



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
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program can enroll one to three employees. Going through the OJT program more than once helps trainees build additional skills and increases their marketability. In addition, it provides our team and Subcontractors with a future employee who has a variety of skills at his or her disposal.

Additional Local Training Programs

Additional resources exist within the surrounding neighborhood and region that will help FRMG supplement the existing CCA OJT program. **Our team will engage with the following organizations to determine partnerships and resources that can provide training for the Central 70 workforce:**

- **Colorado Construction Institute, Elyria/Swansea**
 - Construction education and job placement
- **Community College of Aurora**
 - Diesel mechanic and office/accounting
- **Community College of Denver**
 - Welding, office/accounting, pre-engineering, drafting
- **Construction Industry Training Council**
 - Electrician, plumbing/pipe-fitting, carpentry, sheet metal
- **Denver Joint Electrical Apprenticeship Training**
 - Electrical industries
- **Emily Griffith Technical College**
 - Welding, drafting, office, pre-apprenticeship
- **Front Range Community College**
 - Welding, draft, other certificate programs
- **Independent Electrical Contractors, Rocky Mountain Chapter**
 - Electrical industries
- **Pickens Technical College, Aurora**
 - 50 certificates available including CAD, HVAC, welding

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Workforce Development Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

2.c Monitoring

FRMG’s OJT Administrator will be responsible for tracking hours and assuring the training and work is performed. Through their time sheets, trainees will record the number of hours they have compiled within the training activities in their individual programs. Each trainee will have to fill out a form confirming enrollment in the OJT program and will be provided detailed information regarding the necessary training hours to graduate. The CRPM will verify the accuracy of the hours of training through payroll and the trainees’ supervisors.

The CRPM and his team will monitor and record hours worked and compare these to the hours left on the Project to ensure the team is tracking toward the training goal. Through continuous, diligent, accurate monitoring, our team can receive early warning and see any trends that require immediate attention. Additional information about recovery methods can be found in Section 2.f.

Trainees graduate from the OJT program when they have completed all the required hours associated with their training track. Additional information about graduation from the OJT program can be found in Section 2.d.

FRMG will submit the Federal OJT Monthly Reporting Form to the Department’s Office of Civil Rights. The monthly reporting form, comprising information from the tracking report, will include total labor hours expended on the Project to date. It will also include a list of trainees/apprentices by providing full name, employer, work code, start date, skilled craft program registered with verification of enrollment, pay rate, total hours worked to date on the Project, and supervisor’s full name.

FRMG will use the Department’s Forms 832 and 838 in accordance with Exhibit P of the Contract in tracking the OJT program.

FRMG will provide each trainee with a certification showing the type and length of training satisfactorily completed.

FRMG understands that the Department may withhold the monthly Project payment, or a portion thereof, until the monthly report has been provided to the Department for the payment period.

Alleviating Barriers to Employment, Graduation, and Placement

FRMG is committed to training OJT participants through the course of the Central 70 Project so that they can obtain the skills necessary to be successful on other jobs and benefit from stable, well-paid employment. Our team will be proactive about identifying OJT opportunities early in the life of the Project and communicating those to prospective employees. In this way, FRMG will have positions on the Project available for trainees upon completion of the OJT program. In addition, FRMG will work with Subcontractors to identify classifications so graduates can receive referrals upon successful program completion. This investment in our prospective employees and OJT trainees is an investment in our Project and an investment in the construction industry.



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

FRMG has identified below some of the major barriers for prospective employees, along with a broad range of existing resources within the construction footprint that can assist employees in overcoming barriers:

- Do not own resources or tools needed to begin a job in construction, including steel-toed boots and other personal protective equipment
- Do not have adequate daycare
- Do not have access to affordable or nearby public transportation
- Are not native English speakers or do not speak any English

FRMG will partner with the resources listed in **Table 5** below to guide employees to their services. In each of these instances, FRMG will work on a case-by-case basis with each employee to identify barriers and find solutions to alleviate them. Employees will still need to meet basic requirements to be accepted on to the Project, such as being able to pass a drug test and literacy. However, FRMG will work with individuals to determine other eligibility criteria for employment.

