the public. Ideally all communication will be immediate/same day, recognizing that sometimes that isn't possible due to other events, issues, and Project expectations.

Table 11. Response Protocol.

Communication Method	Response Protocol
Hotline Calls	• Check messages throughout day • Respond same day (initial call) or within 24 hours (including weekends if work is occurring)
Emails	• Same day (within two Working Days for high volume situations)
Call from Department Staff	• As soon as possible (no later than 24 hours)
Web Page/Social Media Inquiries	• Same day (within two Working Days for high volume situations)
Public Meeting Inquiries	• Within one week of the meeting

5.3 CPCP Quarterly Reporting

FRMG has prepared and will provide a quarterly communications report during the Construction Period. The initial report will be submitted to the Department for Acceptance no later than 10 Working Days after the 90th Calendar Day following the issuance of NTP2. Each quarterly report will be provided in English and Spanish. Elements provided in the quarterly report are summarized below. FRMG will use the CPCP throughout the duration of construction to manage, implement, and maintain the public information process, and it will submit the CPCP to the Department for Approval prior to the issuance of NTP1.

CPCP Quarterly Reporting:

- A summary of primary Construction Work and O&M work during construction activities performed during the preceding quarter, in accordance with Schedule 8 Project Administration

- Detailed summary of Strategic Communication efforts as part of the Progress Report activities performed during the preceding quarter
- Detailed summary of the ECWP as part of the Progress Report activities, environmental mitigation summary, and a list of the date and time of any PM10 alert thresholds reached or exceeded, in each case, during the preceding quarter
- A summary of progress in implementing the Small and Disadvantaged Business Participation Plan's Construction Contract Plan from the preceding quarter
- A summary of progress in implementing the Workforce Development Plan from the preceding quarter
- Detailed summary of number of accidents cleared during the preceding quarter
- Detailed summary of measures taken to communicate with LEP persons and requests for language assistance during the preceding quarter

Attachment A
Sample Cover Sheet

Front Range
Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

ATTACHMENT A – SAMPLE Cover Sheet

Front Range Mobility Group

COVER SHEET

DATE	REVISIONS MADE	SECTION	REVIEWER

Attachment B
Sample Business Coupons

Front Range
Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

ATTACHMENT B – SAMPLE Business Coupons

Front Range Mobility Group

10% Off

Any Automotive Reconditioning Service

Sam's Automotive Repair

2700 W. 44th Avenue, Denver, CO 80216

www.1samsautos.com

SAMS AUTOMOTIVE

Expires December 31, 2017

Front Range Mobility Group

Front Range Mobility Group

Free Fountain Drink with Purchase

Burger King

3051 E. 45th Avenue, Denver, CO 80216

BURGER KING

Expires December 31, 2017

Not Valid with any other coupons or promotions

Please present this coupon at time of service

Attachment C
Sample Employee Email

Front Range
Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

ATTACHMENT C – SAMPLE Employee Email

Central 70 Employee Email

Dear Central 70 Employees,

As you know, construction of Central 70 is a large operation and can be particularly difficult for local business operators. We need to do our part to show them we care and support their businesses. In an effort to minimize negative impacts, we have created a Business Outreach approach that gives the Department and Front Range Mobility Group (FRMG) an opportunity to address construction impacts with area businesses.

As part of the Business Outreach approach, we would like to encourage all CDOT, FRMG, and Central 70 employees to frequent the businesses affected by construction whenever possible. Whether it's getting your car serviced at (list a specific business) or grabbing a cup of coffee at (list a specific business), you can help them cope with this interruption to their community. By shopping at affected businesses, we can help sustain or increase their sales, as well as gain support from them as we build out the Project.

To see a complete list of businesses, click on the attachment above.

Thank you! While it is not required that you support local businesses as a Central 70 Employee, we certainly appreciate your willingness to help in our effort to support local businesses.

Maintenance and Operations Communications Plan

Front Range Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

6. Maintenance and Operations Communication Plan

6.1 General Requirements

The Maintenance and Operations Communications Plan (MOCP) will be used throughout the duration of the Operating Period to manage and implement the PI process. The PCM will be responsible for overseeing FRMG's communication effort during the Term. In addition, FRMG will provide a full-time Spanish/English bilingual Community Liaison with experience in, and knowledge of, the Swansea-Elyria neighborhoods. The Community Liaison will coordinate closely with the Department and be responsible throughout the Term for ensuring that local residents, businesses, and nonprofit groups are informed about the Project and have a single point of contact for all questions and concerns.

For the duration of the Term, FRMG will hold a weekly Strategic Communications meeting, including the Department's Communication Team, at the Project office. During these meetings, FRMG and the Department will discuss upcoming planned projects, communication needs, and upcoming media advisories/press releases, community meetings, Lane Closure Reports, website updates, and information line recordings. The agenda for each meeting will be the responsibility of the PCM and will be submitted to the Department in advance of each meeting.

FRMG's external communications messaging will focus on providing the stakeholders listed below the information they need to make short-term and long-term decisions about how they cope with the O&M work, potential detours, and temporary lane Closures with as little disruption as possible. FRMG's means of communication during the Operating Period will consist of, but not be limited to:

- A dedicated Project website that provides scheduled upcoming O&M Work information for press releases and regular interviews on local radio newscasts that inform users on how to plan ahead
- Alerts sent to the Department to include on social media and third-party mobile technology/information providers
- Liaison with the CTMC for ITS messaging to inform users of any safety hazards and detours
- The Maintenance Management Information System (MMIS) to generate alerts related to lane Closures and traffic incidents to the Department

The following is an MOCP Primary Stakeholder Communications List:

- Local Area Residents
- Local/Regional Business Owners, Employees, and Customers
- Registered Neighborhood and Local Associations and Organizations
- Property Owners and Property Management Companies
- Local Schools, Universities, and Colleges
- Local Churches and Community Organizations
- Taxi, Shuttle, and Rental Car Companies

- Delivery and Courier Services
- Transportation Management and Advocacy Organizations
- Chambers of Commerce
- Commercial Vehicle Operators and Ports of Entry
- Denver Permit Office and Colorado Motor Carriers Association
- Tourist Destinations and Organizations
- Commuters and the Traveling Public (pedestrians, bicyclists, and persons with disabilities)
- CDOT employees, Headquarters, and Office of Communications and Public Relations
- Denver International Airport
- NWC
- RTD
- Local, Regional, and State Government Officials and Offices of Public Information
- Emergency Response Agencies (fire rescue, police, state patrol, hospitals)
- DBE/ESB
- Utility Owners
- Railroads
- News Media (radio, print, and television)

6.1.1 Preparing and Maintaining the Maintenance and Operations Communications Plan

This draft MOCP provides the foundation and guidelines for two-way communications of Project information with the public; FRMG will use the MOCP throughout the duration of the Operating Period to manage and implement the public information process. FRMG will submit the MOCP to the Department for Approval prior to Substantial Completion.

Public Information Outreach Tools

The FRMG PI Toolbox was created with the flexibility to meet a variety of stakeholder needs. The PI Toolbox will be accessible to the internal communications and management teams on the O&M team and will be further divided by stakeholder type. All materials contained in the PI Toolbox will be provided in English and Spanish. FRMG will continually coordinate with the Department to make sure the tools employed during the Project are effective.

FRMG's Communications Team will bring proven effective materials from the PI Toolbox employed during the Construction Period for use during the Operating Period. With the Department's guidance, FRMG's Communications Team will bridge the gap between the Construction Period outreach efforts and the transition into the Operating Period. We will work with the Department to help Project resources maintain a high degree of operational efficiency.

Phone and Email

FRMG will have an established public information office from the issuance of NTP2, and it will use this office throughout the Term. The office will be equipped with a telephone, voicemail, and computers. The Project Information telephone line will be the Department's current Project hotline number. The voicemail for Project information will be recorded in English and Spanish.

The voicemail for the Project Information line will provide an updated message each week with relevant completion dates and forthcoming activities on the Project. It will allow the caller to leave a message. FRMG's Communications Team will check and respond to voicemail messages throughout each day that renewal work and lane Closures are being conducted. During times of highly impactful renewal activity or extended night work, as identified by the Department, FRMG will provide 24-hour coverage of the public information telephone line.

FRMG's Communications Team will track inquiries made by citizens, businesses, and government offices. This tracking will include names, addresses, phone numbers and follow-up action taken in response to inquiries. All inquiries and any follow-up action will be entered in ***Dialog***, a web-based contact and issue tracking database provided by the Department.

Public Meetings

FRMG will host and facilitate an in-person public meeting within one month after the transition from Construction Period to the Operating Period to inform the stakeholders of what to expect during the Operating Period. While Public Meetings will not be as extensive as during the Construction Period, FRMG will continue to work with the Department on conducting Public Meetings the Department deems necessary during this phase.

FRMG will prepare an agenda for all Public Meetings for Department Acceptance, two weeks prior to the meeting date, with the Department's Approval. We will publicize these meetings through a number of communication means, including email, inserts in local newspapers, door-to-door flyers, mailers, Project website updates, and Entravision, as well as developed messaging provided to the Department for Approval and use on social media, and through other mediums used by the Department.

FRMG's Communications Team will utilize the stakeholder list issued by the Department prior to the issuance of NTP1 for meeting attendees to make sure all stakeholders are included. The public meetings will be held within the corridor boundaries; when relevant, they also will be located in the neighborhood location(s) closest to the upcoming O&M work.

All public meetings will be open-house format and will inform attendees of Project plans and schedules and provide information on how to receive updates on the Project through email address lists and/or the Department's preferred email messaging system. FRMG's Communications Team will provide Project displays that provide information on Construction Work, O&M Work, phasing, traffic impacts, etc. All Project displays and other presentation materials will be bilingual.

FRMG's Communications Team will provide professional quality by creating Project displays and presentation materials that adhere to the ***CDOT Colorado Brand Guidelines*** specifications and print standards. Our visual communications will be designed with integrity and quality, using the approved size, format, and style. Materials will be reviewed and approved by our internal Quality Assurance team before submission to the Department for Approval.

FRMG's Communications Team will continue to coordinate with the Department in responding to all feasible requests to attend regular community and stakeholder meetings or community events, such as those organized by nonprofit groups and neighborhood and business associations.

Business Meetings

In addition to the public meetings listed in the previous section, FRMG's Communications Team will organize and lead public meetings specifically focused on local and regional business impacts within one month after the transition to the Operating Period. FRMG's Communications Team will host additional meetings focused on local and regional impacts at designated Project phases (e.g., major or extended Closures) as identified by the Department.

Social Media

As required, FRMG's Communications Team will submit all social media posts to the Department for Acceptance one Working Day in advance of inclusion on social media.

Stakeholder Distribution List

FRMG's Communications Team will coordinate with the Department to update the master distribution list of contacts used during the Construction Period for public information publications and informational flyers/newsletters. This list will be submitted to the Department for Acceptance prior to Substantial Completion and updated annually throughout the duration of the Term from website, hotline, or public meeting requests. FRMG also will utilize the Department's preferred email messaging system and will assist the Department in supplementing the database and the email messaging system throughout the Department's data gathering process.

Lane Closure Reports

FRMG will, throughout the Term, submit a Lane Closure Report each Thursday as required by Schedule 10, Section 2 Maintenance of Traffic for the following week (Saturday through Friday). This report will be provided to the list of contacts as provided by the Department.

Traffic Alerts

FRMG's Communications Team will submit a weekly traveler alert each Thursday for distribution on the Department's preferred email system and ***CoTrip*** throughout the Term. The alert will include I-70 Mainline, CDOT Roadways, and Local Agency Roadways, in addition to any activity that might impact the traveling public. Upcoming alerts will be reviewed and discussed during the weekly Strategic Communications meetings.

Web Page Updates

FRMG's Communications Team will work with the Department to develop internet web page content for a website developed specifically for this Project by the Enterprises and CDOT. FRMG will provide website content updates weekly and otherwise as reasonably required with pertinent schedule information, new photos, contact information, etc. FRMG will submit all proposed update content for the Project website to the Department for Acceptance two Working Days in advance of inclusion on the website. FRMG's Communications Team will utilize the Department's web page template to provide consistent updates and all appropriate links to/from other sites (e.g., local city, county, bus service); associated graphics (e.g., detour maps) also will be included.

Language Assistance for Limited English Proficient Persons

The Community Liaison and communications team will be responsible for providing translation during individual conversations and short communication materials such as door hangers or simple web updates. FRMG understands that the Department will provide translation of all other communication materials and interpretation services at meetings. FRMG will document all measures taken to communicate with LEP persons and record all requests for language assistance. The details of this documentation will be submitted in the MOCP quarterly report.

Public Communication Collateral

FRMG's bilingual Community Liaison will work with the Department to develop outreach collateral materials to share information with the public as necessary for major Project changes such as significant O&M maintenance or Renewal Work activities. All collateral materials will adhere to the ***CDOT Colorado Brand Guidelines***. FRMG's Communications Team will not use contractor or subcontractor logos for any public communication materials. Only Department provided branding will be used on all PI materials throughout the Project. All collateral materials will include Spanish translation, provided by the Department, for broad distribution by the Department. Collateral materials that will be updated from the Construction Period are discussed in **Table 1** below or previously listed PI Toolbox.

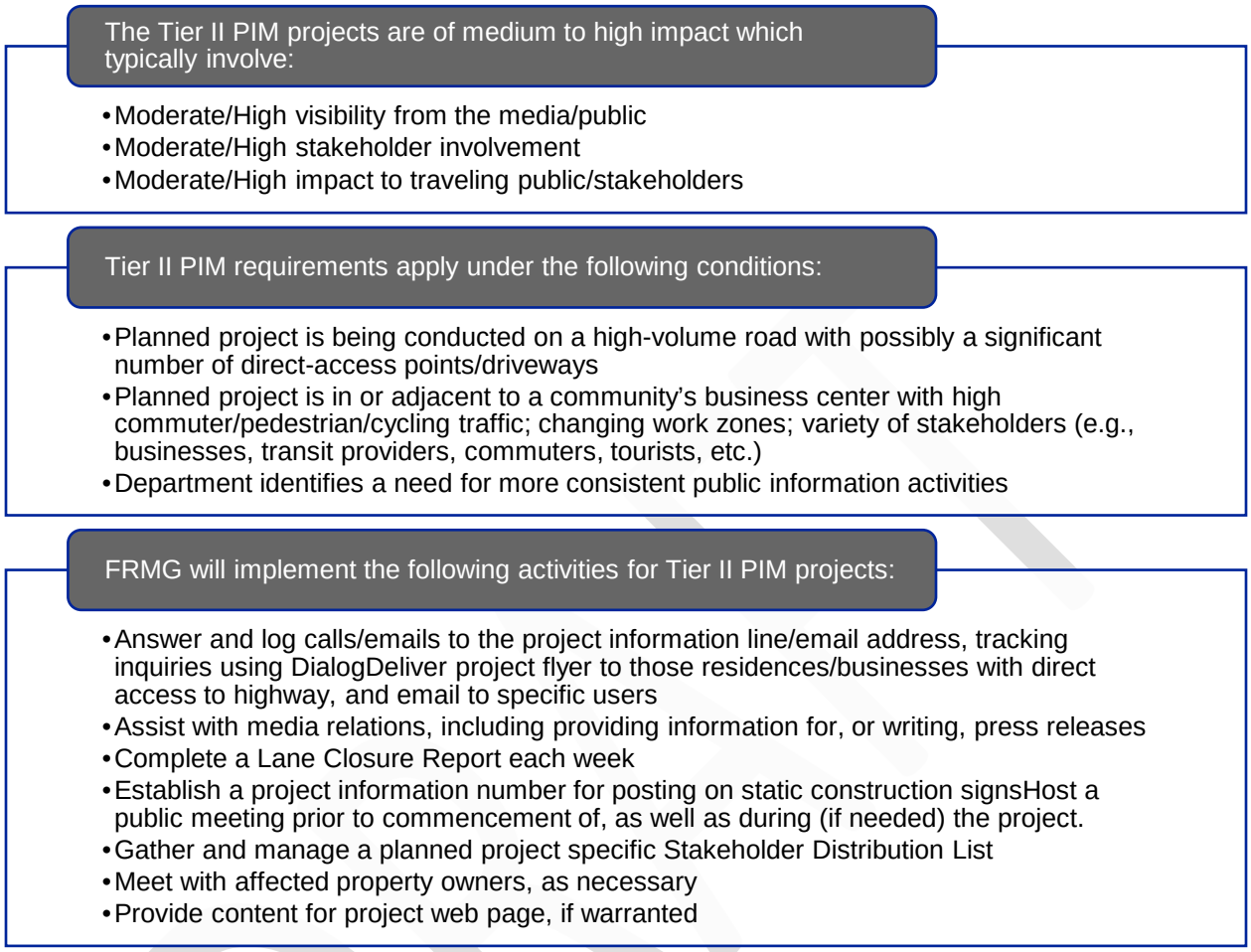
Table 1. Communication Collateral.

Collateral Type	Description
Document Templates	Provides a variety of document templates to be updated, including: • Fact Sheets/Flyers • Letterhead • Presentations • Posters
Work Zone Safety Brochures	• Provides traffic and work zone safety-related information • Contains Point of Contact for safety • Guidelines for working, walking, biking, and living in a construction zone
News Releases; Traffic Alerts/Releases	• Provides standard information to the news media regarding the Project, successes, traffic alerts, etc.

6.1.1.a Planned Projects

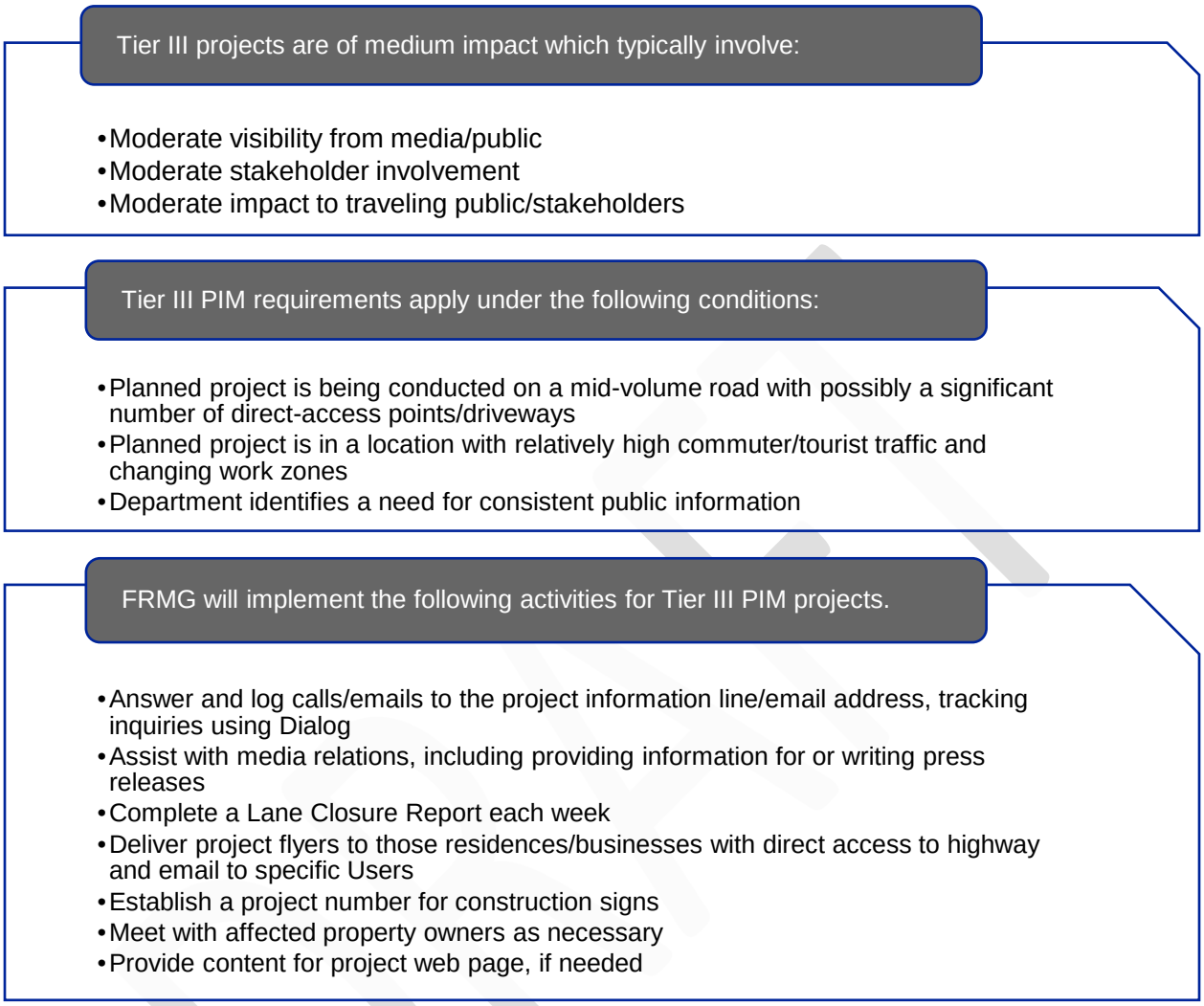
FRMG will provide regular and continuous public information services throughout the duration of the Operating Period. These public information services will adhere to the specifications outlined in the HPTE Strategic Communications and Transparency Plan. The PCM will meet with the O&M Manager before the weekly Strategic Communications meetings to determine upcoming planned projects. These planned projects will then be discussed at the weekly Strategic Communications meetings with the Department to determine the level of the public information Management activities warranted for the various planned O&M Work projects, prior to commencement of these projects. Dependent on which tier (Tier II or Tier III), the Department determines the level of PIM activities warranted. FRMG will Tier II PIM for medium-to-high impact, shown in **Figure 1**; or Tier III for medium impact, outlined in **Figure 2** on the following page.

Figure 1. Tier II Public Information Management Project Activities.



Examples of these projects (provided in Section 6 of Schedule 14): Grand Avenue Bridge, Glenwood Springs; I-25 in Colorado Springs; I-76 (Brush to Fort Morgan); US 36 Lyons to Estes Park; and US 160/US 550 CFI Durango.

Figure 2. Tier III Public Information Management Project Activities



Examples of these projects provided in Section 6 of Schedule 14 include I-25 Lane Balancing, US 287 Resurfacing, US 50 Delta to Montrose Resurfacing.

6.1.1.b Safety-Related Complaints

FRMG will report safety-related complaints to the Department within one Calendar Day of receipt, unless the circumstances constitute an immediate safety hazard. In that case, FRMG will notify the Department as soon as practical after the receipt of such complaint but not later than one hour after receipt.

FRMG will respond to valid complaints or requests, to the extent the complaints or requests are within FRMG's scope, as it did during the Construction Period. We will establish and maintain a public information hotline equipped with a telephone, voicemail, computer, and email address. The public information telephone line will be a local call line, and FRMG will work with the

service provider to create an easy-to-remember number. The voicemail for O&M information will be recorded in English and Spanish. It will provide updated messaging as needed concerning relevant maintenance operations and will allow the caller to leave a message. FRMG will check voicemail messages and respond to them throughout each day. During times of highly impactful activities or extended night work as identified by the Department, FRMG will provide 24-hour staffing of the public information telephone line.

FRMG will track safety-related complaints made by citizens and businesses, including names, addresses, phone numbers, and follow-up action taken in response to inquiries. All inquiries and any follow-up action will be entered in ***Dialog***, provided by the Department. FRMG will use the automated report generated by the system to follow up on all inquiries and complaints with a return phone call or email from FRMG and/or, in some cases, the Department. FRMG will convey any requests for services that are beyond the scope of FRMG's obligations under the Project Agreement to the Department.

6.1.1.c Operations and Maintenance Education

FRMG will assist the Department in outreach and education messages to help clarify unfamiliar, complex or often misunderstood concepts related to the Project's long-term O&M, allowing the public to make informed decisions. These topics include High Occupancy Vehicle (HOV) 3, Travel Demand Management, and accessing Tolled Express Lanes. The outreaches will adhere to the specifications outlined in the HPTE Strategic Communications and Transparency Plan. FRMG's PCM will work with the Department on the information needs for the outreach and education messages and provide the correct personnel for any outreach or education meetings the Department deems necessary. We will refer back to the safety complaints captured in Dialog, to identify reoccurring issues or questions that would be prime opportunities to provide additional clarification and improve the public understanding of the long-term O&M strategy.

6.1.1.d Maintenance and Operations Communications Plan Quarterly Reporting

FRMG will prepare and submit quarterly maintenance and operations communication reports during the Operating Period. The initial report will be provided to the Department for Acceptance no later than 10 Working Days after the 90th Calendar Day following Substantial Completion. Each quarterly report will be in English and Spanish. FRMG will keep track of the activities that take place during the preceding quarter and report as follows:

- Details of primary O&M Work activities performed during the preceding quarter; these will be in compliance with Progress Reports, Section 4 of Schedule 8 Project Administration
- Detailed summary of MOCP activities performed during the preceding quarter
- Detailed summary of the ECWP as part of the Progress Report activities during the preceding quarter
- A summary of progress in implementing the Small and Disadvantaged Business Participation Plan's O&M Contract Plan from the preceding quarter
- Detailed summary of number of accidents cleared during the preceding quarter
- A summary of calls and emails as recorded in the Dialog system

- Detailed summary of measures taken to communicate with LEP persons and requests for language assistance during the preceding quarter

6.1.2 Emergency Maintenance

FRMG will establish a dedicated Emergency contact phone number to assist in the coordination, command and support of Emergency preparedness, response, and recovery activities performed by FRMG and its partners. The FRMG dedicated Emergency contact phone number will provide communications support to operations. It will be monitored continuously by trained Emergency and Incident response personnel to ensure that FRMG responds to such events and deploys resources 24 hours per day, seven days per week, including holidays. The dedicated Emergency contact phone number will be responsible for dispatching FRMG forces in response to Incidents occurring within the Project O&M limits. The continuous operation of the dedicated Emergency contact phone number will ensure timely, consistent compliance with the Department's goals for arriving on scene, and restoring safe travel. As both roadway and information networks are interconnected, interagency coordination is critical for smooth traffic flow, predictable travel times, and overall efficient traffic operations.

FRMG will provide the following information immediately to the Department and CTMC for Emergency maintenance:

- Description of the activity and why it is necessary
- Start of the activity
- End of the activity including any updates to the above
- Impacts to traffic and property (businesses and residences)
- Communications tools to share information (e.g., Variable Message Sign boards, GovDelivery alerts, Twitter, photos)
- Contact number
- Contact once the Emergency maintenance work is completed; FRMG will contact the Department's Communications Manager and the CTMC

To communicate repair impacts to stakeholders, FRMG will utilize the already established contact databases and provide information via all channels mentioned in Section 4.1.1 General Requirements, including email, social media, mobile technology (apps), newsletters, press/traffic releases, Lane Closure Reports, and website updates.

Crisis Communications Plan

Front Range
Mobility Group

THE EXTRA MILE

CONNECTING COMMUNITIES

7. Crisis Communications Plan

7.1 General Requirements

The Crisis Communications Plan (CCP) will be used throughout the duration of the Construction Period and Operating Period to provide information the Department needs to disseminate related to a crisis situation. The PCM will be responsible for overseeing FRMG's crisis communication information effort during the Term. As discussed in the CPCP and MOCP, there will be ongoing public awareness activities, particularly during the Construction Period, or if any major maintenance or Renewal Work is being undertaken in the Operating Period. This CCP is focused on the activities surrounding unexpected events.

In addition, FRMG will provide a full-time Spanish/English bilingual Community Liaison who will coordinate closely with the Department and be responsible throughout the Term for ensuring that local residents, businesses, and stakeholders are informed about the Project and have a single point of contact for all questions and concerns.

The role of FRMG is to assist the Department with coordination and provide the necessary information to respond to the crisis. To support the Department's efforts, FRMG has prepared, and will maintain, this CCP for response to Emergencies and Incidents at any time during the Project Term. FRMG's CCP will be submitted to the Department for Approval prior to the issuance of NTP1 and updated regularly during the Construction Period and Operation Period (annually, at minimum).

Following is a CCP Primary Stakeholder Communications List:

- Local Area Residents
- Local/Regional Business Owners, Employees, and Customers
- Registered Neighborhood and Local Associations and Organizations
- Property Owners and Property Management Companies
- Local Schools, Universities, and Colleges
- Local Churches and Community Organizations
- Taxi, Shuttle, and Rental Car Companies
- Delivery and Courier Services
- Transportation Management and Advocacy Organizations
- Chambers of Commerce
- Commercial Vehicle Operators and Ports of Entry
- Denver Permit Office and Colorado Motor Carriers Association
- Tourist Destinations and Organizations
- Commuters and the Traveling Public, including Pedestrians, Bicyclists, and Persons with Disabilities
- CDOT employees, Headquarters, and Office of Communications and Public Relations
- Denver International Airport
- Office of the National Western Center
- RTD
- Local, Regional, and State Government Officials and Offices of Public Information

- Emergency Response Agencies (fire rescue, police, state patrol, hospitals)
- Disadvantaged Business Enterprises and Emerging Small Businesses
- Utility Owners
- Railroads
- News Media (radio, print, and television)

7.1.1 Prepare and Maintain the Crisis Communications Plan

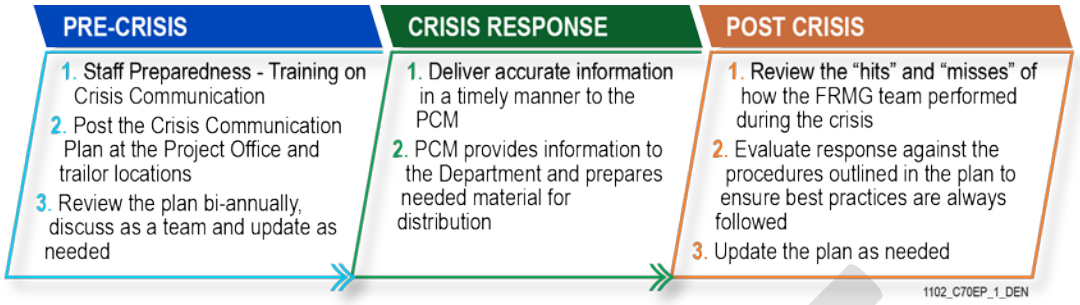
When an Emergency occurs, the need to communicate is immediate. The proliferation of social media channels and the exponential growth in mobile smartphone use have ensured that breaking news of an incident or crisis will usually appear first on Twitter or Facebook. Photos, commentary, and even streaming video may be available in real time to a vast audience before those involved are fully aware of what happened. Misinformation can drastically impede efforts to provide the ***right*** information to the ***right*** audience. Correct, accurate and timely release of information in a crisis can help reduce confusion and alleviate public concern. One of the most important requirements for effective communication during an urgent situation is gathering and understanding the facts and implications of a given situation, and then providing accurate and consistent information. FRMG's Communications Team will support the Department by providing the information needed to respond to the crisis.

As part of FRMG's first Strategic Communications Task Force meeting, an agenda item will include crisis communication. During this discussion with the Department, we will address different tiers of crisis and the anticipated communication level and protocol, as discussed below and shown in Table 3 in Section 7.1.3.c. FRMG will coordinate its approach with FRMG's overall Incident Management Plan, and it will address interfaces with respect to the Safety Plan.

The overarching goal of a CCP is to address public concern. The goals of FRMG's CCP are to reduce the impact of the crisis on those affected by assisting the Department in their efforts to collect, process, and disseminate information as quickly and accurately as possible. FRMG will funnel all interaction from government officials, Local Agencies, and other relevant parties through the Department to ensure we are most responsive to stakeholders and the Department. FRMG's Communications Team will ensure a well-organized flow of accurate and timely communications, supplementing information regularly as circumstances change. The faster we react to the situation, the quicker the Department can respond. FRMG's Communications Team will control the flow of information from FRMG personnel involved to the Department's Communications Team and expedite quick accurate summations of events throughout the crisis.

The Department is the lead on all external communications per Schedule 14 Section 7.1.2. There are three key elements important to managing crisis communications, which are summarized in **Figure 1**.

Figure 1. Crisis Communication Management.



7.1.2 Crisis Communication

FRMG understands the Department will be the lead agency to handle communication with the media, public, Department staff, and other relevant parties in the event of a crisis. FRMG's Communications Team will be available to help coordinate with the Department and provide information necessary to respond to the crisis. For that purpose, roles will be defined based on the level of communication required to sufficiently provide information to the Department for media, the internal audience and affected stakeholders. FRMG will position the FRMG Communications Team staff on the receiving end of information coming from the site, ensuring the right information is being provided to the Department.

7.1.3 Crisis Communication Plan Contents

7.1.3.a Types of Potential Emergencies

The types emergencies that we may encounter on the Project are listed in **Table 1**.

Table 1. Types of Potential Emergencies.

Incident Type	Possible Lane Closures	Possible Injury or Fatality
Traffic Accident	✓	✓
Rogue Vehicle Entering Restricted Construction Area	✓	✓
Pedestrian Entering Construction	✓	✓
Damage to Passing Vehicle	✓	✓
Traffic Hazard/Debris (Not involving Hazardous Materials)	✓	✓
Utility Strike	✓	✓
Medical Emergency	✓	✓
Construction Accident	✓	✓
Hazardous Material Spill	✓	✓
Civil Disturbance	✓	✓

Incident Type	Possible Lane Closures	Possible Injury or Fatality
Extreme Weather (Flood, Tornado, Fire, Blizzard)	✓	✓
Bomb/Terrorist Threat or Incident	✓	✓
Workplace Violence	✓	✓

7.1.3.b Designated Staff

In the event of an Emergency, FRMG's PCM will assist the Department in designating staff to communicate the relevant information. In the event of a crisis, it will assist in determining the type of crisis and the level of communication response required. During the first Strategic Communications Task Force meetings with the Department, we will present a crisis communications organizational chart for discussion, ensuring that the relevant Department and FRMG personnel are included.

For severe conditions such as an extreme weather event, a Crisis Command Center (CCC) could be established at the Project office or at (FRMG's team member) Flatiron's operations office, located at 4604 Paris Street in Denver. The established team, listed in the organization chart established with the Department, either already would be located at the Project office or readily available to respond to the crisis.

A key responsibility of FRMG is to help the Department meet the needs of the public and media during a crisis. The public and media see the functioning and safety of the roads as being important; therefore, FRMG will work cooperatively with the Department and others to achieve a positive image of the Project, the Department, and the team when responding to emergencies affecting the Project corridor. FRMG's Communications Team members will perform the functions identified in **Table 2**.

Table 2. FRMG Communication Team Roles and Responsibilities.

Title	Responsibilities and Authorities
Project Communications Manager (PCM)	1. Responsible for the overall management of the FRMG Communications Team 2. Manages the flow of information from the FRMG Project team to the Department 3. Responsible for ensuring the FRMG communication strategy is executed 4. Single point of contact for all crisis-related information from the location of the crisis 5. Interacts on-site with Project Management, Incident Command, and Safety Manager to identify key facts of the crisis 6. Answers calls and requests for information from Project employees as directed by the Department 7. As Approved by the Department, provides updates to internal audiences, including applicable Project team contractors 8. If a CCC is set up, supports CCC staff and serves as liaison between CCC and on-site personnel
Community Liaison	1. Responsible for drafting all written materials, including news releases, briefing documents and statements, to be Approved by the Department in English and Spanish 2. Compiles post-crisis report on crisis incident information; social media usage; and community, business, and government requests and responses

	3. Provides information for messages posted on the Project website, CDOT, or Project Facebook pages; on CDOT or Project Twitter pages; and through other appropriate social media tools 4. Provides information as it becomes available for the Department to communicate for incoming community, business, and government stakeholder calls 5. Records caller information and responses for the PI hotline 6. Ensures all relevant information is provided for electronic, print, and online media coverage for use by the Department 7. If a CCC is set up, takes notes at news conferences and briefings

7.1.3.c Addressing Potential Emergencies

The CCP is focused on how we will assist the Department to manage the communications in event of any Emergency impacting the Project. **Table 3** below provides a proposed strategy for classifying potential Emergencies/Incidents based on the impact to the traveling public and the appropriate actions that FRMG will take to assist the Department to manage stakeholders and the media.

Table 3. FRMG Communications Actions

Classification	Impact to Roadway	FRMG Communication Actions
Minor	Short duration lane blockages; on-scene responders responsible for traffic control Duration: < 30 min.	1. Notify the Department communications contact and provide specific details on the incident, including a written summary 2. Prepare Project website information update
Intermediate	Lane blockages requiring traffic control; short duration traffic management activities may be needed Duration: 30 min. – 2 hours	1. Quickly gather facts of the Emergency/Incident 2. Notify the Department Communications contact and provide specific details on the incident, including a written summary 3. Assist as directed by the Department in disseminating Approved information 4. Information prepared will include: cause of the disruption, actions being taken to alleviate the problem, impact to the public, instructions for coping with/avoiding the impact, and anticipated duration Materials to be prepared may include: • Press releases with relevant information • Twitter feeds • Facebook posts • Project website information update • If needed, information for dissemination to affected governmental agencies • If needed, information for dissemination to area residents and businesses • If needed, information related to impacts on schools 5. Preparation of an after-action report for the Department
Major	Full or partial roadway closure Duration: 2 hours or longer	1. Quickly gather facts of the Emergency/Incident 2. Notify the Department Communications contact and provide specific details on the incident including a written summary

Classification	Impact to Roadway	FRMG Communication Actions
		3. Assist as directed by the Department in disseminating Approved information. 4. Information prepared will include: Cause of the disruption, actions being taken to alleviate the problem, impact to the public, instructions for coping with/avoiding the impact and anticipated duration. Materials to be prepared may include: • Press releases with relevant information • Twitter feeds • Facebook posts • Project website information updates • Information for dissemination to affected governmental agencies • Information for dissemination to area residents and businesses • If needed, information related to impacts on schools 5. Preparation of an after-action report for the Department
Severe	Long-term Closure or Major Hazard/Threat to Project area	If directed by the Department, assist in the establishment of a Crisis Command Center.

Contact Lists

It is essential to have the means to reach internal and external stakeholders quickly through multiple modes of communication. Knowing who the internal and external stakeholders are is an imperative aspect to quick response times. FRMG will create and maintain contact lists including, but not limited to:

- Emergency Communications Tree (discussed further in Section 7.1.5 Emergency Information Dissemination – Communication Tree)
- Emergency Service Public Information Officers
- The Department Communications personnel
- Strategic Communications personnel for the Project
- Internal Team members (i.e., Design-Build Manager and Safety Manager)
- Jurisdictional Public Information Officers
- Major Utility Contacts

Once information is received, disseminating that information to the contacts listed above is critical. FRMG will continuously update and maintain these lists to facilitate the Department's ability to communicate messages through social media, email, SMS (text), phone calls, reverse 911 phone systems (if needed), and press releases.

Crisis Follow-Up

After the immediate crisis is addressed, FMRG will conduct follow-up activities with the Department outlined in **Table 4**.

Table 4. Crisis Follow-up Activities.

Steps for Follow-up Activities

1. Determine what happened, when/where, and who is involved?
2. Determine what follow-up communication is needed and who is responsible
    a. The Department
    b. FRMG
3. Verify the current status of the site.
    a. If not resolved, anticipated duration of disruption
4. Identify potential spin-off crises
    a. Determine responsible party
5. Hold a preliminary accident review meeting.
    a. Determine next steps/additional meetings for responsible party
    b. Construction site repair (if needed)
        i. Signage
        ii. Traffic control
    c. Determine additional messaging and tool for distribution
        i. Media
            1. The Department will take the lead, with FRMG providing statement support as necessary
        ii. Stakeholders – determine communication method
            1. GovDelivery.com
            2. One-on-one meetings
        iii. Community – determine communication method
            a. ITS
            b. Project website
            c. Community meeting

7.1.3.d Boilerplate Messaging

FRMG will establish a boilerplate messaging template that can be easily completed and located at the Project office, with the following information:

1. Cause of specific disruption (whether or not it was construction-related)
2. Actions being taken to alleviate the problem
3. Impact to the public and notification procedures
4. Instructions for coping with/avoiding the impact (e.g., detours)
5. Anticipated duration of the disruption

An example boilerplate message for each type of potential emergency is shown below:

Traffic Accident

A XXX car pileup occurred on I-70 from mile marker X to mile marker X. We are working with local and state authorities to investigate the cause. Currently, we know of zero injuries. Vehicles traveling in the area should expect a XX-hour delay.

Injury - The project team is supporting local emergency medical services. According to emergency services, there were injuries to some drivers and passengers. The project team is working with authorities to investigate the cause of the accident. The project team anticipates X hours of additional closures in the area due to the incident.

Fatality - The project team is working with emergency medical services to ensure the safety of the traveling public and our teammates. The XX-car pileup has caused motorists damage to

vehicles and some drivers and passengers suffered injury. The project team is working with authorities and emergency medical providers to support the injured party/parties and to investigate the cause of the incident. The project team anticipates X hours of additional closures in the area due to the incident. The site is secure, and work around the incident area has ceased. In coordination with emergency medical providers and authorities, we are investigating the situation.

Rogue Vehicle Entering Restricted Construction Area

A rogue vehicle entered a marked construction area on I-70 between mile marker X and X.

Injury - An unauthorized vehicle hit XX barriers, causing injury to the driver and damage to the vehicle. The project team is working with authorities to investigate the cause of entry and how to repair the site so that it is clearly inaccessible to the public. The project team anticipates X hours of additional closures in the area due to the incident.

Fatality - The project team is working with emergency medical services to ensure the safety of the traveling public and our teammates. An unauthorized vehicle hit XX barriers, causing injury to the driver and damage to the vehicle. The project team is working with authorities and emergency medical providers to support the injured party and to investigate the cause of entry. Repair of the site will occur so that it is clearly inaccessible to the public. The project team anticipates X hours of additional closures in the area due to the incident. The site is secure, and work around the incident area has ceased. In coordination with emergency medical providers and authorities, we are investigating the situation.

Pedestrian Entering Construction

A pedestrian entered the marked construction area on I-70 between mile marker X and X.

Injury - An unauthorized pedestrian experienced an injury while on the active construction site. The project team is working with authorities to investigate the cause of entry and how to repair the site so that it is clearly inaccessible to pedestrians. The project team anticipates X hours of additional closures in the area due to the incident.

Fatality - The project team is working with emergency medical services to ensure the safety of the traveling public and our teammates. An unauthorized pedestrian entered the active construction site and suffered injury. The project team is working with authorities and emergency medical providers to support the injured party and to investigate the cause of entry. Repair to the site will occur so that it is clearly inaccessible to the public. The project team anticipates X hours of additional closures in the area due to the incident. The site is secure, and work around the incident area has ceased. In coordination with emergency medical providers and authorities, we are investigating the situation.

Damage to Passing Vehicle

A vehicle experienced damage when (a debris event, e.g., boulder/load of asphalt) damaged its exterior on I-70 between cross streets X and X. The Project team is investigating the cause of debris to eliminate future instances. There appears to be no impact at this point to the public; please check the variable messaging signs and Twitter before entering the Project area for updates to the impacted area incident. It is anticipated to take less than an hour for sweeping crews to clear the debris, and there will be no anticipated lane Closures.

Traffic Hazard/Debris (Not Involving Hazardous Material)

XXX (describe debris event) fell off (vehicle, e.g., an 18-wheeler) and created a traffic hazard on I-70 from mile marker X to mile marker X. No one was hurt. The project team is working with local authorities to properly clear the roadway of the non-hazardous materials. Travelers may expect XX hours of delay in the area.

- *(Follow-On) The debris has been cleared and the roadways are now open.*

Injury - The project team is supporting local emergency medical services. Due to the debris in the roadway, a traveler sustained an injury and a vehicle was damaged. The project team is working with medical services to provide support to the traveler, and we are working with authorities to investigate the accident's cause. The project team anticipates X hours of additional closures in the area due to the incident.

Fatality - The project team is working with emergency medical services to ensure the safety of the traveling public and our teammates. The nonhazardous debris spill caused an accident that resulted in injury to drivers and passengers, and damage to vehicles. The project team is working with authorities and emergency medical providers to support the injured party/parties and to investigate the cause of the incident. The project team anticipates X hours of additional closures in the area due to the incident. The site is secure, and work around the incident area has ceased.

Utility Strike

A utility line on I-70 near/between mile marker X and X was struck. Fiber optic cable was sliced, causing an internet outage (describe the area). No one was hurt. We are working with CenturyLink/Xcel and anticipate (fiber option/internet/phone) coverage to resume in 30 minutes (or whatever time is reasonable). The situation is being investigated to ensure proper protocol and procedure are followed when excavating and that no additional incidents occur. Vehicles traveling in the area should expect a XX hour delay.

Injury - A utility line on I-70 near/between mile marker X and X was struck. Fiber optic cable was sliced, causing an internet/phone/electrical outage (describe the area). A teammate sustained a minor injury, and the project team is supporting local emergency medical services. The situation is being investigated to ensure proper protocol and procedure are followed when excavating and that no additional incidents occur. Vehicles traveling in the area should expect a XX-hour delay.