A member of the Project team who is bilingual or an on-call translation service for Spanish speakers will be available to alleviate language barriers. All OJT program sessions will be offered in both English and Spanish.

The resources list also will be provided to all superintendents and foremen to let them work with individuals they believe need assistance. FRMG is arming our Project staff with the knowledge and resources they need to point trainees in the right direction. We will emphasize that Project personnel refer employees to the Workforce Development team as well.

FRMG will assist in providing necessary tools that craft workers will need to get up and running in the OJT program including the provision of personal protective equipment to all workers on-site.

Table 5. Resource List

Resource	Job Search / Interview Prep	Housing	Transportation	Child Care	GED / High School Equivalency	Veteran Services	Food / Clothing / Personal Needs	Equipment / Tools
Arapahoe/Douglas Works!	X	X	X	X				
Adams County Housing Authority	X	X			X			
Aurora Housing Authority		X						
Beau Matthews Center for Excellence	X	X						
Break Careers Pathway Collaborative Empowerment Program (focus on ex-offenders)	X							
Catholic Charities of Denver	X	X		X			X	
Center for Work Education and Employment	X						X	



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
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Resource	Job Search / Interview Prep	Housing	Transportation	Child Care	GED / High School Equivalency	Veteran Services	Food / Clothing / Personal Needs	Equipment / Tools
Colorado Department of Labor and Employment – Denver Office of Economic Development		X	X	X		X		
Community College of Denver			X	X				
Community Development Food Distribution Center		X					X	
Community Reentry Project	X	X	X				X	
Denver Housing Authority	X		X	X				
Denver Human Services	X	X	X	X			X	X
Denver Indian Center (for Native American communities)	X						X	
Denver’s Road Home – Employment Subcommittee	X	X						
Denver Workforce Services, Montbello	X							
Denver Works	X						X	
Dress for Success, Denver	X						X	
e-Colorado	X	X	X			X		
Eastside Workforce Center	X							
El Centro Humanitario	X							
Families Forward Resource Center				X			X	
Far Northeast Neighbors, Inc.							X	
Front Range Economic Strategy Center (FRESC)	X	X						
Gathering Place	X						X	
MiCasa Resource Center	X		X		X			
Mile High 2-1-1	X	X	X	X	X		X	
Mile High Connects		X	X					
Mile High United Way		X		X	X		X	
Northeast Transportation Connections			X					
St. Francis Center	X	X					X	
Turnabout Inc. (ex-offenders services)	X							
Urban Peak	X	X					X	
Veterans Administration Community Workforce Training	X						X	
Volunteers of America	X	X		X		X	X	



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
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Working with Returning Veterans

Veterans returning from deployment face particular barriers to employment that other prospective employees might not. Many veterans returning from service have a difficult time transitioning to civilian life. They might not have the qualifications to apply for certain jobs, or they have difficulty seeking out education or training. Veterans require particular resources and information to make a smooth transition to life after service. In Colorado alone, there are more than 440,000 veterans, and each month, 60 to 70 veterans return to the state, according to a [November 18, 2016 article by The Denver Post](#).

FRMG is committed to assisting veterans by connecting them with resources that include:

- Job search assistance
- Pre-employment and job preparedness
- Education and training
- Case management and other support services
- Life skills



FRMG will put an emphasis on considering veterans for placement on the Project by partnering with the Colorado Department of Labor & Employment’s Veterans Employment Program to communicate and engage with job-seeking veterans. We will post new job openings on ConnectingColorado.com and register as an employer on HireaColoradoVet.gov to ensure veterans are receiving updates about opportunities to participate on the Project.

Additional Benefits of FRMG’s OJT Program

Trainees who complete FRMG’s OJT program will receive a compensation adjustment once they have graduated the program and take on a job on the Project. This is an added incentive for individuals pursuing training through FRMG’s OJT program.



In addition, FRMG’s team members are local companies; even after this Project concludes, our teams will continue to have opportunities for job placement. **Because of the depth of our team and the size of the companies who comprise FRMG, not only are there opportunities within the State of Colorado, but throughout the country, and on projects that range in type: highway, high-speed rail, bridges, airports, tunnels, and wastewater treatment.** There are more opportunities for OJT graduates with each of FRMG’s team members, opening up a path to long-term employment and career advancement.