Fatality - Following a major utility strike, the project team is working with emergency medical services to ensure the safety of the traveling public and our teammates. The project team is working with authorities and emergency medical providers to support the injured party/parties and to investigate the cause of the utility strike. The project team anticipates X hours of additional closures in the area due to the incident. The site is secure, and work around the incident area has ceased. In coordination with emergency medical providers and authorities, we are investigating the situation.

Medical Emergency/Construction Accident

Injury - The project team is working with emergency medical services to ensure the safety of our teammates. The site is secure, and work around the incident area has ceased. In coordination with medical providers and authorities, we are investigating the situation.

OR

At XXX (date/time), an accident occurred on the site. The project team is working with emergency medical services to ensure the safety or our teammates. The site is secure, and work around the incident has ceased. In coordination with medical providers and authorities, we are investigating the situation.

OR

At XXX (date/time), an accident occurred on the site. The project team is working with emergency medical services to ensure the safety of our teammates. The team anticipates X hours of closures due to the incident and recommends XXX as a route detour.

Fatality - The project team is working with emergency medical services to ensure the safety of our teammates. The site is secure, and work around the incident area has ceased. In coordination with emergency medical providers and authorities, we are investigating the situation.

Hazardous Material Spill

XXX (describe the debris) fell off (vehicle, e.g., an 18-wheeler) [or spilled from a jackknifed truck / equipment leaked, etc.] and created a traffic hazard on I-70 from mile marker X to mile marker X. No one was hurt. An Exclusion Zone and Contamination Reduction Zone or state a contained area in accordance with health and safety standards] has been established for the areas. The project team is working with Department, state, and local authorities to properly clear the roadway of the hazardous materials. Flagmen and/or signage, as necessary, will be used on site to minimize the potential for accidents. Travelers may expect XX hours of delay in the area.

- *(Follow-On) The debris has been cleared. Roadways are open.*

  OR

  The groundwater contamination has been contained in accordance with health and safety standards.

Injury - The project team is supporting local emergency medical services. Due to the hazardous debris in the roadway, a traveler sustained an injury, and a vehicle was damaged. A contained area, in accordance with health and safety standards, has been established. The project team is working with medical services to provide support to the traveler, and we are working with authorities to investigate the accident's cause. The project team anticipates X hours of additional closures in the area due to the incident.

Fatality - The project team is working with emergency medical services to ensure the safety of the traveling public and our teammates. The hazardous debris spill caused an accident that resulted in injury to drivers and passengers, and damage to a vehicle. A contained area in accordance with health and safety standards has been established. The project team is working

with authorities and emergency medical providers to support the injured party/parties and to investigate the cause of the incident. The project team anticipates X hours of additional closures in the area due to the incident. The site is secure, and work around the incident area has ceased.

Civil Disturbance

The project team is working with state and local authorities to support investigations during this civil disturbance. The construction site is secure, and any additional information will be provided by authorities or the Department.

Extreme Weather (Flood, Tornado, Fire, Blizzard)

Work activities will cease during extreme weather. The Design-Build Manager will make such a determination, if appropriate, and notify all personnel to cease work and take appropriate shelter during episodes of extreme weather.

Flood
The recent inclement weather has caused flooding on I-70 between mile marker X and mile market X. The project team is working with the Department, federal, state, and local authorities to facilitate drainage and to determine safe vehicle passageway. Flooding should be alleviated within X hours. A recommended detour route is XXX.

Tornado
A tornado was spotted near/on I-70 between mile marker X and X. It is traveling (state the direction). The project team is working with the Department, federal, state, and local authorities to determine safe vehicle passageway. A recommended detour route is XXX.

Fire
A fire was spotted near/on I-70 between mile marker x and x. It is traveling (state the direction). The fire department has been notified. All personnel are accounted for, and no one is injured. The project team is working with the Department, federal, state, and local authorities to determine safe vehicle passageway, and it currently anticipates a XXX-hour delay. The project team is working with the aforementioned authorities to support cause-of-fire investigations. The site is secure, and any additional information will be provided by authorities or the Department. A recommended detour route is XXX.

Injury - The project team is supporting local emergency medical services. Due to the extreme weather event (flood/fire/tornado), a traveler sustained an injury, and a vehicle was damaged. The project team is working with medical services to provide support to the traveler. The project team anticipates X hours of additional closures in the area due to the incident. A suggested detour route is XXX.

Fatality - The project team is working with emergency medical services to ensure the safety of the traveling public and our teammates. The extreme weather event (fire/flood/tornado) resulted in injuries to drivers and passengers, and damage to vehicles. The project team is working with authorities and emergency medical providers to support the injured party/parties. X hours of additional closures are anticipated in the area due to the incident. A suggested detour route is XXX.

Blizzard

The recent inclement weather has caused extreme snowing and limited visibility on I-70 between mile marker X and mile marker X (or list cross streets). The project team is working with the Department, federal, state, and local authorities to facilitate snow removal and to determine safe vehicle passageway. Travel slowly and safely. Weather stations predict the blizzard should subside within X hours, with snow removal occurring continuously. A recommended detour route is XXX.

Bomb/Terrorist Threat or Incident

Travel on I-70 between mile marker X and X is currently impacted due to a potential threat. The project team is working with federal, state, and local authorities to support investigations. The site is secure, and any additional information will be provided by authorities or the Department. XX hours of delay are anticipated in the area. A recommended detour route is XXX.

Injury - The project team is working with state and local authorities to support investigations and is committed to doing all it can to ensure that our employees, subcontractors, and the traveling public are safe. A XXX (describe who) sustained injury during the (incident/explosion/shooting/etc.). Due to the sensitive nature of this unique situation, additional details will be provided by authorities. The project team anticipates X hours of additional closures in the area due to the incident. A suggested detour route is XXX.

Fatality - The project team is working with state and local authorities to support investigations and is committed to doing all it can to ensure that our employees, subcontractors, and the traveling public are safe. Due to the sensitive nature of this unique situation, additional details will be provided by authorities. The project team anticipates X hours of additional closures in the area due to the incident. A suggested detour route is XXX.

Workplace Violence

Travel on I-70 between mile marker X and X is currently impacted due to a potential threat. The project team is working with state and local authorities to support investigations and is committed to doing all it can to ensure that our employees and subcontractors are safe. The Department and authorities will provide additional information as the investigation continues. Anticipate XX hours of delay in the area.

Injury - The project team is working with state and local authorities to support investigations and is committed to doing all it can to ensure that our employees and subcontractors are safe. Due to the sensitive nature of this unique situation, additional details will be provided by authorities. The project team anticipates X hours of additional closures in the area due to the incident. A suggested detour route is XXX.

Fatality - The project team is working with state and local authorities to support investigations and is committed to doing all it can to ensure that our employees and subcontractors are safe. A teammate sustained injury during the incident. Due to the sensitive nature of this unique situation, additional details will be provided by authorities. The project team anticipates X hours of additional closures in the area due to the incident. A suggested detour route is XXX.

7.1.4 Internal Coordination and Communication

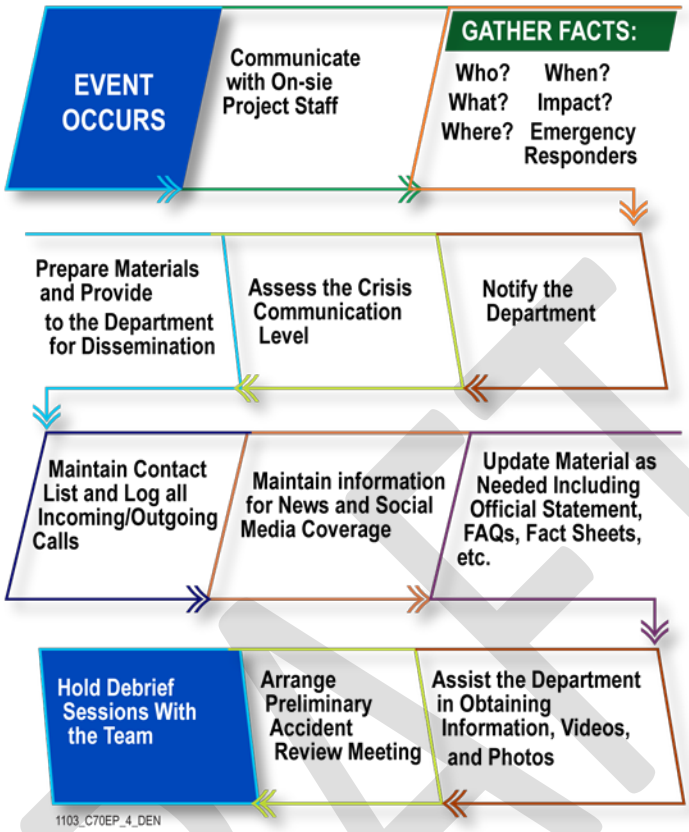
FRMG will have an Approved Incident Management Plan that details the specifics of responding, and managing any incidents on the Site. As outlined in the plan, the FRMG Emergency contact will be notified for immediate response, will assess the situation, and will immediately notify the appropriate personnel to implement the Incident Management Plan and verify that the FRMG Communications Team has been alerted. Upon notification of the Incident, the Developer will cooperate with Emergency Services and immediately undertake actions necessary to restore traffic operations as described in the Approved Incident Management Plan. This will encompass all necessary traffic management activities including detours as necessary**.** All Project personnel will be trained on the procedures outlined in the Approved Incident Management Plan.

In the event of an Emergency that impacts the Project, once notified, the FRMG PCM will gather as many preliminary facts as possible and make preliminary contact with the Department's Communications Manager, Project Manager, FRMG Design-Build Manager, and/or O&M Manager (depending on Project phase). The FRMG PCM will proceed to the site as quickly as possible and confirm the crisis with the appropriate on-site personnel. The PCM will gather additional facts about the situation, including: what/when/where; impacts (human/traffic/utilities, etc.); injuries/fatalities; who is at the scene (Emergency responders); and whom from FRMG is on the scene. All available information will be communicated to the Department Communications Manager to determine the type of crisis and level of response required based on established protocols. At that point, the appropriate team will be mobilized to prepare all needed information to be provided to the Department. This will include items such as official statements, Frequently Asked Questions, and other facts on the Emergency for the Department to review and Approve then provide to the media, internal staff, appropriate government agencies, stakeholders, and community (e.g., responding to phone inquiries).

The flowchart in **Figure 2** provides an overall summary of these steps. As outlined in Table 1 above, depending on the severity of the situation, the amount of investigation and information prepared will vary. FRMG will work with the Department to refine these procedures and provide a more detailed protocol that will be followed.

FRMG will ensure a consistent approach to crisis communications. Internal reporting procedures are in place to ensure timely, accurate information is sent from Project Management and the Incident Management Team to the FRMG Communications Team and then forwarded the Department.

Figure 2. Emergency Response Flow Chart.



FRMG will provide the instructions and training for all Project personnel on the procedures for internal coordination and communication when an Emergency occurs as shown in **Table 5**.

Table 5. Instructions and Training for Project Personnel on Internal Coordination and Communication Procedures.

Internal Coordination and Communication Procedures

Project Field Personnel
If any Emergency scenarios occur: 1. Contact your immediate supervisor 2. Call FRMG Safety Manager, who will initiate the procedures for addressing potential Emergencies, including making sure that the FRMG Project Manager and Communications Manager are contacted.
When calling in, please provide the following: 1. What happened 2. Specific location 3. Your name 4. Your current contact number 5. General activity involved/how it happened 6. Current status of people/situation 7. Is media on-site? If yes, give clear directions to location.
Project Office Personnel

When an incident or crisis has been reported from the field to Project office personnel:

1. Call FRMG Project Manager
2. Call FRMG Project Communications Manager

Central 70 On-site Procedures for Emergency Communications

Recognizing that news media may arrive at the crisis site before FRMG or the Department, procedures have been established, and are provided in **Table 6** below, to guide FRMG's on-site personnel's communications, as listed in 7.1.3.b Designated Staff.

Table 6. Procedures for On-Site Personnel Emergency Communications During Construction.

Personnel	Responsibilities	Actions
Crew Supervisor	Call/notify the following immediately: Construction Safety Manager (Construction Period) **or** Health & Safety/Operations Superintendent (Operating Period) **and** FRMG PCM	Provide the following information: 1. What happened 2. Specific location, exit #, cross streets, mile marker, etc. 3. Your name 4. Your immediate contact number that will remain open for incoming calls 5. General activity involved or how it happened 6. Current status of people/situation 7. Is the media on-site? If yes, give clear directions to location.
Field Staff Assigned to Media Control	**If media is on-site:** Use tape, cones, traffic control equipment, or other means to mark off a secure area for the media to gather. Look for an area safely away from any hazards to create a "Safe Zone" that is large enough to accommodate 20+ people and is accessible via car from a public street.	1. Direct all media to the Safe Zone. If already on-site, escort them to this area. 2. Keep other staff completely separate from the media Safe Zone. 3. Stay with this group. 4. Do not, under any circumstances, leave the media personnel alone. 5. DO NOT COMMENT. The media will ask questions and attempt to get you to talk about what is happening, the people, your job, etc. Try to be as polite and courteous as you can, but do not answer any questions. In this situation your only statement is: "*I'm sorry, I am not a Spokesperson. I am here to keep you safe during this incident. As soon as information is available, a Spokesperson will provide it to you."*
Manager/ Super-intendent	Wait for the Spokesperson to arrive and do not make any statements to the media unless directed to do so by the Department. If, for some reason, the Spokesperson cannot arrive in a timely manner, the Department may direct the Manager/Superintendent to provide an approved statement.	If there are several media representatives present and a Manager/Superintendent is directed to address the media, the following SAMPLE statement will be read by the Manager/Superintendent: *"My name is _____and I'm a _____ (Title) on the Central 70 Project. At approximately ____p.m./a.m. we experienced a(n) (accident, fire, explosion [or describe situation]) near _____ (approximate street address). Emergency crews are responding and we will have additional information available as we are able to confirm it. Please remain in this safe area and a spokesperson will be back with any additional information that can be verified. We will hold a press briefing at _____p.m./a.m. and will notify you at least a half-hour prior to the briefing as to the location. That is all I have for now. We will answer questions as soon as we can."*

Personnel	Responsibilities	Actions
Manager/ Superintendent (cont.)	If the incident is resolved fairly quickly, the media will probably leave to prepare their story, but they may still have questions that need to be answered.	In that event, please take down the following information: 1. Name of Media Outlet (publication/radio/TV station) 2. Reporter's Name 3. Mobile Phone # 4. Reporter's Deadline 5. Reporter's Questions 6. Facts Given (this will consist only of the facts released through the approved statement) Once all information is collected, immediately forward written documentation of the media inquiries to the PCM.
Staff Assigned to Public Safe Zone	Keep the public in a contained area, safely away from the incident scene AND away from the Media Safe Zone.	Do not provide information or updates on status of people/situation to any one present. This information will be provided *only* by the Media Spokesperson

Wallet Cards
Wallet Cards will be distributed to all FRMG members, including Subcontractor crewmembers working in the field. They will include internal notification procedures and contact information, brief instructions on how to respond to on-site media, and a statement clarifying they are not spokespersons.

Review Information on Wallet Cards
FRMG will make sure all employees understand the procedures outlined on the Wallet Cards and that they review the approved statements printed on the Wallet Card. We will ensure that all appropriate employees have cards on their person when they are working. Crisis Communications procedures will be outlined and reviewed during all employee orientations.

Media Inquiries
Media representatives will be instructed on the following protocol if a member of the media arrives on-site without warrant during a crisis: Media representatives are to be escorted to the on-site supervisor. The worker who made contact with the media representative will explain that they are not a spokesperson for the Project and are not authorized to answer any questions. The worker will refer the media representative to the FRMG Project Communications Manager, whose phone number is on the worker's Wallet Card. The worker will be instructed to write down the media representative's name, the station or publication they work for, and their mobile phone number. Afterwards, staff will call FRMG's Project Communications Manager with the information. The PCM will provide this information to the Department's Communications Manager, who may follow up and schedule a visit for the media representative if necessary. All media visits must be approved through the Department. It's FRMG's integral safety policy that individuals cannot walk on-site without proper protective equipment (i.e., hard hat, safety vest, safety glasses).

The Response Procedures for the Operations of the Project will follow similar principles and will be integrated with the Operations Incidence Management Plan.

7.1.5 Emergency Information Dissemination – Communication Tree

All appropriate personnel are included on the emergency communication tree for immediate response in the event of an Emergency. The telephone/email tree will be divided into areas of expertise so the proper people are called and/or emailed for specific Emergency situations. The Department's Project Manager, FRMG's Design-Build Manager, FRMG's Safety Manager, Department's PCM, FRMG's PCM, and the Crisis Communications Team members are included on the phone/email tree for notification of any Emergency.

FRMG will develop and maintain a contact list of Emergency service providers by utilizing the database already established by the Department and adding to it as required. This list will become a working document inside the Crisis Communications Plan and an FRMG Communications team member will verify and update this list regularly, ensuring the most up-to-date contact information is in place.

FRMG will provide information to Emergency service providers and will submit the Emergency response communications tree to the Department for Acceptance prior to the issuance of NTP 1.

The FRMG PCM will initiate the Emergency Communications Tree to gather the Crisis Communications Team and set up the Crisis Communications Center (if needed). Once the team has gathered, the Department's Communications Manager will determine if interagency collaboration is required (e.g., City and County of Denver), and assign responsibilities to the crisis team members.

The Emergency Telephone Tree Contacts summarized in **Table 7** will be populated with names and contact information in the final plan after contract award. Individuals at the end of this phone tree must determine whether other staff within their respective departments/disciplines should be called.

Table 7. Emergency Telephone Tree Contacts.

NAME	OFFICE	CELL PHONE	HOME PHONE
TBD **Department Communications Manager**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
Kathy Berumen **FRMG Communications Manager**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
TBD **Media Coordinator**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
TBD **Public Information Coordinator**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
TBD **Media Spokesperson**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
TBD **Social Media Coordinator**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX

TBD **Business/Community Liaison**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
TBD **Government Coordinator**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
TBD **Internal Coordinator**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
TBD **Crisis Communications Center Coordinator**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX
TBD **FRMG Project Manager**	XXX-XXX-XXXX	XXX-XXX-XXXX	XXX-XXX-XXXX

Front Range
Mobility Group

APPENDIX J
DRAFT STRATEGIC COMMUNICATIONS PLAN

VOLUME 2 – TECHNICAL SUBMISSIONS
Binder 15 of 18

CENTRAL 70 PROJECT

PUBLIC DISCLOSURE
Administrative and Technical Proposal:

Front Range Mobility Group

THE EXTRA MILE

APPENDIX K

DRAFT SMALL AND DISADVANTAGED BUSINESS PARTICIPATION PLAN

CONNECTING COMMUNITIES

Draft Small and Disadvantaged Business Participation Plan

For

Central 70 Project

Contract #

Prepared By:

Front Range Mobility Group

Front Range Mobility Group	Central 70 Project - Draft Small and Disadvantaged Business Participation Plan	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Table of Contents

List of Attachments

Attachment A – DBE Form
Attachment B – Safety and Rules Pledge
Attachment C – CUF Training Presentation

Acronyms and Abbreviations

ATSP	Approved Transportation Service Provider
CDOT	Colorado Department of Transportation
CRPM	Civil Rights Program Manager
CUF	Commercially Useful Functions
DBE	Disadvantaged Business Enterprise
ESB	Emerging Small Business
FRMG	Front Range Mobility Group
HCC	Hispanic Chambers of Commerce
NAICS	North American Industry Classification System
O&M	Operations and Maintenance
RTD	Regional Transportation District
SDBP	Small and Disadvantaged Business Participation
SDBPP	Small and Disadvantaged Business Participation Plan
USDOT	United States Department of Transportation

1. Introduction

Front Range Mobility Group (FRMG) strives to work cooperatively with owners, stakeholders, Subcontractors and consultants, and our team believes that the success of a project comes with effective partnership among all stakeholders. In particular, we believe in the Colorado Department of Transportation's efforts toward putting each "Project First." Constructive dialogue and collaborative efforts among members of the Project team will allow us to work toward the success of the Project. It will help us build trust, promote empathy, and look for creative, positive solutions to issues before they escalate. In alignment with our philosophy, our team has a reputation for working collaboratively with transportation owners to accomplish their project goals.

FRMG has already begun proving our commitment to bringing Disadvantaged Business Enterprise (DBE) and Emerging Small Business (ESB) firms and Suppliers onto our team. We have held meetings and outreach events geared toward prospective DBE/ESB firms interested in participating on the Project. FRMG has participated, attended, or sponsored several events:

- Participated in the Colorado Department of Transportation Trade Fair (Oct. 22, 2015)
- Attended the Hispanic Contractors of Colorado/CDOT presentation on the Project (Feb. 17, 2016)
- Participated in the Central 70 Workforce Roundtable discussion (Sept. 8, 2016)
- Sponsored and participated in the Duct Works/Paint the Viaduct event hosted by CDOT (Oct. 1, 2016)
- Participated in the Black Construction Group Panel Discussion on Central 70 (Nov. 8, 2016)
- Participated in the Central 70 Workforce Roundtable discussion (Jan. 6, 2017)
- Sponsored and attended the Hispanic Chamber of Commerce (HCC) Awards Dinner (Feb. 27, 2017)
- Sponsored and attended the HCC/CDOT presentation on the Project (Feb. 15, 2017)
- Sponsored and attended the HCC Awards Dinner (Feb. 25, 2017)
- Participated in panel discussion with Transportation Leading Edge Course, hosted by the Denver Metro Chamber of Commerce Small Business Office (May 2, 2017)

In addition, FRMG has held six outreach events throughout the proposal phase geared toward introducing the FRMG team to the DBE/ESB community and helping stakeholders understand the Project and the procurement process. These outreach events are described in further detail in Section 3.c of this plan.

To continue our good faith efforts to encourage participation by DBE/ESB firms on the Project, FRMG has developed a Small and Disadvantaged Business Participation Plan (SDBPP) that has exceeded the requirements in Appendix A of Schedule 15 of the Project Agreement (Federal and State Requirements). We understand the need for proactive, ongoing dialogue

between our team and local DBE/ESB firms, and the importance of establishing and communicating needs and expectations early, to ensure Project success.

Our team's SDBPP achieves the following:

1. Providing training opportunities for both DBE/ESB firms and FRMG personnel, so all have an understanding of the program and the Department's expectations
2. Identifying prospective challenges DBE/ESB firms face and finding ways to creatively mitigate those issues
3. Creating a culture of transparency and open communication among FRMG team members and DBE/ESB firms

1.a Small Business Team Members

FRMG's Civil Rights Program Manager (CRPM) Reggie Gamlin and Small and Disadvantaged Business Participation (SDBP) Coordinator Tamaka Thornton comprise our experienced leadership for the small business program development team. Their collective talents and previous work experience positions our team to best execute and continue to develop this comprehensive and innovative program in support of the SDBPP goals above.

Reggie Gamlin will oversee the management of the entire DBE/ESB program. A manager with nearly 20 years of construction and construction-related experience, he has worked on a variety Transportation and Public Construction projects totaling over $2B. Working closely with small businesses since 2002, his ties and relationships with the Denver metro area DBE/ESB community gives him a strong understanding of local small business issues. The relationships he has established with local owner/agencies and construction associations such as United States Department of Transportation's Small Business Training Resource Center, Hispanic Contractors of Colorado, and the Colorado Contractors Association (CCA) makes him an expert in the Denver market.

Reggie has also been called upon as an expert in the national DBE/ESB community. In summer 2016, he spoke on a panel discussing building capacity in the DBE community at the national conference for the Airport Minority Advisory Council (AMAC). Through Morgan State University, Reggie is also in process of receiving his national certification as a Certified Compliance Administrator from the American Contract Compliance Association.

Reggie formerly served as Director of the Rocky Mountain Minority Contractors Association, a program under the CCA. In this capacity, he directly assisted hundreds of small businesses in certification, compliance, building capacity, prompt-pay issues, insurance, and bonding regulations, along with how to properly bid on City, State, and Federal agency projects. He also brought in more than $70,000 in revenue to CCA to support small business workshops and programs.

As a Contract Compliance Coordinator with the Division of Small Business Opportunity for the City and County of Denver, Reggie has been highly trained in compliance regulations of the 49 CFR parts 26 for MWBE and DBE programs. He has worked on over 600 City and County of Denver and Denver International Airport projects to ensure prompt payment and that DBE/ESB requirements were met. He participated in pre-bid and bid openings for both public sector and transportation pursuits. Reggie's extensive knowledge of ADA, DBE, Davis-Bacon, EEO, and Title VI contract compliance regulations of government construction contracts makes him a strong resource for the Civil Rights Program Management Office.

In addition to his compliance and contract experience, Reggie also has served as a project engineer. Among his duties, he solicited and analyzed contractor bids received, finalized and made award recommendations, and negotiated and executed contracts. He was proactive with contractors to ensure contract compliance; he also ensured the generation of progress reports, schedules, daily reports and related status reports, invoices, and supporting documents in a

timely manner. He performed closeout of contracts; finalized outstanding contract issues, final invoices, and contractor performance evaluations; and prepared and executed purchase orders.

Tamaka Thornton, SDBP Coordinator, has worked in the construction industry for 10 years and in particular with DBE/ESB firms for the last six years. She has worked in a variety of states and has in-depth knowledge of the Department's and federal DBE/ESB programs. Also, Tamaka has managed the compliance reporting requirements for DBE/ESB and non-DBE/ESB Subcontractors to the owner. She has coordinated preconstruction and post-award outreach events for DBE/ESB, along with specialized training in the areas of Commercially Useful Functions (CUF), Certified Payroll, Good Faith Efforts, and DBE/ESB Certification.

Tamaka will implement past successful strategies on this Project to engage the DBE/ESB community, as well as lessons learned from past experience. This includes the approach of attending events and meetings as often as possible, ensuring the Project team is transparent with information and available for questions and concerns. Outreach events not only provide information to Subcontractors, but also help our team's representatives know more about companies and their capabilities.

One of Tamaka's greatest past victories was having eight DBE or ESB firms receive contracts and perform without failure due to education through the partnership of the prime and the United States Department of Transportation Bonding and Education Program.

In addition, Tamaka has implemented trucking plans for DBE/ESB firms in the past. Submitting information about their firm size, capacity, and past experience up front allowed the team to validate and expedite the process of ensuring DBE/ESB participation would be counted; it also minimized CUF failure.

A mandatory preconstruction meeting with all Subcontractors, including DBE/ESB firms and non-DBE/ESB firms, after contract execution let all parties understand the process and expectation of the work and documentation needed right from the start.

Tamaka has worked successfully with the following agencies on DBE/ESB firm opportunities:

- United States Department of Transportation – Small Business Transportation Resource Centers
- Association of General Contractors
- North American Montessori Center
- Women in Transportation
- National Association of Women in Construction
- Regional Hispanic Contractors Association (Dallas, Houston, and Corpus Christi, Texas)
- CalAsian Chamber of Commerce (Sacramento, Calif.)
- Greater Houston Black Chamber of Commerce
- Small Business Administration
- Metrolina Minority Contractors Association (Charlotte, N.C.)
- Houston Supplier Development Council

Tamaka has also worked with the following DBE Certification Agencies:

- Birmingham Airport Authority
- Alabama Department of Transportation
- North Carolina Department of Transportation
- Georgia Department of Transportation
- South Carolina Department of Transportation
- City of Charlotte, N.C., Small Business Office
- North Central Texas Regional Certification Agency
- Texas Department of Transportation
- City of Houston
- Washington State Department of Transportation (Office of Minority Woman Business Enterprise and WSDOT Office of Equal Opportunity)

1.b SDBP Team Roles, Responsibilities, Authority, Key Personnel Integration, and Meetings

Overview of Roles and Responsibilities

Our Small Business Team will coordinate all SDBP efforts. **Reggie Gamlin**, CRPM, and **Tamaka Thornton**, SDBP Coordinator, will be dedicated to establishing and maintaining compliance information gathering and reporting processes, as well as ensuring that DBE/ESB firms receive the assistance and training they need to excel on this Project. At a minimum, our team will:

- Seek out and assist interested DBE and ESB firms in the prequalification process and use of FRMG's contract database, iSqFt, the use of which is further detailed in Section 2.b
- Respond to DBE and ESB inquiries and concerns, and proactively work with our Project team to address issues before they escalate
- Review paperwork submitted by DBE/ESBs for content and assist firms as needed
- Lead the cooperative effort among the Department, FRMG, local resources and organizations to distribute Project information and contracting opportunities
- Meet on a regularly scheduled basis with the Department regarding DBE/ESB issues and approvals
- Submit monthly log of phone calls, meetings, and other contacts with DBE and ESB firms for tracking purposes
- Schedule and conduct meetings with the Department to address any issues or concerns
- Annually review FRMG Project procedures regularly for effectiveness and recommending adjustments as the Project progresses

Reggie will be the CRPM appointed from prior to issuance of NTP1 through the duration of the Construction Period. FRMG will submit an identified individual/position to the Department for Acceptance prior to Substantial Completion who will be responsible for compliance with the Civil Rights Requirements for the Operating Period. The Operating Period Goals Compliance and Plan Requirements will be submitted to the Department for Approval prior to the Substantial Completion Date.

Activities and Delegated Authority

As CRPM, Reggie will be responsible for the day-to-day execution of this plan, with particular focus on the outreach and procurement activities of the SDBPP. He will serve as the main point of contact for the Department and for DBE/ESB firms. He will ensure FRMG's overall program compliance with the DBE/ESB program, as well as compliance of DBE/ESB and non-DBE/ESB firms on the Project. Resolving potential issues with DBE/ESB firms and/or FRMG will be under Reggie's authority, including reviewing DBE/ESB firm performance. He also can make recommendations for hiring, working with Project personnel to backfill potential opportunities.

Reggie and his team will participate in appropriate meetings to be up to date with contracts approaching the procurement stage, as well as to advise the team on packaging the Work to best use and benefit the DBE/ESB contracting community. In particular, the Civil Rights Meeting is developed in more detail in the next section.

Reggie and his team also will meet on a monthly basis to develop and execute outreach events to inform the community about DBE/ESB opportunities. Details about these events and outreach can be found in Section 2.d.

Reggie will work with the SDBP Coordinator to compile reports as required by the Department, and Reggie ultimately will be responsible for submitting these reports as outlined below and expanded upon in Section 2.e of this plan:

Construction Period Monthly Reporting Requirements: Reggie will be responsible for submitting a monthly summary report for Acceptance by the Department no later than the 10th Working Day of each month. This report will detail Subcontractor participation and payment, separated into four categories of Work:

1. Design Services
2. All Other Construction Work
3. Routine Operations & Management (O&M) Work
4. All Other O&M Work During Construction to Date

Construction Period Semi-Annual Self-Assessment: Reggie will submit an assessment of FRMG's progress toward achieving the Construction Work Small Business Goals for Approval by the Department. This assessment will provide a summary of solicitation and good faith efforts to date, along with anticipated DBE/ESB firm participation for the next six months. This assessment will be submitted no later than each anniversary of the commencement of each Contract Year and of the date that is six months after that in each Contract Year during the Construction Period.

Construction Period Annual Progress Review: For this annual review, Reggie will submit a report that contains the bidders list (all firms that submitted a quote to participate on the Project), participation assessment (DBE/ESB firm participation for the past Contract Year and to date progress made toward the Construction Work Small Business Goals), and strategies for continuing to implement the SDBPP. This review will be used to discuss FRMG's progress toward its commitments to Community Development Programs, including the college scholarship program and partnership with Swansea Elementary School.

Web-based compliance system: Reggie will lead FRMG's efforts in using B2Gnow and LCPtracker (certified payroll and contractor compliance systems) to submit required Deliverables, report payments to Subcontractors, and document compliance to the SDBPP.

Integration with Key Personnel and Meetings

The Construction Work Small Business Goals are vital to the overall success of the Project, and every member of our Project team places these goals at a high priority. Involving Key Personnel

who will be integral to decision-making early and frequently will mitigate issues that arise as the Project progresses.

With this approach in mind, Reggie will integrate with the Design-Build Coordinator, Project Manager, Construction Manager, and Contract Administration Manager. In addition to working closely with Reggie, Tamaka will also work in concert with Key Personnel such as the Project Manager, Construction Manager, and Contract Administration Manager. This Key Personnel integration will manifest in meetings and briefings our team has developed to best serve the needs of the Construction Work Small Business Goals.

While the Department requires a monthly meeting to discuss matters concerning the Civil Rights Requirements, **FRMG requests to host a meeting every other week to provide updates on the status of the Civil Rights Requirements.** Suggested attendees to this meeting would include the CRPM, SDBP Coordinator, Certified Payroll Representative, FRMG Project Manager, Construction Manager, Design-Build Coordinator, the Department's Consultant Engineer, the Department's Project Director, FRMG's Project Communications Manager, and others requested by the Department. Members of our team currently are implementing this meeting every other week on C-470, another project with CDOT.

This meeting will let the team focus on issues associated with achieving the Construction Work Small Business Goals, and it brings in Key Personnel who have authority to make decisions for the FRMG Project team. The Department and FRMG will work together to determine the agenda for each Civil Rights Meeting. These meetings will detail construction-related Work items, significant upcoming construction activities being accomplished, and Project progress. Using FRMG's schedule will be an important tool to help the team understand how DBE/ESB firms are integrated in current activities, how they are being utilized, and the type of work they are performing.

This meeting also will allow the team to provide updates on the approval of Subcontractors before they begin work on-site and resolve any issues with DBE/ESB firms — for example, those who were not previously approved to begin work or have incorrectly filed paperwork. Pending documentation, updates on status of approval, and new firm commitments are also discussed during this time.

2. Strategic Approach for Meeting Goals during the Construction Period

2.a Value of Design Services and Construction Work

FRMG will calculate the value of Design Services and Construction Work by using the formula outlined by the Department, found within Design Services and Construction Work. All good faith efforts are performed in accordance with 49 CFR 26.53. In the past, FRMG has not had to rely on good faith efforts, as we have achieved the required goals outlined by the owner. We have developed a thorough process with our local vendor library to ensure participation.

To calculate the value of Design Services and Construction Work, FRMG will separate design-related activities and all Work to be performed during the Construction Period. For the purposes of this Draft SDBPP, the determination of the value for Design Services and Other Construction Work is outlined in the tables included in sections 2.b and 2.c below. The dollar values will be based on design and construction cost only, not on overall price.

Determining the Value of Design Services: FRMG will determine the dollar value of the DBE Design Goal by multiplying the percentage of the goal (11.6%) by the total value of the Design Services contract. In addition, we will determine the dollar value of the ESB Design Goal by multiplying the percentage of the goal (3%) by the total value of the Design Services contract.

During the proposal phase, FRMG has partnered with several DBE firms that will remain a part of our team through the delivery of this Project. We also anticipate adding several additional firms to our team upon award of the contract. To date, methods for reaching out to design subconsultants have included FRMG-hosted Small Business Events to which DBE/ESB firms have been invited, referrals to our Central 70 team from other Colorado projects, email communication and follow-up with potential DBE/ESB firms, and sponsorship/attendance at events attended by small businesses. (That includes events by organizations such as Hispanic Contractors Colorado, where design firms are also in attendance.) These methods for reaching out to DBE/ESB firms will continue through the remainder of the proposal phase through the award and contracting phases.

Determining the Value of Construction Work: Other Construction Work comprises all other Work to be performed during the Construction Period under the terms of the Construction Contract (excluding O&M Work during Construction). Per Appendix A to Schedule 15, FRMG is requesting that any design-related services under the direct control of the Construction Contractor be included as Other Construction Work. FRMG will determine the dollar value of the DBE Construction Goal by multiplying the percentage of the goal (12.5%) by the total value of the Other Construction Work. FRMG will determine the dollar value of the ESB Construction Goal by multiplying the percentage of the goal (3%) by the total value of the Other Construction Work.

FRMG also understands that the 3% ESB goal encompasses Routine Maintenance during the Construction Period.

2.b Estimated Schedule of Achievement of Small Business Goals

This Project is especially complex because of the variety of scopes of Work: Design and construction will not only include horizontal roadway elements, but also vertical elements such as electrical and mechanical rooms and other aspects of the tunnel. Expanding our reach for prospective firms allows for additional participation opportunities for the DBE/ESB community. We further detail this approach in Section 2.c.

In Table 1 below, we have identified our anticipated schedule of expected participation, broken down by our annual target for each contract year during the Construction Period.

Table 1. Construction Work Small Business Goals

	2017	2018	2019	2020	2021	2022	TOTAL
DBE Design Goal	1.74%	5.22%	4.64%	0.00%	0.00%	0.00%	11.60%
ESB Design Goal	0.45%	1.35%	1.20%	0.00%	0.00%	0.00%	3.00%
DBE Construction Goal	0.00%	2.50%	3.13%	3.13%	2.50%	1.25%	12.50%
ESB Construction Goal	0.00%	0.60%	0.75%	0.75%	0.60%	0.30%	3.00%

2.c Potential DBE or ESB Participation

The nature of this Project necessitates effective collaboration across all local owner agencies — in particular, CDOT, the City and County of Denver, and RTD. It is customary that DBE/ESB firms tend to work with one owner in particular, rather than across agencies or even with more than one. Each entity solicits from its own pool of DBE/ESB firms to work on projects. FRMG will work with all local owner agencies to engage with DBE/ESB firms that best fit with the design and construction opportunities on this Project. This will enable opportunities across the DBE/ESB community.

In particular, FRMG will utilize CDOT's Small Business Collaborative Forums (Construction and Professional Services) to share information about opportunities to participate on the Project. Members of FRMG's design and construction disciplines also will be available to participate in Forum meetings, ensuring a transparent sharing of information and the availability of staff to answer questions and provide design and Project updates.

In Tables 2 and 3 below, FRMG has identified areas of Work for potential DBE or ESB participation, with a range of the approximated percentage of the value of the applicable Construction Work relative to the value of all Construction Work, for each Construction Work Small Business Goal.

Table 2. Construction Areas of Work

Construction Areas of Work	2017	2018	2019	2020	2021	2022
Asphalt Paving	0 – 0%	0.20% - 0.30%	0.25% - 0.38%	0.25% - 0.38%	0.20% - 0.30%	0.10% - 0.15%
Concrete Flatwork	0 – 0%	0.15% - 0.25%	0.19% - 0.31%	0.19% - 0.31%	0.15% - 0.25%	0.08% - 0.13%
Building Demo	0 – 0%	0.05% - 0.15%	0.06% - 0.19%	0.06% - 0.19%	0.05% - 0.15%	0.03% - 0.08%
Electrical	0 – 0%	0.30% - 0.40%	0.38% - 0.50%	0.38% - 0.50%	0.30% - 0.40%	0.15% - 0.20%
Erosion Control	0 – 0%	0.05% - 0.10%	0.06% - 0.13%	0.06% - 0.13%	0.05% - 0.10%	0.03% - 0.05%
Fencing & Railing	0 – 0%	0.05% - 0.10%	0.06% - 0.13%	0.06% - 0.13%	0.05% - 0.10%	0.03% - 0.05%
Landscaping	0 – 0%	0.15% - 0.25%	0.19% - 0.31%	0.19% - 0.31%	0.15% - 0.25%	0.08% - 0.13%
Pavement Marking	0 – 0%	0.05% - 0.10%	0.06% - 0.13%	0.06% - 0.13%	0.05% - 0.10%	0.03% - 0.05%

Construction Areas of Work	2017	2018	2019	2020	2021	2022
Reinforcing Steel	0 – 0%	0.50% - 0.60%	0.63% - 0.75%	0.63% - 0.75%	0.50% - 0.60%	0.25% - 0.30%
Surveying	0 – 0%	0.10% - 0.15%	0.13% - 0.19%	0.13% - 0.19%	0.10% - 0.15%	0.05% - 0.08%
Traffic Control	0 – 0%	0.10% - 0.30%	0.13% - 0.38%	0.13% - 0.38%	0.10% - 0.30%	0.05% - 0.15%
Trucking	0 – 0%	0.50% - 0.60%	0.63% - 0.75%	0.63% - 0.75%	0.50% - 0.60%	0.25% - 0.30%
Utility	0 – 0%	0.15% - 0.25%	0.19% - 0.31%	0.19% - 0.31%	0.15% - 0.25%	0.08% - 0.13%

Table 3. Design Areas of Work

Design Areas of Work	2017	2018	2019	2020	2021	2022
Survey, Geotechnical, Utilities	0.26% - 0.34%	0.79% - 1.01%	0.70% - 0.90%	0 – 0%	0 – 0%	0 – 0%
Rodway, Drainage, Structures	1.16% - 1.24%	3.49% - 3.71%	3.10% - 3.30%	0 – 0%	0 – 0%	0 – 0%
Traffic Engineering	0.11% - 0.19%	0.34% - 0.56%	0.30% - 0.50%	0 – 0%	0 – 0%	0 – 0%
Landscaping	0.23% - 0.26%	0.68% - 0.79%	0.60% - 0.70%	0 – 0%	0 – 0%	0 – 0%

Our approach to meeting the DBE/ESB Goals with ready, willing, and able DBE- and ESB-certified firms to perform applicable Work consists of three steps:

1. FRMG creates smaller scope packages that allow for more opportunities for participation
2. FRMG communicates opportunities for participation to the DBE/ESB community
3. FRMG determines and vets DBE/ESB firms' capability to participate

In addition, FRMG will implement the following steps to expand the pool of eligible DBE/ESB firms to participate on the Project:

- Educate existing firms on eligibility requirements for DBE/ESB certification
- Invite DBE/ESB firms that normally perform vertical Work to participate on this Project
- Implement a trucking commitment to expand the trucking scope of Work

Office Support Program: A limited pool of DBE/ESB construction Subcontractors restricts opportunities to contract construction opportunities to small and disadvantaged businesses. On

the Central 70 Project, the need for staffing is enormous, and staff augmentation and staff recruiters will be essential to generate staffing assistance. Therefore, as an innovative approach to DBE/ESB participation, FRMG will use a DBE/ESB staffing company, such as Classique, CRA, Empowercom, Perseverance or Boulder Staffing, to assist in running its office support program. This solution both increases DBE/ESB firm participation and enhances the ability for FRMG to meet its local hire goal for workforce development. In particular, FRMG will direct this staffing company to fill slots in administrative support, including general administrator/receptionist, safety, safety administrator, document control personnel, and quality.

Creating Scope Packages

FRMG will create scope packages that will be sustainable for DBE/ESB-certified firms and post these packages to iSqFt, a "software as a service" (SaaS) solution our team will use to connect with prospective Subcontractors. This easy-to-use application provides tools for pairing prospective Subcontractors with scopes of Work that best fit the firm's capabilities. Prospective firms will need to create a free account with iSqFt to access packages for bidding.

The following process will allow more opportunities for participation by creating manageable scopes, and, if necessary, retooling the scope packages to more accurately fit and support the DBE/ESB firms' capabilities:

1. The estimating team will audit the Project to identify areas where DBE/ESB participation can be added.
2. The team will use a list of certified firms by scope from www.coloradodbe.org and www.coloradoesb.org to ensure we will have coverage in that area.
3. An estimating team member will be assigned scopes they are responsible for managing and will develop the smaller scope package. Each package consists of:
    a. Drawings
    b. Quantities
    c. Special provision
    d. Cover letter with scope-related information for the Project
4. All packages will be posted to iSqFt. Prior to accessing packages, each firm will be required to electronically sign a Non-Disclosure Agreement. Any addenda to the job will also be posted on iSqFt for viewing.
5. Certified firms will receive an invitation to bid for the Project.
6. Estimating administrators, along with estimators, will begin reaching out to certified firms via phone, fax, and email.
7. All follow-up conversations will be tracked by individual or directly in iSqFt.
8. All quotes will be received by fax or email.

9. Quotes will be tracked by scope.
10. All quotes will be reviewed to make sure they match the requested information from the estimator. If anything is missing, the estimator will reach out to the firm, go over what is missing, and ask the firm to resubmit.
11. At bid time, Form 1414 (Anticipated DBE Participation Plan) will be completed and submitted with the bid.

Continued Outreach and Bid Solicitation: FRMG's estimating team also has established a process and schedule of bid solicitation between the submittal of our technical proposal and the submittal of the financial proposal. Before and during this time, FRMG is providing packages to prospective Subcontractors to solicit preliminary indicative pricing from DBE/ESB firms and non-DBE/ESB firms alike. We will make the commitment with these companies that if FRMG is awarded the Project contract, they will be added on to our team.

Communication to the DBE/ESB Community

A more detailed approach to communicating opportunities to the DBE/ESB community can be found in Section 2.d. In addition to the packages on iSqFt, each estimator will contact via phone and email any firms on the www.coloradodbe.org or www.coloradoesb.org that fall within the scope that estimator is working on. Estimators will use the MWDSBE and Contract Management System for the City and County of Denver (https://denver.mwdbe.com) to engage with additional prospective Subcontractors.

Our team understands that not everyone might have the ability to access iSqFt. Accordingly, by following up with a phone call or email, we are able to send this information by other methods to ensure those interested in providing quotes on the Project are not overlooked. Utilizing several estimators in this process of communication creates a smooth, transparent process.