We will also provide opportunities for trainees to in the OJT program in a different classification upon completion of another. FRMG wants our employees to constantly seek to better their marketability and their skill sets, bettering the Project and the work we produce.

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Workforce Development Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

2.d Approach to Graduating Participants

FRMG’s team members will use a proven mentoring approach to increase OJT program graduation rates. Experienced personnel on FRMG’s project team, including superintendents and foremen, will be tasked to guide, assist, and encourage each trainee to complete the program. Individual trainees will be paired with an appropriate mentor, in a ratio of no more than three trainees to one mentor, who will check in with them regularly to make sure they are receiving the proper amount of training and opportunities to graduate the program.

Mentors will meet with trainees during toolbox meetings, normally held first thing on Monday mornings, and provide guidance and assistance as needed. Mentors will also ensure that trainees understand all facets of their position, including the upkeep and maintenance of their equipment and vehicles.

While the onus is on the trainee to be held accountable for their progress, FRMG will provide assistance and guidance from experienced field personnel. Our Project staff will not only provide the technical skills trainees need in order to graduate, but also impart an overall understanding of how to conduct themselves in the workplace. This will include reporting to work on time and ready to work with all their necessary, tools, equipment, and safety gear.

We will continue to evaluate the hours and opportunities throughout the Project to identify a target number of graduates. FRMG anticipates graduating approximately 75% of trainees each year. This number will evolve based on the opportunities available, the employees’ hire dates, and the current and upcoming scopes of work. Based on initial construction estimates, our target for graduated trainees is 80, depending on the number of qualified, skilled craft available in the marketplace vs. the number of potential employees who need in-depth training.

		Central 70 Project Draft Workforce Development Plan	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Reviewed by:
Approved by:		Release Date: TBD	

2.e Annual Schedule of Training Hours

FRMG’s annual schedule of training hours over each Contract Year for the duration of the Construction Period is as follows in **Table 6**:

Table 6. Annual Schedule of Training Hours

Year	Hours
2017	8,000
2018	56,000
2019	46,000
2020	34,000
2021	32,000
2022	24,000
Total	200,000

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Workforce Development Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

2.f Recovery Tools and Methods

FRMG is committed to the overall attainment for the Construction Period OJT Goal of 200,000 employment hours. Training hours will be managed much like schedule or cost: Should we lag behind toward the Construction Period OJT Goal, our team will focus on the remaining portion of hours to get the goal back on track.

The CRPM and his team will monitor and record OJT hours worked; each month, they will compare these to the progress against target annual training hours, as well as the hours left on the Project to ensure the team is tracking toward the training goal. Subcontractors will perform the same monitoring processes and report back to FRMG's CRPM. Through continuous, diligent, accurate monitoring, our team can receive early warning and see any trends that require immediate attention.

The Department is an integral part of the WDP. FRMG commits to hosting progress meetings and working closely with the Department to keep lines of communication transparent and open. FRMG also has scheduled meetings, including the Lead Contractor monthly meeting, that will allow Key Personnel and other decision-makers to discuss progress toward the overall goal attainment. This provides an opportunity for the CRPM to report progress to the Lead Contractor and to assist in developing timely strategies if the team is behind on its goal. In this way, any issues can be addressed quickly and effectively.

Some of these strategies include proactively scheduling outreach events with the Department and our partners to increase participation in and education of the OJT program and its benefits. In addition, FRMG will return to the process described in Section 1.d, and immediately reach out to our Subcontractors to identify opportunities that can be filled for their scopes of work.

With individuals enrolled in the OJT program, the CRPM, if necessary, will develop a plan regarding lack of performance. If a trainee is terminated or leaves the program, FRMG will make a good faith effort to replace the trainee within 30 calendar days of the termination. We will keep a list of interested candidates to refer to in the event of a job opening. In addition to submitting monthly reports, we will submit an updated plan semi-annually, as well as an assessment of current OJT participation and revised schedule with activities to ensure the goal is met.

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Workforce Development Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Reviewed by:
Approved by:		Release Date: TBD	

3. Local Hiring Plan

3.a Strategic Approach for Meeting the Local Hiring Goal

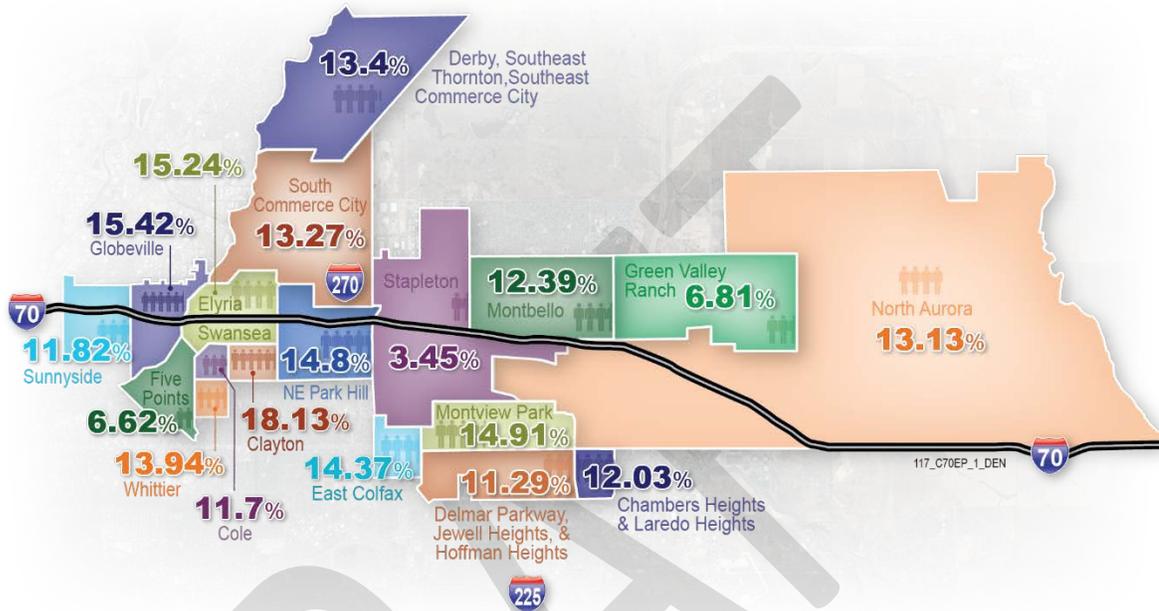


Figure 1. Unemployment Rates along the I-70 Corridor. (Source: Community College of Denver, Center for Workforce Initiatives)

The Community College of Denver Center for Workforce Initiatives’ August 2016 paper, “Community Job Readiness and Workforce Assessment,” details the unemployment rates for the above neighborhoods adjacent to the I-70 Corridor. Such potential for local hiring in these Denver metro area neighborhoods provide a pool of prospective employees for this Project — approximately 178,000 individuals over the age of 18.

FRMG’s strategic approach for meeting the Local Hiring Goal includes focusing on the targeted local areas for recruitment, working with DBE-staffing agencies to help source jobs, offering prospective employees resources for job placement, and proactively identifying jobs to be sourced with local labor. Additionally, FRMG will establish a length of employment and estimated schedule of the distribution of hours for the Construction Period for local hires.

The area within the construction footprint that will be targeted comprises the following zip codes: 80010, 80011, 80019, 80022, 80205, 80207, 80211, 80216, 80221, 80238, 80239, 80249, and 80266. Targeted local hire individuals include:



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

- Current residents who have lived within the geographic areas listed above for at least 60 consecutive calendar days
- Former residents who lived within the geographic areas listed above for at least 180 consecutive calendar days, provided that their residency ended no more than one year prior to the agreement date
- Displaced residents who were subject to right-of-way relocation

As discussed in 1.c. above, job openings will be advertised locally in a variety of methods – website, phone calls, social media, Department-approved workforce development organizations, Entravision Communications partnership, community resources, and working with local schools. The on-site office will specifically provide a designated computer local workers can use to apply for positions and personnel will be available to answer their questions about the Project. The advertising strategy will underscore the push for local hiring and providing information on the OJT opportunities. The outreach events held within the construction footprint, also discussed in Section 1.c., will have a particular focus on recruiting local candidates.