Determining Firm Capability

FRMG will diligently vet DBE/ESB-certified firms for each scope of Work. Each company will be asked to complete a form providing the following information:

- Preferred scopes of Work and areas of expertise
- North American Industry Classification System (NAICS) code
- Bonding and financials
- Work history and past experience
- Safety and quality program

A sample questionnaire for DBE/ESB firms can be found in Attachment A of this plan. FRMG will also submit Form 1415 – DBE Commitment Confirmation once a Subcontractor has been accepted onto the Project.

FRMG's outreach staff, including Reggie Gamlin, CRPM, and Tamaka Thornton, SDBP Coordinator, **will follow-up with an in-person, one-on-one interview to ensure we have accurately communicated the scope of Work and requirements for the position, and that the company understands the risks associated with the scope.** During this meeting, we also will discuss the preferred scope of Work of the firm, to ensure we are diligently vetting prospective firms. FRMG wants to set the company up for success by selecting the company that best fits the scope of Work.

Connect2DOT's Transportation Leading Edge Program and the United States Department of Transportation's (USDOT) Bonding Education Program are two resources for DBE/ESB firms to get a better understanding of the procurement process with the Department. If the firms have not already done so, FRMG will direct them to participate in the Connect2DOT and USDOT programs. This will help the firms determine what assistance they need to better position themselves to participate on the Project. These programs provide education on the procurement process, what insurance firms need, and what bonding capacity they need. These resources ensure firms are better prepared for the Project and pursuing scopes of Work.

Additional FRMG Approaches to Meet Goals

Educate Firms on Eligibility Requirements. FRMG will promote and assist companies as needed in the process of obtaining certification, or do the same for companies that are already certified as a DBE or ESB and can qualify for an additional classification. FRMG will work with the Department and other organizations in providing the resources needed for firms to achieve certification. FRMG will work to support and grow the Department's overall DBE/ESB program.

Additional methods of educating the DBE/ESB community about prospective eligibility can be found in Section 2.d and Section 3.c.

Opportunities for Firms that Perform Vertical Work. The size and complexity of this Project allows for participation from both the vertical and horizontal market. Initially, **FRMG identified the interest for vertical contractors to receive tools and training they need to transition to the horizontal market; however, this Project already has scopes of Work of a vertical nature.** FRMG has identified nearly 80 DBE/ESB firms certified in Colorado who can perform the following scopes, so as to solicit primarily vertical contractors and add value to the Project:

- Storm Sewer Pump Station
- Concessionary Building
- Shade Structures
- Specialty Landscaping on Cover Structure
- Maintenance Building
- Fire Pump Room
- Plant Room
- Valve Rooms
- Mechanical Ventilation System

- Mechanical/Plumbing
- I-70/Airport Node Building

Trucking Commitment to Increase Participation: As part of our efforts to increase participation, **FRMG will develop an overall trucking commitment to maximize DBE/ESB trucking opportunities and encourage the fair allocation of Work opportunities**.

Our team understands the difficulty owners of DBE/ESB trucking operations or DBE/ESB owner-operators experience in attempting to aggressively market their services and to compete against large companies with fleets of trucking units. Whenever there is an opportunity to participate in the hauling/trucking scope of Work, each of these trucking companies will have a fair chance of being called upon.

The trucking commitment will be most effective on Work that FRMG self-performs. Subcontractors with trucking needs will be made aware of the commitment and the rates charged for the various types of haul units. FRMG encourages these Subcontractors to make use of this valuable resource.

Contacting Eligible Trucking Firms
FRMG will contact certified DBE/ESB trucking firms within a reasonable range of the Central 70 Project to determine their interest in providing trucking services for the Project. If a firm is interested and can meet the insurance limits required by the Department, the firm will be included in the commitment of available trucks, per the type of trucks and/or trailers owned or to which they have access, and the rates they charge for these units.

The trucking commitment will be structured to comply with Schedule 15, Appendix A, Part II, Section 3.a.ii. Potential truckers will be made aware of any special work conditions, the insurance program will be explained, and an indefinite quantity purchase order will be negotiated.

The following is a list of local DBE/ESB trucking companies, generated from www.coloradodbe.org and www.coloradoesb.org, that potentially can participate in the trucking commitment:

Prospective DBE Trucking Firms

Company Name	**City**
Affordable Trucking, LLC	Denver
ARLVIC Trucking, LLC	Westminster
Blas Chavez Trucking, Inc.	Denver

Caraveo's Trucking L.L.C	Denver
Chavez Concrete & Trucking Inc.	Thornton
CHOM Trucking	Denver
Clear Creek Trucking Co., Inc.	Denver
Consolidated Trucking Solutions LLC	Lakewood
D.D.E.K., INC.	Westminster
Elias Ch. Trucking Inc.	Thornton
Excel Trucking, Inc.	Thornton
F & M Trucking, LLC	Thornton
Francisco Quintero Trucking, Inc.	Brighton
Froy's Trucking	Denver
Grunt Work Trucking LLC	Aurora
H & J Trucking, LLC	Aurora
Ibarra & Sons Trucking, LLC	Thornton
J&K Trucking, LLC	Aurora
J.E. Trucking Ltd.	Thornton
J.F.W. Corp.	Commerce City
Jose Casillas Trucking, Inc.	Denver
Juan A. Diaz Trucking	Denver
L. Flores Trucking	Aurora
Lechuga Trucking INC.	Thornton
LJ & Sons Trucking LLC	Brighton
LPS Trucking INC.	Thornton
Majalca Trucking	Denver
Oscar Aceves Trucking, Inc.	Englewood
Quintana's Trucking, LLC	Denver
R. Martinez Trucking, LLC	Brighton
Ralph Martinez Trucking, Inc.	Commerce City

Ram-Co Trucking Services LLC	Fort Lupton
Rascon Trucking, LLC	Lakewood
RP Trucking Inc.	Denver
S Rivas Trucking	Commerce City
Saint Jude Trucking LLC	Denver
Scooby's Trucking LLC	Thornton
Simon Elite Trucking, LLC	Aurora
Tavo's Trucking, LLC	Thornton
Tee's Trucking Inc.	Commerce City
Toby Cordova Trucking	Brighton
Tom Calabrese Trucking, Inc	Denver
UB Trucking, Inc.	Westminster
Venegas Trucking, LLC	Aurora
VM Trucking	Englewood
VVS	Lakewood
Wheels & Thrills Inc.	Denver
Zeny's Trucking	Thornton

Prospective ESB Trucking Firms

Company Name	**City**
P&H Equipment, Inc.	Denver

Tracking Firms

These resources will be entered into a database that will be managed by a central dispatcher who will work side by side with FRMG's field contracting team. Upcoming trucking needs determined by field supervision will be relayed to the dispatcher as they arise. The dispatcher will call the firms to verify truck availability and allocate the work opportunities on a fair basis that spreads the work among the pool of responsive DBE/ESB trucking companies. We will use a local hire for the recordkeeping functions for the trucking commitment.

We will use the following prequalification checklist as part of the trucking commitment:

- DBE/ESB Certificate

- Auto Liability: Proof of truck and or trailer insurance with FRMG listed as additional insured, along with MCS99 Insurance Certificate
- Proof of Workers Compensation Insurance with Waiver of Subrogation in favor of FRMG
- Proof of Ownership: Current registration for all vehicles must match insurance
- Declaration of Independent Contractor's status
- W-9
- Copy of Commercial Driver's License and current Medical Exam Card for all employees
- Letter stating company belongs to a Random Employee Drug Screen
- Notarized Statements of Compliance of CDOT and Colorado Immigration Laws
- Signed Safety Pledge and Initial Site Safety Hauling Sheets per each Driver
- Annual vehicle inspection sheet per each vehicle
- Hauling Agreement

Reporting

FRMG will submit the details of all trucking activity for the applicable month with its monthly report. Copies of all truck leases, ownership information, VIN numbers, dispatch records, daily trucking tickets, payment records, and insurance certificates will be kept on file at FRMG's office and be available for the Department to review upon request. Additionally, copies of truck leases will be forwarded to the Department's Civil Rights Department.

Training for Firms

Prior to joining the pool of eligible trucking firms, FRMG will host training to educate prospective companies on the requirements for insurance and the process for participation in the trucking commitment.

Management

FRMG is committed to providing a diverse, cooperative working environment for all contract truck haulers used on the Project, and we will have a dedicated staff member managing and tracking the trucking commitment. The trucking commitment will provide an opportunity for DBE/ESB trucking companies to work with larger Subcontractor trucking companies to gain more efficient techniques and experience in working on a large haul project. All truck haulers will be required to provide proof of ownership by submitting current registrations for all vehicles. A Certificate of Insurance within the limits of the Project requirements with FRMG and/or the Department listed as additional insured, along with an MCS99 Insurance Certificate, also will be required.

FRMG will assemble a strong, safe team of drivers by providing safety orientation for all truckers as they join the Project, and we will conduct daily vehicle inspections to ensure trucks are safe and properly maintained. All truckers will be required to sign and adhere to a Safety and Rules Pledge, updated annually throughout the term. This pledge can be found in Attachment B of this plan.

We have created dispatch procedures and a progressive Four Stage Discipline Matrix, enabling FRMG to control the fleet. The document can be found in Attachment C of this plan. We will objectively monitor safety, attitude, and performance to evaluate the trucker's overall performance. Also, all trucking commitment members will be required to complete, sign, and submit a Central 70 truck ticket for each day of work on the Project; subsequent billings will be audited against these truck tickets.

Existing DBE/ESB Team Members

FRMG already has begun to assemble a diverse team of qualified DBE/ESB-certified firms. Table 7 below highlights a few of the key Subconsultants we have engaged to date:

Table 4. Qualified DBE/ESB Key Subconsultants

DBE/ESB Company	Activities
Vivid ***ESB***	Quality Assurance/Quality Control
Goodbee and Associates ***DBE***	Utilities
Communication Connections Consulting ***DBE/ESB***	Community and Public Relations Manager
Geocal ***DBE/ESB***	Geotechnical Investigations
Valerian ***DBE***	Landscape / Irrigation Design

2.d Strategic Approach to Integrating Achievement of Small Business Participation

A strategic approach and transparent process in the achievement of small business participation is the cornerstone of FRMG's overall approach to subcontracting. FRMG's approach involves communicating opportunities through outreach events, local partnerships, and advertising; unbundling Work to establish more opportunities if needed; and building transparency.

Communicating Opportunities

FRMG understands that constant, consistent, transparent communication is critical to delivering a successful Project and a team with solid DBE/ESB-certified firms. This includes the communication of upcoming opportunities to the entire DBE/ESB community, as well as to all Subcontractors and Suppliers already working on the Project. FRMG will use several methods of communication throughout the term of the Project.

Local Partnerships

FRMG will partner with local organizations to advertise upcoming opportunities to participate on the Project. Local organizations with whom FRMG will work include:

- Associated General Contractors/Colorado Contractors Association
- Black Chamber of Commerce
- Black Construction Group
- Center for Work Education and Employment
- Colorado Department of Labor and Employment – Denver Office of Economic Development
- Community College of Denver
- Denver Human Services
- Denver Metro Chamber of Commerce
- Denver Workforce Services, Montbello
- Denver Works
- Gay and Lesbian Chamber of Commerce
- Hispanic Chamber of Commerce
- Hispanic Contractors of Colorado
- MiCasa Resource Center
- Mile High United Way
- Veterans Administration Community Workforce Training
- Volunteers of America
- Women's Chamber of Commerce

While we plan to communicate information about upcoming opportunities on the Project through these organizations, we also will assist organizations that already have existing training and resources for DBE/ESB firms. FRMG's CRPM and SDBP Coordinator will provide outreach

assistance by sharing opportunities for certification and training to our existing DBE/ESB firms on the Project.

The Department also regularly hosts workshops and provides supportive services. FRMG is committed to posting to our Project website information about enrollment in such workshops and use of resources to ensure a knowledge-share of upcoming events for DBE/ESB firms and others wishing to be certified.

Outreach Events

FRMG will hold a series of outreach events prior to each Notice to Proceed and ongoing for each new scope of Work that becomes available on the Project, at least two per quarter.

- An initial outreach event will introduce the Project itself; our team will present an overview of the order of phases of Work, potential scopes of Work, and additional forthcoming opportunities.
- FRMG will hold additional outreach events for each scope that comes out and for potential additional Work coming up. We will also use these outreach events as a venue to announce when on-the-job training will be held and what that program encompasses.
- FRMG also will host outreach that features face-to-face, one-on-one meetings with DBE/ESB firms. Based on the highly effective United States Department of Transportation (USDOT) program Prime Connections, **this event will pair our team and its individual members with DBE/ESB firms for private meetings**, scheduled in 15-minute blocks over the course of a day. FRMG will invite USDOT to partner with and sponsor this outreach event.
- In the past, this program has provided quality time between members of our Project team and DBE/ESB firms. In fact, 25 DBE/ESB firms were invited to a June 2016 event with Flatiron, one of FRMG's team members. Of the 16 firms that attended, three received contracts (on C-470, Tower Road, and Denver International Airport projects), and two are being considered for additional opportunities on C-470 and other projects.

We also will work to benefit the community during these outreach events by holding clothing, toy, and school supplies drives, as well as other fundraising opportunities. We will advertise these events for both DBE/ESB firms and non-DBE/ESB firms to attend outreach events. This will not only let the firms benefit from knowledge and connections to our team, but also better assist the surrounding community through fundraising and toy/clothing drive efforts.

Mentor-Protégé Program

FRMG is committed to developing and implementing a collaborative Mentor-Protégé Program for DBE/ESB firms, based on an award-winning, successful program from our team. **The Mentor-Protégé Program's objective is to provide comprehensive mentoring and technical assistance to DBE/ESB firms working on the Project, ensuring they successfully complete their contracts, develop and broaden their capabilities to compete on future work, expand their businesses, and yield sustainable growth.** FRMG envisions that the long-term impacts of this program will improve the competitive position of DBE/ESB firms, enabling them to graduate to primes and significantly influencing economic development on the Project and other surrounding areas.

Protégés that participate in the Mentor-Protégé Program must be certified DBE/ESB firms and have a good work history on construction projects in the Colorado area, demonstrating the ability to graduate to performance as a prime contractor.

FRMG's Mentor-Protégé Program is intended to enhance and diversify DBE/ESB firms' capability. To achieve the best results, interested design and construction DBE/ESB firms should want to build long-term relationships founded on integrity and trust. All parties must be committed and engaged to make the Mentor-Protégé Program a success.

FRMG will conduct educational outreach events to explain and evaluate the needs of the DBE/ESB firms that wish to engage in a Mentor-Protégé relationship. During this process, FRMG will help DBE/ESB firms identify their strengths and weaknesses, letting us customize our approach to the Mentor-Protégé Program to best fit their business growth goals. Some sample goals include financial, safety, program management, technical, marketing/business development, bonding, insurance, legal, banking, and human resources. FRMG will conduct one-on-one interviews to establish a DBE/ESB firm's desire to participate and select those that demonstrate a commitment to enhancing their business through a Mentor-Protégé Program.

Mentor-Protégé Agreement

FRMG will develop a Mentor-Protégé Agreement for DBE/ESB firms that agree to participate in a Mentor-Protégé relationship. This agreement outlines the relationship goals, assesses the needs of the Protégé and identifies their potential growth, as well as the committed level of the DBE/ESB firm to the Mentor-Protégé Program for a period of at least one year.

In concert with each DBE/ESB, FRMG will create a development plan that defines the growth areas from the Mentor-Protégé Agreement. These are areas in which the DBE/ESB desires to enhance its business, as well to ensure diversification. They include supporting activities, matrix, accountability, resources, and target dates to meet the defined goals. Monthly meetings will be established with the DBE/ESB firms to review progress toward goals and set action items for the next meeting for accountability. FRMG will provide monthly meeting minutes and reports to the Department on the DBE/ESB firms' progress within the Mentor-Protégé Program to show transparency.

Subcontractor Participation

FRMG will also encourage sub-tier levels to participate in the Mentor-Protégé Program to achieve and contribute the overall DBE/ESB Goals of the Project. FRMG will conduct training seminars to educate sub-tier contractors on how to develop a Mentor-Protégé Program and engage with DBE/ESB firms for the betterment of the Central 70 Project and to support local surrounding communities and DBE/ESB firms.

FRMG will host outreach events to introduce primes and Subcontractors to interested DBE/ESB firms in the Mentor-Protégé relationship.

Participation in a Mentor-Protégé Program will bring overall DBE/ESB participation on the Project to a higher level that provides Project enhancement. FRMG will engage DBE/ESB firms to succeed on the Project and afford them new skill sets to advance their companies to the next level. FRMG is not just interested in significantly contributing to the DBE/ESB goal, but also in investing in the growth of the DBE/ESB community.

Advertisements

FRMG will provide DBE and ESB firms with the bidding information, including solicitations, plans, specifications, and requirements of the contract, necessary to bid on the particular scope of Work. This information will be distributed via iSqFt, email, fax and/or the United States Postal Service in a timely manner to ensure the DBE/ESB firm has a full understanding of the prospective bid and a maximum opportunity to participate in the solicitation. We also will provide the evidence that specific DBE and ESB firms have been identified from the Colorado Unified Certification Program DBE and ESB Directories.

In addition, **FRMG will use the team's Project website to communicate all outreach activities and serve as a secondary outlet for communication between the DBE/ESB community and the team**. The current website is www.frontrangemobilitygroup.com, and it features a page dedicated to subcontracting opportunities on the Project. Upon award, upcoming opportunities to participation in the Project will be posted to this page and updated on a weekly basis as upcoming scopes become available for bid.

Unbundling Work

Unbundling scopes of Work allows us to break down Project scopes into smaller, easily defined tasks that can be successfully managed and delivered by small and disadvantaged businesses.

FRMG will look to unbundle Work at all stages of the Project, from design to construction to operations. In addition, companies can gain experience and growth opportunities they wouldn't otherwise have.

FRMG will select scopes of the Work to be performed by DBE/ESBs to increase the likelihood of maximizing DBE/ESB participation. To promote opportunity and participation, FRMG will (when appropriate) select DBE and ESB companies for Work packages even when FRMG has the capacity to do the Work itself. DBE/ESB Work packages will be developed based on our

understanding of capabilities available in the community and on our need for support. It is critical to identify portions of the Work that can be performed by these firms. Contract packages offering potential application of services available from the DBE/ESB community will be structured to maximize participation. As previously discussed in 2.c., we have identified a number of areas of Work that are good candidates for DBE/ESB participation. Potential scopes of Work we anticipate to be unbundled include:

- Asphalt Paving
- Concrete Flatwork
- Erosion Control
- Hardscaping on Cover Structure
- Landscaping
- Specialty Landscaping on Cover Structure
- Reinforcing Steel
- Traffic Control
- Trucking

We understand that the Department is already committed to unbundling Work to the fullest extent possible, and we will support and supplement this commitment to identify and bundle estimating packages to a manageable contract size. FRMG will review and research every opportunity to provide unbundled scopes to DBE/ESB firms. We will continue to work with the Department to ensure we are including high-quality Subcontractors on the Project.

We will communicate and receive feedback on any issues with the scopes we have identified and unbundled, and we are willing to mitigate issues in breaking down these scopes of Work. FRMG also will expect and encourage non-DBE/ESB Subcontractors to evaluate their scopes of Work and devise ways to help our team meet the DBE/ESB firm participation goal. By including our non-DBE/ESB Subcontractors and maintaining an open line of communication with all our firms, we are aiming to build a culture of transparency in which everyone understands expectations for the Project.

Building Transparency

Building transparency begins with establishing and growing a relationship with the Department and the DBE/ESB community. FRMG is committed to working cohesively with the Department to ensure the Project is successful and that the DBE/ESB community continues to thrive after completion. We will accomplish this through a process that encourages transparency at each step of securing DBE/ESB participation and our overall approach to engaging with Subcontractors:

1. ***Putting the Project First.*** As part of a Project First mentality, FRMG will make the Department aware of any difficulties or constraints that arise during the course of the Project, and the Department will do the same for FRMG. In this way, the Project team can engage in effective, efficient problem-solving to benefit the Project. Clear

expectations will bolster teamwork and accountability on the job. This attitude cascades from our leadership through to our Subcontractors and creates an atmosphere of transparency where our DBE/ESB partners feel empowered to elevate issues that might affect the Project.

2. ***Maintaining accurate, open documentation***. As FRMG garners DBE/ESB participation, we will provide frequent updates to the Department about our progress. The most up-to-date information also will be available on our document management system, and the Department will be able to audit and review documents and reporting at any time.
3. ***Communication and availability to the community***. FRMG will build transparency with the community by making members of the Project team available at public events and being communicative with the community.
4. ***Working with the CRPM***. FRMG will meet with the Department to determine and coordinate the frequency of meetings as outlined in Section 1.2 of Schedule 15. The parties will schedule additional meetings as the Project moves forward to review our SDBPP program, updates/changes, or to communicate any questions or concerns relating to DBE/ESB participants.

Summary

Our team's objective to all the steps listed above is to not only build a state-of-the-art Project, but to guide DBE/ESB-certified firms toward a sustainable growth through the Project, while supporting growth than can be sustainable in the long run and provide more priming opportunities.

2.e Monitoring and Tracking Participation

FRMG will incorporate the tools provided by the Department for this Project. These include:

1. LCPtracker, a CDOT program we will use based on direction from the Department
2. B2Gnow, a tracking tool to coordinate DBE/ESB participation

FRMG's team members include power users in both LCPtracker and B2Gnow who will work to accurately monitor and track DBE/ESB firm participation on the Project. Both LCPtracker and B2Gnow let us track DBE/ESB contract awards to design and construction firms, amounts paid and claimed for each DBE/ESB Subcontractor and/or DBE/ESB vendor, progress toward achieving DBE/ESB Subcontractor Goals, and other DBE/ESB good faith efforts as they pertain to the Project.

In addition, we will use JD Edwards' accounting software program to assist us internally in tracking and monitoring DBE/ESB participation. Combined, these programs will reflect the information our team will submit in required reports to the Department.

As previously discussed, through collaboration between FRMG's design and construction teams, we will identify specific scopes for DBE/ESB firms to perform. In turn, the CRPM will identify ready, willing, and able firms to perform that work. Through collaborative effort, including frequent communication between our design and construction disciplines, all parties will understand what scopes exist and break these out for DBE/ESB firm participation. Opportunities for DBE/ESB firm participation will be communicated through continuous coordination with the design team, as the design plans yield additional opportunities for participation in construction scopes.