Table 7 below identifies the jobs targeted for recruitment, estimated length of employment for each, and distribution of hours. The numbers are in full-time equivalents for one year (e.g., 1 = full-time position for a full year).

Table 7. Targeted Jobs for Local Hiring Goal

Job Classification	# of Local Hires (New Hires)				# of Local Hires (Other)			
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Administrative		1			1			
Engineering/CAD/Drafting*		1			1			
Warehouse/Material Handling		1						
Carpenter**		6			2			
			5		6			
				1			1	
								1
Concrete Finisher†		1			1			
Ironworker		1			1			
			1				1	
Laborer‡		4			6			



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

			8			8	
			8			5	
			1				
Operator		2			3		
		4			4		
		4			2		
Teamster		1			1		
Electrician		1			1		
		1			1		
Traffic Signal Tech		1			2		
		2			2		
		2			1		
		1					

* We plan to hire one engineer/CAD/drafter new hire for a total of one year, beginning in Year 2

** We plan to hire six carpenter new hires for a total of three years, beginning in Year 2. We plan to hire five carpenter new hires for a total of two years, beginning in Year 3. We plan to hire one carpenter new hire for a total of one year, beginning in Year 4

† We plan to hire one concrete finisher other hire for a total of three years, beginning in Year 2.

‡ We plan to hire six laborer other hires for a total of four years, beginning in Year 1. We plan to hire eight laborer other hires for a total of three years, beginning in Year 2. We plan to hire five laborer other hires for a total of two years, beginning in Year 3.

FRMG will work with DBE-certified staffing agencies, such as BCM Global and Cephers Enterprises, to coordinate all efforts to build the workforce for the Project. This both increases DBE participation and assists FRMG in meeting its Local Hiring Goal for workforce development. In particular, FRMG will look to these staffing companies to fill slots in administrative support, including general administrator/receptionist, safety, safety administrator, document control personnel, and quality technician. Our past experience has shown that this leads to simple yet sustainable growth. For example, after hiring an individual as a basic receptionist, FRMG can train that person to be a safety administrator and hone the worker's skills to transition into a documents control administrator or other opportunities as they arise.

Information about the applicant's residency, ethnicity (optional), and household income (asked as a multiple-choice question) will be used to capture information about prospective local hire individuals, in particular about their interest and capability in performing the job for which they are applying.



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

Local physical resource center buildings, such as recreational centers, churches and other places of worship, schools, and other gathering places will provide a variety of methods to use existing channels of communication, letting us begin to develop and maintain partnerships to ensure our objectives for workforce development are aligned and supplement each other.

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		<h2 style="text-align: center;">Central 70 Project</h2> <h3 style="text-align: center;">Draft Workforce Development Plan</h3>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Reviewed by:
Approved by:		Release Date: TBD	

3.b Assistance to Prospective and Local Employees

To achieve a successful program for local hiring will require utilizing all available resources to not only assure that local candidates are aware of positions and ready for them, but also to create an ongoing support strategy to enable long-term employment success.

The Workforce Development Organizations and Resource Matrix discussed in Table 1 and the Additional Resources in Table 2 of 1.c provide many services for assisting local hiring candidates. A specific focus will be placed on assuring that the candidates discussed in 3.a. receive briefings and all necessary materials to take advantage of these resources.

As discussed in section 2.c above, FRMG has identified some of the major barriers for prospective employees, along with a broad range of existing resources within the construction footprint that can assist employees in overcoming barriers:

- Do not own resources or tools needed to begin a job in construction, including steel-toed boots and other personal protective equipment
- Do not have adequate daycare
- Do not have access to affordable or nearby public transportation
- Are not native English speakers or do not speak English at all

The barriers to training program graduation and permanent placement that were addressed in Section 2.c are very similar to those that local employees will face. Some of the additional workplace competency skills offered will include personal assessment, preparation for entry into nontraditional employment careers, safety instruction (OSHA 10, OSHA 30 certificate program), environmental education and remediation, and other job retention skills.

A customized plan of employment will be designed by the CRPM to personalize the employment relationship between the employer and the local hire in a way that meets the needs of both. **The customized plan will promote hiring and employee retention. Employees hired through this program will be placed on a follow-up plan that provides contacts early and often to enhance successes and find options for improvement.** This will include connecting them with those local organizations and agencies that provide support services to identify on a case-by-case basis the needs of each prospective local employee who applies for a job on the Project. These organizations are further discussed in Table 5 in Section 2.c of this plan.

As mentioned earlier, FRMG’s team members are local companies; even after this Project concludes, our teams will continue to have opportunities for continued job placement. There are more opportunities for locally hired employees with each of FRMG’s team members, opening up more long-term employment options for a prospective employee and incentivizing retention over the life of the Project and beyond.





Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	



FRMG’s CRPM will coordinate with the Project Communications Manager to identify opportunities for employees’ families to participate in events sponsored and hosted for the Project. These would include participation in the Cover design work, or assisting in local community Project outreach efforts. **Engaging our locally hired employees in this way will bolster and promote neighborhood legacy pride that will be created from the Project.**

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	<h2 style="text-align: center;">Central 70 Project Draft Workforce Development Plan</h2>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

3.c Monitoring and Tracking Hours

FRMG is committed to meeting or exceeding the Local Hiring Goal of 760,000 total contract employment hours, with a minimum of 380,000 hours by new hires. The human resources and payroll departments will be integral in capturing and tracking information for employees whose participation on the Project counts toward the Local Hiring Goal will be key to ensuring accurate monitoring and tracking of hours worked.

We will track the Local Hiring Goal similarly to our approach to monitor the overall WDP performance as described in Section 2.f. The CRPM and his team will monitor and record local hire hours worked. Each month, they will compare these to the progress against target annual hours, as well as the hours left on the Project, to ensure the team is tracking toward the Local Hire Goal. Our early warning system will immediately alert us if we are not on track for meeting our goal. In this way, FRMG will identify any trends immediately that need to be rectified and implement proper measures to recover toward our goals.

The payroll department will use JD Edwards’ software to both engage in standard payroll procedures and assist in tracking an employee’s hours once they have been accepted on to the Project workforce. Local hire program employees’ entries in JD Edwards will be identified and contain the following information, which will assist FRMG in accurately tracking and reporting its hours to the Department:

- Zip code
- Residency status (current, past, etc.)
- Renter/homeowner
- Proof of residency (e.g., utility bill)
- Area of employment:
 - Skilled craft
 - Professional services
 - All other employment
- Hire date
- Race
- Gender
- Likelihood to continue working on this Project in the next 12 months

The human resources department will develop a coding system for Local Hire participants that will capture information about each employee’s ethnicity (optional) and residency status so data can be accurately collected from the start of the Project while still maintaining employees’ privacy and confidentiality. Time sheets, check-ins with a supervisor, or work hours tracking through an internet portal (depending on the job performed) will go toward monitoring and tracking hours toward the Local Hiring Goal. The coding system will be rolled out to employees and Subcontractors to implement on timesheets and other paperwork. **Table 8** shows the initial codes to be utilized:



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

Table 8. Coding System for Local Hire Tracking

Three-Letter Code	Definition	Objective
ZIP	Zip code	Ensure the following zip codes are represented for current, former or displaced residents: 80010, 80011, 80019, 80022, 80205, 80207, 80211, 80216, 80221, 80238, 80239, 80249, and 80266
CUR FRM DSP	Residency status: Current, Former, Displaced	Track whether employees are current residents, former residents, or displaced residents of the zip codes listed above
SKL PRF AOE	Employment area: - Skilled craft - Professional services - All other employment	Ensure valid employment is tracked

Each month, a report (shown in **Table 9**) will be pulled from JD Edwards’ software to fulfill the requirements of FRMG’s annual reports to the Department:

Table 9. Annual Reports to the Department

Report	Frequency	Objective
Local Hiring Program Reports	Monthly No later than the 10th Working Day of each month during the Construction Period	Total employment hours expended during the Construction Period to date separated into skilled craft employment hours, professional services employment hours, and all other employment hours New hires Projected Local Hiring hours to be utilized during the Construction Period How FRMG intends to remedy shortfalls toward the Local Hiring Goal Information on newly employed locally hired individuals within that month Performance problems