Ensuring valid participation begins at the initial required documentation, when DBE/ESB firms are selected to perform design and construction scopes of Work on the Project. FRMG will accurately track firms' participation from the start of their relationship on the Project. Our CRPM and SDBP Coordinator will not simply confirm reporting occurs. Rather, they will ensure there is consistent, accurate collection of information and assure that only valid participation is counted. The SDBP Coordinator will track firm participation to ensure all Davis-Bacon and Related Acts and prevailing wage requirements are met.

Reggie Gamlin, CRPM, will manage the reporting process and will obtain appropriate sign-off from FRMG management. Reggie and the SDBP team will be responsible for making sure all reporting is being prepared and delivered to the Department based on the required schedule. To begin the reporting process, we will work with the Department to verify we understand the required forms and format of reporting, along with their respective deadlines.

Based on Schedule 15 please see Table 8 showing required reports and when FRMG will submit the listed deliverables:

Table 5. Required Deliverables to be Submitted by FRMG

Deliverables	Required Schedule	Department Acceptance / Approval
Small and Disadvantaged Business Participation Plan (SDBPP)	Prior to issuance of NTP1	Approval
Annual Small Business Commitments	Concurrently with the SDBPP and concurrently with the Annual Performance Progress Review Report thereafter during the Construction Period	Acceptance
Small Business Commitment for each DBE and ESB	Concurrently with the Annual Small Business Commitments or by the 10th Working day of each month and no earlier than 90 calendar days prior to the firm commencing Work	Acceptance
Small Business Commitment Modification	Submit prior to occurrence requiring termination or modification or, if that is not possible, within five Calendar Days of the occurrence	Acceptance
SDBP monthly reporting	No later than the tenth Working Day of each month during the Construction Period and the Operating Period	Acceptance
Semi-Annual SDBP Self-Assessment	Every six months from commencement of each Contract Year during the Construction Period	Approval
Uniform Report of DBE Awards or Commitments and Payments Form	Submit biannually by May 15 and November 15	Acceptance
Annual SDBP Annual Performance Progress Review	No later than 30 Calendar Days before the end of each Contract Year during the Construction Period and the Operating Period	Approval
Construction Period SDBP Final Report	Within 30 Calendar Days prior to the Substantial Completion Date, with update as needed within 30 Calendar Days prior to the Final Acceptance Date	Approval
Miscellaneous Forms	All Project-related required forms to be designated and communicated by the Department with required submission schedule	As Specified

For Small and Disadvantaged Business Participation monthly reporting, information on current status will be gathered by the CRPM and/or the SDBP Coordinator. They will summarize and distribute this report to our team and the Department on a monthly basis. Our CRPM will

compare FRMG's monthly DBE/ESB participation to our overall Project goals (by year, by scope, and by DBE/ESB category). If FRMG is not on path to achieve a particular goal, the CRPM will work with FRMG's Design or Construction Manager, as well as with procurement staff, to establish a plan for improved performance.

B2Gnow participation is tracked in coordination with Project progress. FRMG will evaluate DBE/ESB participation associated with the Project progress continuously with these tools. Also, our proposed team's biweekly Civil Rights Meetings will let us further evaluate whether we are tracking on the Small Business Goals in terms of the schedule of Work and Project progress.

FRMG will proactively work with our Subcontractors to include DBE/ESB participation and reporting as a flow-down provision to their subcontract. In line with the direct reporting responsibilities of FRMG, each non-DBE/ESB Subcontractor on the job will have reporting responsibilities back to FRMG. They will be required to provide the CRPM all information needed to both track our progress against the Small Business Goals and file our annual report commitments.

The Project with operate in accordance with 49 CFR 26.55. It is the responsibility of each FRMG employee and non-DBE/ESB Subcontractor employee to ensure all DBE/ESB firms are performing a Commercially Useful Function (CUF) review.

While our CRPM ultimately will be responsible for ensuring our team's compliance with CUF and reaching DBE/ESB Goals, FRMG will build a culture of universal team buy-in for achieving all DBE/ESB requirements. **We will train our personnel on CUF and 49 CFR 26 requirements on the Project so team members who might interact with the DBE/ESB program and Subcontractors can identify red flags and navigate any problems that arise.** Disciplines that would work with DBE/ESB firms include estimating, engineers, accounting, administrative, and procurement. Our training program for personnel will be designed for specific disciplines. The program entails education about what DBE/ESB firms are, why compliance is important, good faith efforts for the term of the Project, the definition of CUF, and general red flags to watch for. A sample CUF presentation can be found in Attachment D of this plan.

Training our field personnel in CUF provides FRMG with a tertiary check of our DBE/ESB firm participation. Following this training, members of our Project team will be able to identify DBE/ESB firms on-site immediately and determine any violations or issues with CUF in the field. If everyone is aware of compliance requirements, our team as a whole is better able to check valid participation.

In particular, we will look to our Project Manager, Construction Manager, superintendents, safety manager, and officer manager to work closely with the CRPM and lead the rest of the team as the experts on how the DBE/ESB program works for our team. These key roles are responsible for the day-to-day operations on the Project. They should be aware of all Project developments at all times. They will know who is actively working on the Project and which firms are DBE/ESB certified. They will assist in ensuring compliance in the program and engaging

DBE/ESB managers and CRPM to take action when necessary. They will assist in continually assessing and auditing the health of our DBE/ESB program.

This reaffirms the validity of our method to engage the entire team in being accountable in optimizing DBE/ESB firm participation, allowing us to reach our goal while delivering a successful Project.

3. Approach to Small Business Development and Assistance

3.a Prompt Payment

FRMG understands the importance of prompt payment on this Project for all design and construction Subcontractors. Subcontractors depend on prompt payment to make payroll, and they have a far more limited cash flow than larger contractors. DBE/ESB firms in particular are greatly impacted by late payments, which can pose a barrier to the firms' ability to compete effectively in the marketplace.

FRMG will comply with all prompt payment requirements for the Project. FRMG will adhere to the requirements outlined in Section 17.5 of the Project Agreement. FRMG will not implement any additional prompt payment requirements, as the Department and USDOT's requirements more than adequately outline an approach. FRMG will implement internal measures to ensure the prompt pay clause is followed as directed by the Department by utilizing B2Gnow.

In addition, during our team's first one-on-one meeting with each selected DBE/ESB firm, we will review the process for submitting pay applications and proper invoicing to ensure timely payment. We also will proactively work with first-tier firms so that they understand the process, eliminating issues pertaining to paperwork such as late submittals or incorrect invoicing.

Tracking and Monitoring Invoicing by Subcontractors, Prompt Payment to Subcontractors, and Release of Retainage

FRMG will implement several measures on the Project to monitor and track all invoicing, prompt payment, and retainage release. These include using JD Edwards, internal reporting, pay applications, and the monthly required forms from the Department. This information will be reviewed by FRMG's CRPM, who will be responsible for taking corrective actions if prompt payment is not being made. These actions will include meeting with FRMG accounts payable to understand what the issues are. They also might include meeting with the ESB/DBE to discuss ways to submit timely, accurate invoices, or possibly meeting with the Department if invoice and payment cycles between FRMG and the Department are at the root of the problem.

FRMG also will require all Subcontractors to provide a certification of prompt payment through the Department's B2Gnow system. B2Gnow's prompt payment certification will be used to certify that all Subcontractors and Suppliers were paid from the previous month's payments and retainage was released for those whose work is complete. Certification of prompt payment will be submitted each month to the Department, along with the month following the month when final Acceptance occurred at the end of the Project.

As part of FRMG's aforementioned training opportunities with DBE/ESB firms, and during one-on-one meetings, we will train our Subcontractors on what is expected and what must be included in monthly billing.

Aiding in the Viability of Small Business Participation

FRMG will work with DBE/ESB firms on a case-by-case basis to assist them in establishing a mobilization amount, without retainage, to include in their subcontract. The mobilization amount will support the DBE/ESB firms in equipment mobilization, upfront purchase of material and Project start-up costs. In these efforts, FRMG will involve Subcontractors that are not themselves DBE/ESB firms.

As detailed in Section 2.c, the CRPM and SDBP Coordinator, will meet with DBE/ESB firms one-on-one. During this meeting, a field engineer engaged in the DBE/ESB firms' scopes of Work will meet with firms prior to contract execution and walk through their scopes of Work. We will use this time to identify means that FRMG could provide to assist in mobilizing the Subcontractor and help that firm succeed. Each of these meetings will be documented, and any actions will be signed off by the CRPM, SDBP Coordinator, Project Engineer and Subcontractor prior to execution. This assures the DBE/ESB firms understand their scope of Work, know what the Project team is doing to help them be successful, and establishes relationships between the Project team and Subcontractor.

On a case-by-case basis, FRMG will offer the option of a joint check process to facilitate early procurement of materials or other commitments in the execution of the Work for DBE/ESB firms.

3.b Bonding and Insurance

FRMG will continuously work to mitigate barriers to DBE/ESB participation for this Project through assistance with bonding and insurance capacity. FRMG commits to cooperating with various DBE/ESB conferences, programs, and support services offered by other agencies in an effort to aid the growth of the DBE/ESB market. We believe that a robust DBE/ESB market is beneficial to the industry and to the economy as a whole.

Through training, mentor-protégé relationships, and technical assistance, FRMG will help overcome barriers to participation for these firms and build their capacity to succeed, both on this Project and in the future.

Our team offers the following programs to mitigate barriers to DBE/ESB participation:

Educational Seminars. These will be held by FRMG for participating DBE/ESB firms to define subcontract scopes, the bidding process for their work, how best to communicate with us, and perhaps most important, the steps potential DBE/ESB firms should take to become fully certified.

Among the educational offerings will be workshops on how to successfully do business with FRMG. In these sessions, participants will learn what it takes to compete successfully for opportunities on the Project. Other workshops will cover topics such as construction contracting and requirements; communications; the professional services contract award process and requirements; bonding and insurance requirements; prequalification, bidding, and invoicing; and financing/access to capital.

FRMG also will partner with the local USDOT bonding program, along with additional local bonding resources, to offer DBEs and ESBs additional bonding resources and education. To maximize participation and alleviate barriers for DBEs and ESBs, FRMG will actively work with those that do not initially meet FRMG's bonding and insurance requirements by unbundling packages into more feasible, bondable work.

Bonding Capacity. FRMG will work with DBEs and ESBs when feasible and lawful, waiving bond requirements, and/or incorporating a phased bonding approach over time, as well as choosing to limit bond and insurance requirements imposed on DBEs and ESBs by non-DBE Subcontractors.

In addition to offering training and support in both technical and administrative areas, FRMG will address any bonding issues on a case-by-case basis. We plan to facilitate and offer a variety of bonding options to help accommodate Subcontractors on a regular basis.

FRMG will facilitate access to independent bonding lines by developing a program that includes overviews of insurance, bonding, and selected banks, allowing qualified Subcontractors to take the next step and become prime contractors. Until that time, FRMG will pay for the cost of bonds up to 1.5% of the value of construction for certified DBE/ESB participants. This step

allows DBE/ESB firms to prove their bond worthiness and thus aids them in their pursuit of future work.

3.c Approach to Small Business Outreach

In summary, FRMG views outreach as one of the top forms of communication, especially on this Project. FRMG already has held six outreach events:

- **June 18, 2015:** Introduction to the FRMG team, National Western Center
- **Dec. 3, 2015:** Meet and greet with FRMG Team, DoubleTree by Hilton at Stapleton
- **June 29, 2016:** Transitional Training for vertical contractors, AGC Training Room
- **Nov. 17, 2016:** Project update to Subcontracting community, DoubleTree by Hilton at Stapleton
- **April 24, 2017:** Outreach event covering DBE/ESB participation, workforce development, bonding, insurance, and procurement process, in collaboration with Connect2DOT, Denver Metro Chamber of Commerce
- **May 11, 2017:** DBE/ESB one-on-one meetings with FRMG team members, National Western Center

The goal of our team's outreach during the proposal phase was to establish relationships and identify long-term DBE/ESB involvement initiatives. We will continue this effort under a formal contracting and procurement procedure that provides transparency to the contracting and procurement process, yielding a level playing field in which DBE/ESB contractors can compete for opportunities on this Project.

The size and duration of this Project will allow the team to host several additional outreach events, each having its own independent takeaway. In addition to outreach, our CRPM and the SDBP Coordinator are committed to working with the community to either offer or help locate appropriate training opportunities to help grow their business. Education is viewed as invaluable at any level, whether for individuals or new or established businesses.

1. Outreach to DBE/ESB Firms

Prior to NTP2, FRMG will conduct an outreach event for all certified DBE/ESB firms. At each outreach event, FMRG will focus on communicating design and construction opportunities for joining our team, along with explanation of scopes of Work and how they fit into the overall Project schedule. In addition, DBE and ESB firms will have the chance to meet with members of the FRMG team for answers to any questions they might have about the program or Project. There also will be updated information on the Project itself. FRMG will make sure attendees understand who our team's key contacts are, as well as the expectations and requirements for each scope of Work. FRMG will advertise upcoming outreach events in the following ways:

FRMG will send invitations to all certified DBE and ESB firms via iSqFt. The invitation will include the following information:

- Location, date, and time
- What the firm needs to bring
- What will be provided

- Directions to the location, plus parking instructions
- Details about what the event will address
- How to respond to FRMG
- Whom to contact with questions about the event

FRMG will use the Project website to communicate all outreach activities. The website is currently www.frontrangemobilitygroup.com.

2. Utilizing Connect2DOT

FRMG will advertise outreach events through Connect2DOT, Hispanic Contractors of Colorado, and the Black Construction Group, as well as other local resources as detailed in Section 2.d, in an effort to reach the whole DBE/ESB community. FRMG has used and will continue to use Connect2DOT as one for its primary communications tools for all updates, outreach events, and opportunities for the Project. We will also work hand in hand with the staff at Connect2DOT to make sure we are taking advantage of any opportunity to present at other agency functions and Connect2DOT training sessions.

3. Transportation Leading Edge Course

The Transportation Leading Edge Course is an opportunity for new and established DBE/ESB firms to undertake valuable training, as well as to connect with prime contractors and create or update a business development plan.

FRMG is committed to assisting Connect2DOT in the development and facilitation of this program. FRMG's CRPM and our outreach staff will work closely with Cathy Kramer and her Connect2DOT Transportation Leading Edge Course program staff. Along with the Small Business Development Center, we will develop an appropriate curriculum that combines FRMG's team experience, an understanding of the Project, and the needs of participants in the seven-week Connect2DOT program.

FRMG will provide Project personnel to assist in delivering training, as well as any additional materials or resources that could be beneficial to DBE/ESB firms participating in the course. We understand the audience comprises DBE/ESB firms that have been in business two years or more, and that FRMG will be expected to assist in training firms on a variety of topics, such as finance, marketing, and management in highway design and construction. In addition, we understand that there is one-on-one coaching from course facilitators as part of the training, and FRMG staff will be available as needed to assist in this aspect.

We will work with the Department to explore the feasibility of using the Anderson Building to host this course.

We understand that Connect2DOT has a set process for developing the Transportation Leading Edge Course, and we would defer to the organization to guide our team in supporting them in their efforts.

4. Project Updates to Small Business Collaborative Forums

Project updates will be regularly delivered in the Department's quarterly Small Business Collaborative Forums, in which members of FRMG are currently active. These forums will be a great opportunity for FRMG to provide Project updates, as well as showcase opportunities for participation that are imminent in the next quarter. FRMG members who will attend regularly include the CRPM and his SDBP Coordinator, as well as members of the design and construction teams. We will maintain consistent contact with the Office of Civil Rights headquarters to offer agenda items for each quarterly meeting. We also will provide takeaways for attendees that describe the current progress on the Project and details about how to contact FRMG about upcoming opportunities.

5. Monthly Updates to Connect2DOT Newsletter

On a monthly basis, FRMG will provide Connect2DOT a list of upcoming subcontracting opportunities and events. This information will be submitted to Connect2DOT no later than one week prior to the deadline for distribution of the newsletter. These will detail scopes of Work, qualification requirements, agendas for events, and contact information for the CRPM and SDBP Coordinator. In addition, we will provide a section entitled "What's New on Central 70," which will detail Project progress, upcoming Work, and other information specific to the Work on Central 70. In this way, the DBE/ESB community will stay well informed about the Project.

6. Other Measures of Outreach, Training and Development

In addition to the variety of outreach events, training and one-one-one meetings detailed in Sections 2.c and 2.d, FRMG will:

- Host targeted outreach meetings, workshops, and networking forums to provide Project status and overview to Subcontractors, Suppliers, and professional service firms interested in working on the Project
- Provide website, email, printed material, and telephone solicitations to Subcontractors, Suppliers, and professional service firms listed in the Department's DBE and ESB directories, soliciting them to provide quotes/bids for opportunities on the Project
- Assist the Department in the development of periodic scope of Work meetings, educational sessions, and DBE training workshops to assist a firm's likelihood to participate on the Project

7. Other Activities and Efforts

Throughout this plan, and detailed in particular in Section 2.d, FRMG has demonstrated a variety of activities and efforts to solicit bids from and advertise opportunities to certified DBE/ESB firms that can capably perform the Work of the contract. These have included:

- Hosting outreach events, including an initial kickoff; additional outreach events for each scope of Work that begins with DBE/ESB participation potential; and an outreach event modeled off USDOT's Prime Connections event

- Forming local partnerships with community-based organizations and associations, minority contractor groups, federal minority business assistance offices, and other organizations
- Offering a Mentor-Protégé Program to interested and qualified DBE/ESB firms
- Advertising opportunities to bid through iSqFt, email, fax, and the USPS, as well as the FRMG and Project websites
- Meeting with DBE/ESB firms one-on-one to determine firm capability and train them on Project and scope expectations

As detailed in Section 2.c, FRMG also will use CDOT's DBE and ESB directories to recruit and place firms. FRMG will solicit DBE/ESB firms for bids within sufficient time to allow DBEs and ESBs to respond to the solicitation. FRMG will determine with certainty if DBE/ESB firms are interested by taking appropriate steps to follow up on initial solicitations.

Through these approaches, FRMG is committed to working with the Department, the community of DBE/ESB firms, and other community-based organizations throughout the City and County of Denver and the City of Aurora to enhance the stability and viability of the small business community not only for this Project, but also in the future.

Attachment A
DBE/ESB Participation Form

Front Range
Mobility Group

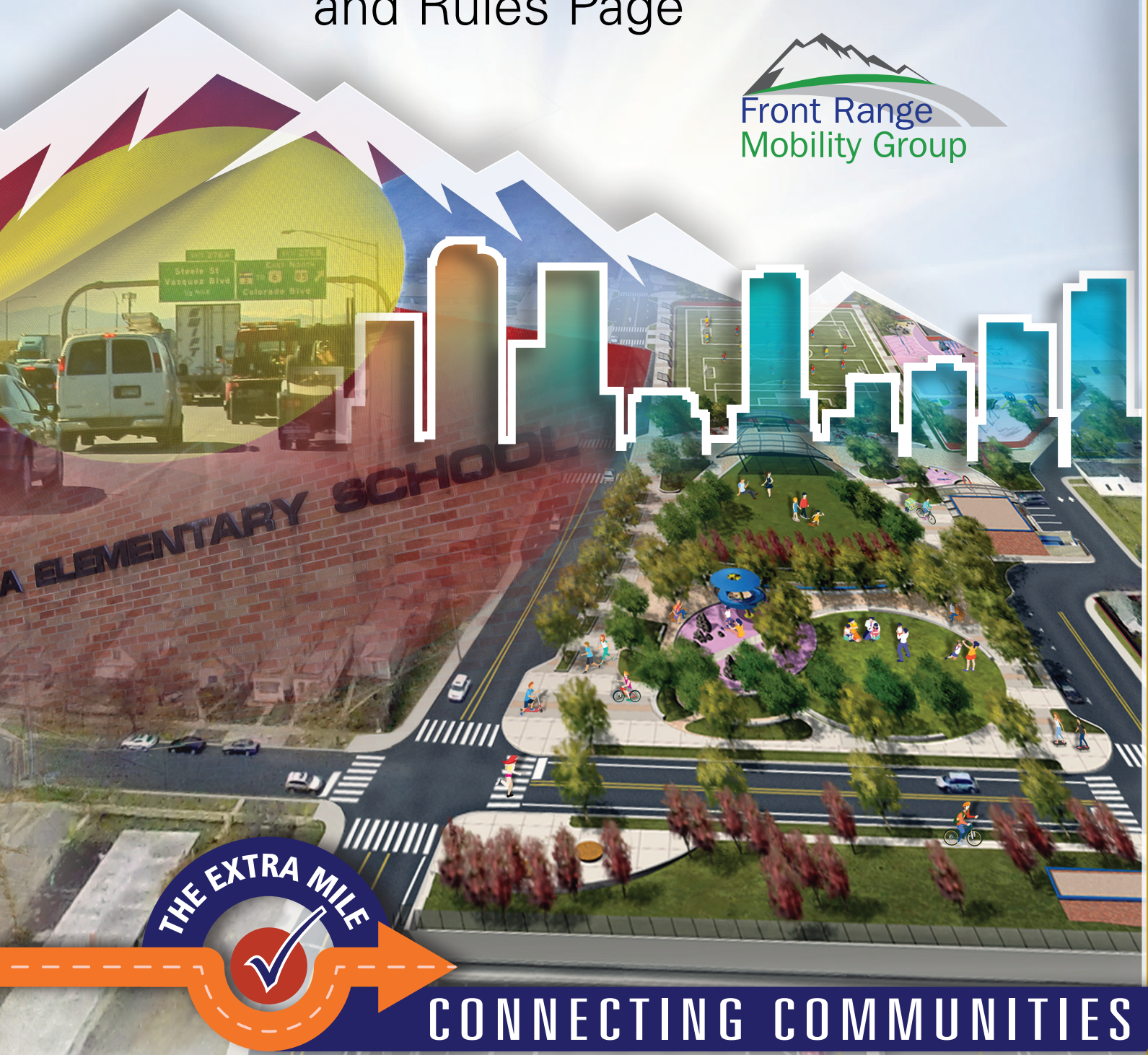
CONNECTING COMMUNITIES

Attachment A – DBE Form

EXPRESSION OF INTEREST			
Please complete the information below and send to opportunities@frontrangemobilitygroup.com			
Please provide your contact information:			
Company Name:	Your Name:	Title:	
Street Address:	City:	State/Zip:	
Email Address:	Office Phone:	Cell Phone:	
What services can your company provide? (Check all that apply)			
☐ Aggregate Supply	☐ Earthwork	☐ Landscaping	☐ Trucking
☐ Architectural Work	☐ Electrical	☐ Painting	☐ Structural Work
☐ Asphalt Paving	☐ Excavation	☐ Rebar	☐ Utility Services
☐ Demolition	☐ Fencing	☐ Signage	☐ Other:
☐ Drainage	☐ Formwork	☐ Site Cleaning	☐ Other:
☐ Design:	☐ ROW	☐ Environmental	☐ Other:
Tell us about your DBE status:			
Are you currently a certified DBE firm? ☐ Yes, in Colorado ☐ Yes, in another state (please list): ☐ No			
If certified, please complete the information below:			
Certifying Agency:	Certification Number:	Certification Type: ☐ Disadvantaged Business Enterprise (DBE) ☐ Emerging Small Business (ESB) ☐ Minority Business Enterprise (MBE) ☐ Woman-Owned Business Enterprise (WBE) ☐ Small Business Enterprise Concession (SBEC)	
Additional Comments:			

Attachment B
Truck Commitment Safety and Rules Page

Front Range Mobility Group



Attachment B –Safety and Rules Pledge

Front Range Mobility Group (FRMG) and its contractor's Subcontractors, along with all personnel assigned to the FRMG's Central 70 Project, will strive for a record of ZERO ACCIDENTS AND ZERO INJURIES. FRMG is firmly committed to maintaining a safe, healthy working environment. To achieve this goal, FRMG has implemented the policies and procedures contained in this initial site safety orientation for hauling.

This safety orientation is designed to prevent accidents and injuries on the Project. Our objective is to conduct operations in a safe, effective, and efficient manner.

We can achieve this objective through a combination of management, responsible and knowledgeable supervision, and ensuring that conscientious, well-trained employees and independent contractors act in a proactive approach to manage safety.

Proactive safety management is key to FRMG's total safety management philosophy. An effective safety program requires total involvement from all levels of personnel to reach our safety performance goal of ZERO ACCIDENTS AND ZERO INJURIES.

1.0 PROJECT JOB RULES

The following safety procedures will be followed when operating a motor vehicle on the FRMG's

Central 70 Project:

- Seat belts will be worn at all times
- Backup alarms must be installed and in working condition
- All traffic and speed limit signs, and site-wide guidelines, must be obeyed
- Workers must park in designated areas
- Workers must be aware of pedestrian traffic
- Drivers must visually check around the vehicle before moving it
- Vehicles will never be loaded in a manner that obscures the driver's front or side views
- Headlamps will be illuminated during hours of low natural light or poor visibility; drivers will ensure all lights on their trucks are functional

A daily vehicle inspection must be completed for all vehicles assigned to the Project to assure all equipment, controls and accessories are in safe operating condition. This inspection will be conducted by the vehicle driver. On-site personnel may request to review the driver's pre-trip inspection.

Additionally, the following general rules and procedures must be followed:

Hardhats, safety vests, and eye protection must be worn at all times when on the Central 70 Project.

Appropriate footwear must be worn. For employees in construction areas, safety-toed footwear is mandatory. Absorptive material shoe tops, such as canvas or cloth tennis shoes, are prohibited. Non-absorptive, skid-resistant sole and heel materials such as neoprene are encouraged.

No illegal drugs, alcohol, or horseplay is permitted on the Project site.

Sleeveless shirts and tank tops are prohibited. Shirts must be worn at all times, and sunblock should be used when appropriate.

Shorts, sweatpants, and similar attire are prohibited. Full-length pants must be worn at all times.

All vehicles must observe safe speed limits.

All preapproved passengers must wear safety belts whenever vehicle is in motion.

Workers must yield to emergency vehicles and heavy equipment.

I have read and fully understand the INITIAL SITE SAFETY ORIENTATION FOR HAULING and will comply with all requirements for the protection of myself, the people around me, and my equipment.

Date _____

Name _____

Signature _____

Attachment C – CUF Training Presentation

Attachment C
CUF Training Presentation

Front Range
Mobility Group

CONNECTING COMMUNITIES

Commercially Useful Function

Reggie Gamlin, Civil Rights Program Manager

Front Range Mobility Group

720-789-0177

rgamlin@flatironcorp.com

Commercially Useful Function (CUF) Subcontractors

- A DBE/ESB provides a CUF when it is responsible for the **execution of the work** of the contract and is actually:
  - Performing
  - Managing
  - Supervising

With respect to materials, a DBE/ESB must also:

- Negotiate Price
- Determine Quality & Quantity
- Order Material
- Install Material (Where Applicable)
- Pay For Material Itself

- A DBE/ESB does not provide a CUF if its role is limited to that of an extra participant in a:
  - Transaction
  - Contract
  - Project
- Through which funds are passed in order to obtain the appearance of participation.

CUF Guidelines

Management	Equipment	Workforce	Materials	Performance
Schedules Work	Owns/Leases With Valid Rates	Regular Workforce	DBE/ESB Negotiates: Cost and Delivery	Self-Performs Work
Obtains Own Quotes for Equip/Materials	Long Term Lease With Exclusive Control	No Sharing Employees with Non-DMWBE Firms	Takes Ownership & Pays for Materials	Provides Management with Own Employees
Prepares/Submits Certified Payrolls	Full Operational Control of Equipment	Responsible For All Payroll/Labor Requirements	Prepares Estimate/ Takeoff	Provides Supervision With Own Employees
Hires and Fires	DBE/ESB Provides Operator and Issues Payroll		Responsible for Quality	Works in Accordance with Industry Practice
Decision Making/ Operational & Mgt	Specialized Equip May be OK		Invoice/Shipping Documents Match	
Daily Supervision				

CUF Red Flags

Management	Equipment	Workforce	Materials	Performance
Supervised by Other Contractors	Prime Leases Equipment Deducts Payments	Sharing DBE/ESB Employees Between Contractors	Material Ordered or Paid for by Prime	Joint Work DBE/ESB and Another Firm
DBE/ESB Provides Low or No Supervision	DBE/ESB Uses Other Trades Equip or Ad Hoc Lease	Employee Paid by DBE/ESB & Prime	2 Party Checks	Not Experienced
Super Not Exclusive Employee	Equipment ID/ Different Owner	Employee Works for Prime in AM & DBE/ESB PM	Materials Billed or Delivered by Another Firm	Work Performed by Another Firm
Prime Supervises	Magnetic Signs			No Subcontract
DBE Unaware Project Status				Subcontract Not Customary $
				DBE/ESB Works for Only One Prime

Front Range
Mobility Group

APPENDIX K

DRAFT SMALL AND DISADVANTAGED BUSINESS PARTICIPATION PLAN

VOLUME 2 – TECHNICAL SUBMISSIONS
Binder 16 of 18

CENTRAL 70 PROJECT

PUBLIC DISCLOSURE
Administrative and Technical Proposal:

Front Range Mobility Group

THE EXTRA MILE

APPENDIX L

DRAFT WORKFORCE DEVELOPMENT PLAN

CONNECTING COMMUNITIES

Draft Workforce Development Plan

For

Central 70 Project

Contract #

Prepared By:

Front Range Mobility Group

Front Range Mobility Group	Central 70 Project Draft Workforce Development Plan	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

Table of Contents

Acronyms and Abbreviations

AGC	Associated General Contractors
CCA	Colorado Contractors Association
CCAP	Child Care Assistance Program
CDL	Commercial Driver's License
CRPM	Civil Rights Program Manager
CWSP	Corporate Work Study Program
DPS	Denver Public Schools
DBE	Disadvantaged Business Enterprises
FRMG	Front Range Mobility Group
OJT	On-the-Job Training
RTD	Regional Transportation District
STEM	Science, technology, engineering, and math
WDP	Workforce Development Plan
WL	WL Contractors

1 Introduction

FRMG is committed to meeting the goals and objectives regarding the On-the-Job Training (OJT) Plan and the Local Hiring Plan and is committed to training and advancing minorities and women toward journeyman-level status within the highway construction trades. FRMG will recruit, hire, and train a qualified workforce, providing uninterrupted labor to complete the Project on time and within budget to meet or exceed the Department's Project, training and local hire goals. Special emphasis will be given to individuals residing in the affected geographical area, including Globeville, Five Points, Elyria and Swansea, Cole, Clayton, Northeast Park Hill, Stapleton, Montbello, Green Valley Ranch, and Gateway.

This detailed plan for Workforce Development, JT, and Local Hiring highlights our understanding of the need for proactive, ongoing recruiting and outreach events, and the importance of providing the local workforce with the tools they require to excel and thrive in their respective positions on the project.

This Workforce Development Plan exceeds the Department's expectations by achieving the following:

1. Identifying workforce personnel within the zip codes of the construction footprint and surrounding areas who are "qualified" — that is, ready to start a career, willing to attend the training, and available to start working as soon as possible
2. Communicating updates to the community and maintaining an active dialogue with local residents, the traveling public and other stakeholders
3. Identifying and eliminating potential "potholes" and barriers for hiring qualified individuals
4. Committing to creating a diverse, inclusive environment to encourage people to enter the workforce and take part in training
5. Highlighting construction trades as options for unskilled labor

1.a Commitment to Achieve the Construction Period OJT and Local Hiring Goals

FRMG is committed to achieving the Construction Period OJT Goal of 200,000 employment hours and a Local Hiring Goal of 760,000 total contract employment hours (with a minimum 380,000 hours by new hires).

To achieve the Local Hiring Goal, this equates to approximately 60 new hires and 50 other local hires during the life of construction on the Project; however, our team's plan is designed to exceed this minimum goal.

1.b Workforce Development Team Members

FRMG's Civil Rights Program Manager (CRPM) Reggie Gamlin will be responsible for recruiting participants in the Workforce Development Plan (WDP). A critical element of this plan is to develop partnerships with:

- Schools (including high school, college, trade schools) in the affected geographical area
- Churches and other places of worship
- Recreational centers
- Neighborhood organizations
- Affected city council members, including Districts 8, 9 and 11 (served by Stacey Gilmore, Albus Brooks, and Christopher Herndon), and Debbie Ortega (at large)
- Workforce Development organizations
- Chambers of Commerce

Reggie will oversee the management of the entire Workforce Development program. With nearly 20 years of construction and construction-related experience, he has worked on transportation and public construction projects totaling over $2B. The relationships he has established with local owner/agencies and construction associations such as United States Department of Transportation's Small Business Training Resource Center, Hispanic Contractors of Colorado, and the Colorado Contractors Association (CCA) make him an expert in the Denver market.

As CRPM, Reggie will:

- Be responsible for recruitment of participants.
- Assure that adequate employment opportunities continue to be available.
- Act as liaison with employees and contractors.
- Be responsible for all reporting, as discussed in Section 2.c of this plan.
- Work with the Department to provide communication to Entravision as part of partnership, as discussed in Section 1.c of this plan.

George Hanible will be the Workforce Development Coordinator, reporting to the CRPM. George will be responsible for:

- Job matching and job coaching
- Screening current employees for potential enrollment in the OJT program
- Implementing and tracking trainees in OJT program and Local Hiring Goals
- Identifying resources and referring employees to organizations that support job coaching.
- Coordinating support services needed, such as transportation, equipment, and childcare

George has 25 years of relevant experience and has worked on some of the largest infrastructure projects over the last 10 years, including work with LAWA, City of Los Angeles,

Metro, and other public agencies. He has also managed similar diversity programs on multiple projects, including major design-build and P3 projects throughout the U.S., and projects in Colorado and the Greater Denver area. George oversaw the implementation of all DBE utilization and other minority requirements and workforce development on more than $4 billion worth of federally funded contracts.

1.c Workforce Recruiting

FRMG is committed to assisting the Department in growing the available pool of skilled journeyman-level craft positions, both for this Project and future projects. FRMG will recruit its workforce through public and private sources. Opportunities for prospective recruits into the Project workforce will be disseminated through outreach events, advertisements in publications, social media, and partnerships with local workforce development organizations. Recruitment efforts will be directed toward a broad range of candidates including female and community organizations; schools with minority and female students; and training organizations both within the recruitment area, as well as those that can best fill the Project's employment needs.

At least one month prior to the date for the Acceptance of applications for apprenticeship or other training by any recruitment source, written notification will be sent to the following organizations describing the openings, screening procedures, and tests to be used in the selection process. Additional commitments from FRMG can be found in the table below.

FRMG will partner with organizations that have already done an extensive amount of outreach and have ample tools and resources in place to assist in building and recruiting the workforce for this Project. Such organizations include those that have participated in the Department's Workforce Development Roundtable forums and are listed in the **Table 1** below. Workforce Development Organization and Resource Matrix below.

Table 1. Workforce Development Organization and Resource Matrix.

Company	Contact	Services	FRMG Actions
Associated General Contractors (AGC)	Lisa Seeman / Bryan Cook 303-388-2422 http://www.agccolorado.org/	• Partners with Emily Griffith training - Hiring fair held after training with approximately 40 students per class • Approximately 30 companies participate in hiring fair • Work with high school counselors to secure interested students	• Coordinate with Emily Griffith and Denver Public Schools (DPS) to coordinate skilled craft/trade school opportunities • Send personnel to attend hiring fair and provide materials for job applications
Colorado Contractors Association (CCA)	Terry Kish 303-290-6611 ext. 14 tkish@ccainfo.org http://www.coloradocontractors.org/	• Apprenticeship program to increase the number of skilled workers through formal training • ManPower Training Program to develop employees in basic work areas of heavy/highway construction industry • Partnership with Build Colorado Program ("Construction Careers Now!"), career training program • Scholarships available through Construction Workforce Foundation of Colorado to	• Continue working relationships already existing through FRMG team members with CCA to develop additional tracks and curriculum to build OJT program • Supply resources/personnel to assist in trainings and mentoring

Company	Contact	Services	FRMG Actions
		promote, educate and train construction workforce	• Refer and enroll employees to matriculate in training programs
Build Colorado Program ("Construction Careers Now!")	Jim Spence 720-456-1845 jim@agccolorado.org https://www.buildcolorado.com/program-overview	• Four-week program at Emily Griffith Technical College • At completion, students attend a hiring fair to meet contractors and be interviewed and complete application process • Employers buy table for $500 to evaluate students from class (funds student tuition) • Build Colorado will follow up with contractor and students • Recruiters on staff to mentor students and work with contractors • Approximately 43 new students graduate per month • No cost to students • Classes cover: career paths, basic terminology, tools and equipment, expectations, safety, blueprint reading, building techniques, leadership/soft skills • Job listings posted on website http://agc-co.ourcareerpages.com/CareerPage.aspx?ccpcode=agc-co • Work Act Grant – Include four partners (AGC, Emily Griffith, Hispanic Contractors and CCA) • Regularly make presentations to various institutions for recruitment, including all high schools, tech schools, focus pointe, recreational centers, career fairs, Rescue Mission and the Reentry Program • Assist in enhancing interviewing skills	• Send personnel to attend hiring fair to meet with and interview students, and provide materials for job application • Buy table for $500 to participate in one student evaluation • Coordinate open positions with FRMG recruiters and Build Colorado staff • Volunteer FRMG personnel at events to help students perfect interviewing skills and hone resume • Regularly make presentations to students about construction industry work and expectations

Company	Contact	Services	FRMG Actions
Community College of Denver – Center for Workforce Initiatives	Katrina Wert 303-352-6991 katrina.wert@ccd.edu www.winforwork.org	• Provides pre-employment preparation and training, placement services and career advancement training • Posts job openings and finds qualified candidates • Provides post-hiring supportive services to ensure retention success • Recruits talent from training and service providers including nonprofits, community and technical colleges, universities, apprentice programs, trade associations and workforce system • Provides assistance for working students with childcare, transportation and other barriers through the Strengthening Working Family Initiative	• Provide information about upcoming opportunities to apply for jobs with the project • Collaborate with Community College of Denver staff to pair prospective employees with open positions on the project • Refer current employees to continuing education and training
Colorado Construction Institute – aka Colorado Home Building Academy	Michael Smith 303-241-9220 michael.smith@cohomebuildingacademy.org http://cohomebuildingacademy.org/about-the-acadamy/#builders	• Provides 6-12 months of training • Hands-on training for basic construction skills, safety and soft skills • Targets out-of-school youth, in-school youth, and adults • New certified graduates available every five weeks • Employers can hire graduates from the construction skills boot camp • Programs to minimize barriers to employment are sought with outside organizations, such as organizations to address transportation barriers	• Refer employees to training and continuing education • Refer employees to utilize resources to alleviate barriers to employment • Collaborate with Colorado Construction Institute to funnel graduates into open positions on Project

Company	Contact	Services	FRMG Actions
Construction Industry Training Council	Cori Gerlitz (Exec. Director) 303-893-1500 cgerlitz@citcinc.org http://www.citcinc.org/about/	• Provides training for apprenticeship program • Accredited through Emily Griffith and U.S. Department of Labor • Trades include carpentry, electrical, masonry, plumbing, pipe fitting, sheet metal	• Members of FRMG team will become affiliated with Construction Industry Training Council to appear on a list of available contractors to students • Sponsor apprentices • Utilize their training as part of program to reach Construction Period OJT Goal

Additional Resources

The resources listed in **Table 2** are available to assist employees in overcoming barriers to successful, permanent employment, and allow them to focus on building their careers, learning new trades and honing their skills. FRMG will make sure that employees are aware of these resources and refer them specifically as needs arise.

Table 2: Additional Employee Resources

Company	Contact	Services
Denver Housing Authority – Community Services	Damen McIntyre (Senior Lead Coordinator) 720-956-3824 Jacqueline Candelaria (Education & Employment Coordinator) 720-956-3830 jcande@denverhousing.org	• Services include: interview skills, soft skills, GED classes, testing resources, trainings, certifications, resume development, job placement, post-placement support and workplace conflict resolution • The program provides entry level and middle skills certification in light industrial construction (Forklift, OSHA 10, fall protection, confined spaces, excavation, and trenching) • 3-6 week programs • Childcare and transportation assistance available
Aurora Housing Authority	Hannah Han 720-251-2066 hhan@aurorahousing.org http://www.aurorahousing.org/	• Provide housing assistance only - Section 8 vouchers – waiting list is closed - Subsidized housing – waiting list is closed - 682 units of affordable housing • GCs can post signs at jobsites for recruitment of low-income individuals known as “Section 3”
MiCasa Resource Center	Anne Volcker (Employer Partnership Coordinator) 303-539-5648 avolcker@micasaresourcecenter.org http://www.micasaresourcecenter.org/ Carla Kaplin Gomez (Coordinator) 303-539-5619 ckaplingomez@micasaresourcecenter.org	• Skills training • Mon-Fri 9 a.m.-3 p.m. – April 17 last registration • Available to low-income residents • Must test at sixth grade level or greater • Training includes: job workplace conflicts, job search, interview skills • Interview Day occurs intermittently for Employer Partners at MiCasa to interview 3-5 candidates from the training program • Service is open to the public • 1x1 career coaching available to participants • Navigators help with career development and barriers: RTD Vouchers, utility assistance available during training session • Ex-felons have career coaching and potential placement opportunities • Presentations made throughout the community to draw attention to services (community centers) • 8-15 participants per class (training focused on customer service, banking and healthcare professions currently –

Company	Contact	Services
		future may include construction via partnership with City and County of Denver)
CareerConnect	Joe Saboe joe_saboe@dpsk12.org Karis Morrall karis_morrall@dpsk12.org http://www.dpscareerconnect.org/welcome/about-us/	• Training program offered to students grades 9-12 • Career pathway determined through "Maker Connect" • Opportunities for job shadowing, mentoring, internships – Opt in as electives • Internships are coordinated according to DPS schedule – 20 hours per week • Ensures students are well prepared with the soft skills needed in the workplace • Company completes a project plan so particular skills are targeted • Company has the opportunity to interview students to determine fit • Mentoring program is yearlong in the classroom – 14-18 students per class, three hours per month. Students will also visit company for practical experience • Construction program is held at the Career Education Center • GED Program is offered through Emily Griffith for ages 20 and older • Construction Bootcamp – held in June through Emily Griffith – students will work 50% of time • ACEConnect Program is designed for special needs students • 97% employer participation retention rate
Mile High 2-1-1	303-561-2111 211colorado@unitedwaydenver.org https://211colorado.communityos.org/cms/home	• Resource for assistance with human services including: housing, child care, high school diploma programs, GED/HSE testing, basic education transportation, job training, clothing, food, etc.
e-Colorado	https://e-colorado.coworkforce.com/	• Repository of many support services throughout the region • Community Reentry Specialists provide case management and comprehensive services that include employment services, shelter and transportation assistance, clothing and tools, healthcare, and referral to community support services that may impact transition from prison to the community • Veteran employment specialists with knowledge of local labor markets and local employers, they conduct in-depth skills assessments for veterans to match individual capabilities with available jobs in the community • The Colorado Child Care Assistance Program provides financial assistance to low-income families who are

Company	Contact	Services
		working, searching for employment or are in training, as well as families enrolled in the Colorado Works Program. Eligibility for child care is determined by county of residence in Colorado, and assistance is administered through county departments of social/human services
Arapahoe Douglas Works	Clay Hoschouer 303-636-1160 choschouer@arapahoegov.com http://www.adworks.org/index.php/job-seekers/our-services	• Veterans and employment representatives are available to assist. Full range of job-seeker and employer services: job search, job counseling, computers with internet access, printers, career library, workshops and seminars, HSE Program, WIOA DW - Adult - youth programs, learning lab, TANF, Employment First, employer services, and job services • Ex-offender resource services include contact with business in the community – depending on offense • Transportation, housing and childcare assistance offered to those in government assistance programs • Workshops routinely held at no charge
Colorado Department of Labor and Employment **Denver Workforce Center/ Office of Economic Development**	Chris Dewhurst 303-318-8770 Christopher.dewhurst@states.co.us https://www.denvergov.org/content/denvergov/en/denver-office-of-economic-development/jobs-employers.html https://www.colorado.gov/cdle	• Colorado Department of Labor and Employment is the administrative arm for services provided by Workforce Centers throughout the area • A host of services are provided to employers and job seekers at the workforce centers • Assistance with posting jobs, screening and assessments, recruitment events, training, and hiring veterans is available to employers • Job seekers find assistance with training and workshops, skill assessment, GED preparation and pretesting • Human services through the workforce centers include childcare, transportation, housing and veteran services
Denver Human Services	720-944-3500 https://www.denvergov.org/content/denvergov/en/denver-human-services/assistance-programs/veteran-services.html	• Veteran services include: housing, food banks, education and training, resume development, interviewing strategies and coaching, job referrals, transportation assistance and equipment/tool purchase • Child Care Assistance Program (CCAP) helps families who are working, going to school or looking for employment. CCAP provides financial assistance for infants to children age 13 and special needs youth up to age 18. Help is provided to families with full-time care, part-time care and summer-time care
Community Reentry Project	Ageno Otii (Director of Employment and Education) 720-865-2327 Ageno.Otii@denvergov.org	• Must be enrolled in the program after deemed qualified • 18 or older with a misdemeanor after serving at least 30 days • Must call within one year of release • Felons are considered on a case-by-case basis

Company	Contact	Services
	http://www.communityreentryproject.org/home.html	• Incentives include access to basic needs including: bus tokens, clothing, hygiene kits and emergency housing • Computer labs, job leads and job search, career development and job search also provided to those enrolled in the program • Services also offered to the broader Denver County community
Community Reentry Center	Tanci Simon 303-763-2400 Tanci.simon@state.co.us Christine Richard 303-763-2495 https://www.colorado.gov/pacific/cdoc/adult-parole	• Service provided by the Colorado Department of Corrections – Adult Parole Division • Career services include: resume preparation, employment resources, career assessment and planning, job coaching and job search assistance • The employment and training program collaborates with state workforce centers and educational facilities to identify certificate and job training programs that enhance skills development for clientele. Its staff members also work with local businesses and community organizations to promote workforce development projects, internships, and apprenticeship programs • GED Preparation and other educational resources • Short-term housing assistance and long-term housing referrals • Transportation assistance (bus passes, bicycles) • Work clothing and tools • Help with ID cards • Food bank resources
Volunteers of America	303-297-0408 https://www.voacolorado.org/	• Support provided to individuals for housing, food and nutrition, childcare and emergency services • Extensive veteran services include leads for employment, VA benefits and crisis intervention

Advertising Job Openings Locally

FRMG understands that not everyone obtains information in the same way. According to a study conducted by the Community College of Denver's Center for Workforce Initiatives ("Community Job Readiness and Workforce Needs Assessment," August 2016), a majority of respondents preferred visiting a website as an outreach recruitment method. Next was phone calls, followed by word of mouth, and then community and recreational centers. We have developed our methods of workforce recruitment and outreach based on these findings.