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
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Report	Frequency	Objective
Semi-annual Assessment	To be determined with the Department	Overall effectiveness of solicitation for Workforce Development Program
Annual Performance Progress Review	30 calendar days before the end of each Contract Year	Review progress toward achieving Workforce Development Goals
Final Report	Within 30 calendar days of the substantial completion date	Total participation data through substantial completion

The Department may review personnel files, as well as interview any individual employed by FRMG or its Subcontractors, to verify employment records and information.

Subcontractor Participation

As discussed in Section 1.d, FRMG will engage with our Subcontractors to achieve the 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.

In particular for local hiring, we expect our Subcontractors to implement a similar process for vetting and hiring candidates from the selected zip codes (80010, 80011, 80019, 80022, 80205, 80207, 80211, 80216, 80221, 80238, 80239, 80249, and 80266). A 90-day probationary period will allow prospective employees to ensure they are a good fit for the team and this Project. An extensive interview, which includes time with human resources, the lead superintendent, the Project manager, and one of our chief estimators, will allow us to properly vet personnel for both the Construction Period OJT Goal and the Local Hiring Goal.

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Workforce Development Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
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3.d Compliance with Residency Requirements

There are several keys to ensuring compliance with the residency requirements per the Department. The area within the construction footprint that will be targeted comprises the following zip codes: 80010, 80011, 80019, 80022, 80205, 80207, 80211, 80216, 80221, 80238, 80239, 80249, and 80266. In addition, the worker must perform a function on the Project as either a skilled or non-skilled laborer. Targeted local hire individuals include:

- Current residents who have lived within the geographic areas listed above for at least 60 consecutive calendar days
- Former residents who lived within the geographic areas listed above for at least 180 consecutive calendar days, provided their residency ended no more than one year prior to the agreement date
- Displaced residents who were subject to right-of-way relocation

The Department will also assist ensuring compliance with the residency requirements and participation toward the Local Hiring Goal. The Department will provide Acceptance for proposed local workers whose submittals are deemed satisfactory — that is, filled out accurately and completely to the best of the worker’s and FRMG’s knowledge, and in accordance with the requirements of the Local Hiring Goal:

- Completed Local Hiring Program Enrollment Form
- Self-Certifying Residency Disclosure Form
- Additional adequate documentation to prove current or prior residency as the Department requires

The Department will be notified if an accepted current resident worker no longer meets the eligibility requirements within 14 calendar days of employer obtaining knowledge of the local worker’s new residency status. FRMG may seek Acceptance for the worker to count as a former resident if eligible.

We will ensure local hire compliance through employees’ timesheets; this reaffirmation from employees will help us ensure they have not changed their residency status. Failure to report such changes would be subject to termination. There will also be weekly spot checks by the Workforce Development team, and at least every six months, employees must specifically re-establish their residency. A similar certification will be submitted by Subcontractors with every payment request.

FRMG or its Subcontractors will not displace or terminate any existing employees as a result of the Local Hiring Goal.



Central 70 Project Draft Workforce Development Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Reviewed by:
Approved by:	Release Date: TBD	

4. Plan Updates

FRMG’s WDP is intended to be a living document and will be updated or revised as necessary during the course of the Construction Period, including as requested by the Department. At a minimum, FRMG will update the WDP and submit to the Department for Approval no later than 30 Calendar Days prior to the commencement of each Contract Year.

FRMG will submit monthly reports that will include employment hours expended during the Construction Period, a list of current and new trainees/apprentices, any performance problems and graduates.

FRMG’s semi-annual assessment will be a summary of solicitation and good faith efforts to date. These could include OJT milestones reached or evidence that a graduate from either training program has since worked at least six months as a full-time skilled craft worker.

FRMG will submit an Annual Performance Progress Review accompanied by an annual meeting with the Department to review progress.