However, while the fewest number of respondents said they prefer social media as their preferred method of outreach recruitment, we also understand the millennial workforce (ages 18-24) tend to reach first to this platform for information. Because of this, FRMG will use targeted social media ads on Facebook to focus on further communicating opportunities for participation.

All job openings through FRMG and Subcontractors will be advertised with Department-approved workforce development organizations for seven calendar days before job openings will be advertised through other resources, such as those listed in the tables above. Advertisements will be developed by Reggie Gamlin, CRPM, and his staff and will highlight that FRMG is "An Equal Opportunity Employer" and will highlight the OJT and Local Hiring commitments for this Project. Sample ads can be found in Attachment 1.

Sample advertisements and flyers.

Advertisements will list upcoming scopes of work to which prospective employees can apply, provide contact information for the CRPM and FRMG's website for additional information, along with pertinent deadlines for application. Advertisements will be written in both English and Spanish. Advertisements will be placed in the publications throughout the Denver metro area listed in **Table 3** below.

Table 3. Publications in Denver and Aurora.

Large Publications	Neighborhood Publications	Spanish/Bilingual/Other
The Denver Post Denver Business Journal Aurora News Aurora Sentinel Westword 5280 Magazine The Daily Journal	The Advocate The Colorado Statesman The Denver Voice (published by homeless and low-income Denver citizens) Glendale Cherry Creek Chronicle Intermountain Jewish News Life on Capitol Hill Local Yeti The Metropolitan (Metropolitan State University) Out Front The Washington Park Profile The Urban Spectrum The Front Porch (Stapleton)	La Prensa de Colorado (Spanish) La Voz (Bilingual) Gorizont (Russian)

Entravision Communications Partnership

FRMG has partnered with Entravision Communications, owners and operators of four local Spanish-language television stations and three local Spanish-language radio stations. This partnership contributes to the community development needs of the Globeville, Elyria, and Swansea neighborhoods and otherwise creates a positive relationship between local communities and FRMG.

Television	**Radio**
KCEC-TV Channel 50	KJMN 92.1 FM
KDVT-LP Channel 36	KMXA 1090 AM
KGHB-CD Channel 27	KXPK 96.5 RM

FRMG will engage with Entravision's partners in the area including (but not limited to) the National Western Center, the Colorado Rapids, and Clinica Tepeyac, to create community development programs that enrich neighborhoods and promote opportunity.

Univision Colorado (Channel 50) will feature a news segment on the Project at least once weekly (more as required) on both the 5 p.m. and 10 p.m. newscasts. FRMG's Community Liaison will be the interviewee on the segment and will provide a glimpse of Project job opportunities as well as the Project's current status, impacts, and detours. The segment will be an on-site interview of about 30 seconds. It will be taped earlier than the broadcasts.

FRMG's Community Liaison will also be featured twice a month on Channel 50's Despierta Colorado (Wakeup Colorado) TV program. Despierta Colorado is a two-minute window in Univision's national programming, Despierta America, and is shown Monday through Friday between 7:30 and 8 a.m. Despierta Colorado promotes Colorado community-based Hispanic organizations and initiatives. FRMG's Community Liaison will highlight job openings and training programs, as well as current activities on the Project, and will spotlight community organizations or businesses affected by construction, and promote upcoming Project events. The program is pre-taped and pre-produced and will feature graphics and photos/videos from the Project team.

FRMG, in cooperation with Entravision, will engage the community within the Project footprint through promotions, radio spots, and television spotlights in the neighborhoods; all Project press/traffic releases will be featured on both radio and TV. FRMG will sponsor and promote job fairs for the Workforce Development program, as well as outreach events for Small and Disadvantaged Business Enterprises (DBE/ESB firms), community meetings and other events, in concert with Entravision. The events will be publicized on radio and TV. FRMG will feature Entravision and its stations as sponsors/partners and include these stations' logos/banners whenever applicable in accordance with our sponsorship agreement.

Other Communication Approaches

Community Resources: Local physical resource center buildings — such as recreational centers, churches, and other places of worship, schools and other gathering places, and community-based organizations — will provide a variety of resources to use existing channels of communication to disseminate information about upcoming opportunities to the community. Flyers will be developed by the CRPM and will highlight that FRMG is "An Equal Opportunity Employer," as well as highlighting our OJT and Local Hiring commitments.

Flyers will list upcoming scopes of work to which prospective employees can apply, provide contact information for the CRPM for additional information, include FRMG's website for additional information and contact, and include pertinent deadlines for application. Flyers will be written in both English and Spanish.

At schools, flyers will be posted on bulletin boards and sent home with children in their backpacks alongside other school flyers to provide information for their parents about opportunities to participate on the Project. As part of this process, we will work with Denver Public Schools to approve posting these flyers on online bulletin boards, where parents go to check announcements. This type of approach has been used successfully on the online announcements board at Swansea Elementary, which already has a robust presence to distribute information about events at the National Western Center complex.

Ongoing Partnerships:

- Opportunities for job seekers on the Project also will be posted to **Connecting Colorado**, the Colorado State Department of Labor's job board. Jobs to post will be identified by the CRPM and shared with the Colorado Workforce Centers service as part of their efforts to support business sustainability, transitions, and growth.
- There will also be a list of upcoming subcontracting opportunities and events provided for distribution via **Connect2DOT** newsletter on a monthly basis.
- Information about upcoming opportunities and outreach events will be provided through each of the Denver City Council members' individual newsletters, as well as the City of Aurora's "News Aurora" newsletter.
- Local representatives and community leaders will be actively solicited to assist in referring interested candidates for employment within the Denver area.

On-site Office: The on-site Project office will serve as another resource for local workers to apply for positions on the Project**. A computer will be designated and available for any prospective employees to apply for opportunities.** The availability of this resource will be highlighted through flyers and advertisements with community-based organizations.

Outreach Events and In-Person Recruitment

FRMG will collaborate with community-based organizations, including those listed in Tables 1 and 2, and local owner agencies, including City and County of Denver, to develop and hold outreach events within the construction footprint. These events would be held at a variety of locations, including local schools, churches, neighborhood organizations, hotels, and recreational centers. As part of the local involvement, these events also will be catered by local restaurants. This approach contributes back into the local economy and allows interested attendees easy access to these events.

An introductory event would occur after NTP 1 to discuss the highlights of the Project and ways that prospective employees can apply for positions on the Project. Recruiting events will be held at least quarterly to continue to update the community on design and Project progress, as well as additional upcoming opportunities. Also, at least once a year, for each of the five years of the

Project, FRMG will host a formal job fair to provide a list of opportunities to participate on the Project. FRMG will also provide Project team personnel to attend any other local agency job fairs throughout the year to provide information about job opportunities on the Project.

FRMG will work with Denver Public Schools and other community-based organizations to help develop construction-related curriculum to better educate students about the Project going on in their community. Parents will also be invited to attend events to better shed light on opportunities to work in the construction industry.

1.d Utilizing Subcontractors to Achieve Goals for Construction Period

Over the course of many projects completed in Colorado, each of the members of FRMG's design and construction teams has developed strong relationships with local vendors and Subcontractors.

FRMG will engage with Subcontractors to achieve the Construction Period OJT Goal and Local Hiring Goal through a flow-down process. Transparent, two-way communication will allow FRMG and our Subcontractors to work together to understand expectations for contributing to the workforce development objectives set for this Project.

Our first-tier Subcontractors are Kraemer, BTC, IHC and WL, who are currently implementing similar measures on other projects throughout Colorado to reach Construction Period OJT and Local Hiring Goals. The partnership with these Subcontractors is composed of local, Colorado-based companies that understand the importance of reaching such goals. They are committed to assisting FRMG reaching the Department's Construction Period OJT Goal and Local Hiring Goal.

Our expectations and our commitment to finding ready, willing and able participants for OJT and personnel to locally hire will be communicated to additional Subcontractors as they join the Project team. In addition, such language will be included in their Subcontracts — that they will meet their proportional share of the goals, so that the commitment is contractually passed down through each Subcontractor.

FRMG will review the scopes of work and opportunities for participation, and will work with our Subcontractors to identify their needs for more personnel.

In reference to Schedule 15, Section 6.4, FRMG will work with Subcontractors to develop financial incentives toward assisting our team in achieving the Construction Period OJT Goal and Local Hiring Goals. We will establish a range of percentages for the Subcontractors to meet or exceed, and the incentive will be commensurate with their achievement. FRMG will submit these terms to the Enterprises for Acceptance prior to execution of the relevant Subcontract.

1.e Utilizing High School Outreach Programs

FRMG will engage with both the Denver Public Schools CareerConnect Program and Corporate Work Study Program (CWSP) at Arrupe Jesuit High School. High school outreach programs such as these provide opportunities for real-life, hands-on experiences that significantly undergird the learning provided in the classroom. They show students that a construction-industry career path is a viable option and how their classroom experience translates into real-world applications. Over a five-year construction program, this provides new candidates for the OJT and Local Hiring pool.

Denver Public Schools CareerConnect Program

The Denver Public Schools (DPS) CareerConnect Program provides students hands-on experience in a variety of areas including science, technology, engineering, and math (STEM), as well as the trades. Work-based learning on the Project provides students to real-world, hands-on experience in construction-industry careers and an understanding of what goes into pursuing, planning, and executing the design and construction aspects of a transportation project.

Two area schools utilizing CareerConnect programs are Denver East High School and the Denver School for Innovation and Sustainable Design, both of which participate specifically in the EngineeringConnect track. This program utilizes Project Lead the Way curriculum to provide project-based classes that focus on engaging students in hands-on activities, projects, and problems; empowering them to solve real-world challenges; and inspiring them to reimagine how they see themselves.

FRMG is committed to working with the CareerConnect Program through two of its engagement opportunities, as described below in **Table 4**:

Table 4. CareerConnect Program Opportunities

Program	Event Details	Age and Number of Students
CareerX Industry Exploration Program	FRMG will provide 2- to 3-hour tour of the Project site to give students a first glimpse into the construction career field. Project personnel will be on hand to connect key academic concepts to business applications.	Available for high school freshmen (14-15 years old) 14-28 students per tour
CareerCoach Mentoring Program	**FRMG Project personnel will meet one-on-one with students as directed by the program. Four hours per month will be split among visiting the classroom, FRMG's Project office and higher education campuses.** **Students will begin to understand the academic and career paths they will need to take in order to reach various levels of the construction industry.** **Students will also make a connection with a construction industry professional for future networking possibilities.**	**Available for high school sophomores (15-16 years old)** **10-16 students per year**

There are several other opportunities for FRMG to partner with DPS' CareerConnect Program and develop ways for our team to contribute to the program. Upon Award, FRMG will work with the CareerConnect Program to develop the best ways our team can engage in:

- CareerLaunch Internship Program, an internship program that allows students to work at a company during the school year or over the summer
- CareerResidency Apprenticeship Program, in which students split their time between the classroom and a workplace/training facility, earning an associate degree and receiving financial benefits
- Industry Summits, in which FRMG personnel can help DPS CareerConnect teachers expand programs across the district and link students with critical industry resources

Arrupe Jesuit High School Corporate Work Study Program

FRMG has committed to being a Corporate Work-Study Program (CWSP) partner for Arrupe Jesuit High School. FRMG will encourage, teach, and mentor students and show them how construction is not just a labor intensive career, but one with many career tracks and opportunities — from the construction crafts and trades to accounting, finance, and engineering. In addition, the CWSP enhances diversity, drives production, and reduces employee burnout by filling entry-level jobs with capable young people.

FRMG will contract with Arrupe Jesuit's CWSP to fill full-time, entry-level jobs in our Project offices. Students are employees of the CWSP, not FRMG: CWSP will handle all payroll, W-4, I-9, Worker's Comp, FICA, FUTA, and other employer issues for the students. In addition, CWSP provides transportation, screening, support, and training.

For the cost of one full-time employee ($26,750), FRMG will teach career skills to four high school students from mid-August through the first week of June. FRMG will place students into positions that include full-time, entry-level clerical positions. Students are to be trained in skills including but not limited to filing, copying, faxing, delivering interoffice mail, data entry, reception, and general office duties in the Project office.

These four students will rotate days, working one full day a week, and once a month they will work two days of the week. Teams of four will job-share their duties for the entire school year. Students who would like to work over holidays or summers can do so, as CWSP employees and the money earned during holidays and summers goes directly to the students.

Students assign their earnings to Arrupe Jesuit High School to pay for over 60% of the cost of their education/tuition. Through this program, they receive a college prep education, which they previously could not afford, while gaining valuable job experience.

FRMG High School Outreach Programs

Build-a-Bridge Program: **FRMG will implement the successful Build-a-Bridge program developed by Flatiron, a team member of FRMG, which has implemented the program with local high schools throughout California for the last 10 years.**

FRMG's Build-a-Bridge program is designed to introduce students to the construction industry as a career option and provide scholarships to those interested in studying engineering in college. Through the program, students will have the opportunity to visit FRMG's Project office and construction site, receive industry training, and compete for college scholarships and a paid internship with one of FRMG's team members.

Students attended instructional classes taught by FRMG Project personnel to learn engineering and estimating fundamentals, including blueprint reading, estimating, MicroStation (basic drawing tools), estimating takeoffs and fundamentals, and practical application to engineering. Final projects are presented to a panel of FRMG judges who select the internship recipient and distribute scholarship awards among participants.

The 17-week program lets high school students learn construction and engineering fundamentals from FRMG instructors. The program begins in January and culminates in May with a final project and presentation where students compete for college scholarships and a summer internship.

Developing Opportunities with High Schools: In addition to the commitments outlined above, FRMG's design and construction teams will work to find additional opportunities to staff our Project with internships or administrative-level positions. We also will engage with our Subcontractors to increase the number of students who can learn about construction careers on

the job. This will allow us to initiate and build long-term relationships with students, monitoring their progress through college and offering them full-time work upon graduation.

FRMG team members (including the Project Manager, Construction Manager, Design-Build Coordinator, Superintendents, and Design Discipline Engineers) will work with our CRPM to develop and execute outreach events at local high schools. These two-hour sessions will provide students with information about construction careers, how math and science function on heavy civil construction projects, and career planning and future opportunities. Topics will cover construction management, estimating, and behind-the-scenes information of what goes into managing a construction project.

Project Site Tours: FRMG will work with local high schools to develop a schedule of times when small groups (no more than 10 students at a time) can tour the work site. Each high school principal will assign staff to coordinate with the CRPM to develop dates and times for tours every quarter, depending on scope and timing that ensures both student and worker safety.

Scholarship Program Development: In addition to the scholarship required under the Community Development Program of Schedule 15, Section 7, FRMG will structure a program that selects five students each year to receive a scholarship for the coming school year. FRMG will partner and work with our Subcontractors, Suppliers, and other vendors to engage in the development of this scholarship program.

2. On-the-Job Training (OJT) Plan

2.a Skilled Craft Areas

FRMG's OJT program is based on the successful program established by Colorado Contractors Association (CCA), and our team will partner with CCA to further develop and expand the program to meet the Construction Period OJT Goal. This industry-specific training program has been approved and implemented across the state, and FRMG will implement this program so that it maintains consistency across the local industry. Trainees can begin their training on this Project; if they do not complete it, they can continue to incur training hours on a different project.

FRMG will administer this program on-site and insert trainees onto the various work crews on-site. Additional information about training, as well as the staffing and mentorship aspects of this program, can be found in Section 2.b of this plan.

FRMG's OJT program will provide employees with hands-on training to increase their knowledge and skill sets, with the aim of enhancing the capabilities of the workforce. We will partner with employment organizations and trade programs to recruit and train workforce candidates. Such organizations are listed in Section 2.b of this plan. Training will be focused on teaching the skills required to perform various job functions, as well as other skills to gain employment and retention in the industry not only for this Project but future career opportunities. Additional information about specific training can be found in Section 2.d of this plan.

This program aims to assist semiskilled workers to acquire new skills so they can seek out higher levels of employment on the Project and within the construction industry. In addition to prospective or newly hired employees on to the Project, FRMG's Workforce Development Coordinator will screen current employees for potential enrollment in the OJT program.

Employees who complete and graduate from one track of the OJT program can enroll in another aspect of the program. In addition, should an employee join the Project late in the lifetime of construction, training credits can be transferred to the next project the employee works on.

FRMG will be enrolling employees into a Project-specific "Skilled Craft Training Program." We have identified four primary skilled craft areas, based on CCA's established program, where trainees and apprentices will be used:

1. Hauling Units/Truck Driving Units. This skilled craft area involves operating large class trucks, and understanding how to turn, back up, park, and maneuver the vehicle in tight spaces. It also involves the safe loading and unloading of haul materials. Some trucks require operation of specialty features, such as watering or dump trucks. Representative positions include truck drivers.
2. Operators and Mechanics. This skilled craft area involves the operation and maintenance of various heavy equipment such as earth moving, earth compacting, hoisting, conveying, and pile driving, among others. Representative positions include heavy equipment operators and mechanics.

3. Structures Work. This skilled craft area involves the construction of bridges, foundations, and other highway structures, such as the partially covered lid. It involves rebar work, concrete finishing, and welding, among other activities. Representative positions include carpenters, concrete finishers, and ironworkers.
4. General Laborer/Entry-Level Craft. This skilled craft area comprises workers who perform construction-related activities. These employees will haul and move material around the job site; shovel and rake asphalt, concrete, and dirt; stack material; clean up the job site; pull nails; load and unload material; and perform any other work as required. Representative positions include carpenters, concrete finishers, and ironworkers.

Within each of these four major categories, FRMG will work to identify all trades with the Department's approval where we feel we can offer valuable training and work with CCA to ensure we are offering employees all the requirements needed to graduate the Skilled Craft Training Program.

2.b Training

FRMG's OJT program will follow CCA's proven program for training and focus on the recruited positions. The duration of the OJT programs will be specific to the position and range from one year (2,000 hours) to four years (8,000 hours) for each position. The more specialized the position, the more hours required for OJT. Every position will include safety; each participant will be at least OSHA 10-Hour certified by the time they graduate.

FRMG will let trainees decide which program track they wish to follow. In such an open market environment, graduates who are able to "jump seats" and operate multiple machinery types are more valuable and can better market themselves to positions on this Project and future projects.

The outline below represents a sample of the training required for **one employee**, based on CCA's established program, through the various tracks of the OJT program. The CRPM will continue to assess other opportunities for training areas through the term of the Project, as well as work closely with the Department and CCA to identify other prospective OJT positions. For every craft position that has a mobility component/ability to grow on this Project, there can be OJT.

Hauling Units / Truck Driving Units

- Truck Driver
  - 1 year / 2,000-hour time based program
  - Must have a current Commercial Driver's License (CDL)
  - Will learn how to operate trucks in a construction operation
  - Driver Safety Training
  - Classroom instruction with CCA

Heavy Equipment

- Heavy Equipment Operator
  - 3 years / 6,000-hour program
  - Master five pieces of equipment
  - Shoot and read grade
  - Safety training
  - Classroom instruction
  - Will receive a CDL Class A or B
- Heavy Equipment Mechanic
  - 4 years / 8,000-hour competence-based program
  - Learn how to repair all types of mechanical and electrical systems on trucks and equipment
  - Learn how to weld
  - Safety training
  - Classroom instruction with CCA

Structures

- Bridge Carpenter
  - 4 years / 8,000-hour program
  - Learn framework
  - Learn concrete finishing
  - Learn how to tie rebar
  - Safety training
  - Classroom instruction
- Welder/Iron Worker
  - 3 year / 6,000-hour program
  - Learn how to tie rebar for all applications
  - Learn how to weld
  - Learn how to do concrete finishing
  - Safety training
  - Classroom Instruction

Training will be offered in both English and Spanish, and the majority of the time, training will take place on-site. FRMG will also partner with a local construction academy, such as Colorado Construction Institute, to provide certification classes on-site and other training outside our own OJT program at a minimal cost (or in some cases, for free).

Employees enrolled in the OJT program will be partnered with a journeyman, supervisor, or mentor — for example, a project manager, superintendent, construction manager, or other senior field worker — in a ratio of no more than three employees to one manager. The mentor, who is knowledgeable in the industry, will provide counseling and assistance to the trainee during the course of the trainee's time in the OJT program. The mentor will take charge of the trainee's instruction, ensuring the trainee receives the correct type and length of training.

The FRMG team will hold hands-on training events at the Project site and off-site supplementary training. Our goal is to make our workforce stronger through the development, training, and retention of long-term employees who continue to benefit to the local workforce, economy, and Department through future projects.

Each OJT candidate will begin with a two-week probationary period, letting us evaluate the candidate's work habits and capabilities and also allow the candidate to experience the work requirements and job conditions. Upon satisfactory completion of the two-week period, the trainee will be officially enrolled in the OJT program.

Professional positions such as accountant, engineering technician, office administrator, or document control will also be available as part of the OJT program. FRMG will cross-train these participants so they have the initial skills to work in an entry-level position. A recent graduate engineer can assist experienced engineers to gain valuable experience.

Upon graduation from one OJT program, participants can enroll in another OJT track. In addition, every Subcontractor working on the job with classifications that align with the OJT