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APPENDIX L

DRAFT WORKFORCE DEVELOPMENT PLAN



CENTRAL 70 PROJECT
PUBLIC DISCLOSURE
Administrative and Technical Proposal:



APPENDIX M
DRAFT ENVIRONMENTAL
COMPLIANCE WORK PLAN
CONNECTING COMMUNITIES



Draft
Environmental Compliance Work Plan
For
Central 70 Project

Prepared By:
Front Range Mobility Group

	<h1>Central 70 Project</h1> <h2>Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Table of Contents

Executive Summary.....	1
1. Introduction	2
1.1. Project Overview.....	3
1.2 Organization and Content of the Draft Environmental Compliance Work Plan	8
2. Plan Components.....	10
2.1 General Requirements.....	10
2.1.1 Goals and Compliance Requirements.....	12
2.1.1.a Environmental Elements of the Record of Decision: Mitigation Measures and Other Environmental Commitments.....	16
2.1.1.b Environmental Elements Assigned to FRMG and the Department	19
2.1.1.c Environmental Law and Environmental Approvals	19
2.1.1.d Means and Methods to Meet Environmental Requirements	24
2.1.1.e Tracking and Documenting Environmental Compliance Status, Progress and Completion.....	49
2.1.1.f Process Control and Independent Quality Control.....	66
2.1.1.g. Communication of Environmental Progress, Completion and Compliance and Document Control	70
2.1.1.h Roles, Responsibilities and Qualifications of the Environmental Manager and Environmental Management Team.....	72
2.1.1.i Uses of the Discipline Specific Management Plans	78
2.1.1.j Frequency and Purpose of Environmental Field Reviews.....	79
2.1.1.k How Site Specific Construction Activities will meet all Environmental Requirements.....	79



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Draft Environmental Compliance Work Plan Attachments

Attachment 1 - Environmental Compliance Tracking Matrix (ECTM)

Attachment 2 - Selected Examples of Environmental Compliance Documents

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Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Acronyms and Abbreviations

APCD	Air Pollution Control Division
APE	Area of Potential Effect
APEN	Air Pollutant Emission Notice
AQ3MP	Air Quality Monitoring, Maintenance and Mitigation Plan
ATC	Alternative Technical Concept
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe
BRMMP	Beneficial Reuse and Materials Management Plan
BRPS	Benefited Receptor Preference Survey
BTPD	Black-Tailed Prairie Dog
CABI	Certified Asbestos Building Inspector
CAD	Computer-aided Design
CASDP	Construction Activities Stormwater Discharge Permit
CCD	City and County of Denver
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
CFR	Code of Federal Regulations
CNMMP	Construction Noise Mitigation and Monitoring Plan
COC	Contaminants of Concern
CPCM	Construction Process Control Manager
CPW	Colorado Parks and Wildlife
CQP	Construction Quality Procedure
CR	Constructability Review
dBA	A-weighted decibels
CWA	Clean Water Act
DBFOM	Design-Build-Finance-Operate-Maintain
DNCE	Diesel Nonroad Construction Equipment
DPCM	Design Process Control Manager
EAC	Environmental Audit Coordinator
ECC	Environmental Compliance Coordinator
ECMTP	Environmental Compliance and Mitigation Training Program
ECTM	Environmental Compliance Tacking Matrix



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

ECWP	Environmental Compliance Work Plan
EIS	Environmental Impact Statement
ELVIS	Engineering and Laboratory Vital Information System
EM	Environmental Manager
ESR	Environmental Status Report
FHWA	Federal Highway Administration
FEIS	Final Environmental Impact Statement
FRMG	Front Range Mobility Group
GPM	Gallons per Minute
HASP	Health and Safety Plan
IDQM	Independent Design Quality Manager
INWMP	Integrated Noxious Weed Management Plan
IQC	Independent Quality Control
IQCEM	Independent Quality Control Environmental Manager
IQCF	Independent Quality Control Firm
IQCM	Independent Quality Control Manager
ITS	Intelligent Transportation System
MMP	Materials Management Plan
MOT	Maintenance of Traffic
MS4	Municipal Separate Storm Sewer System
NAC	Noise Abatement Criteria
NCN	Nonconformance Notice
NCR	Nonconformance Report
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NTP	Notice to Proceed
O&M	Operation and Maintenance
OSHA	Occupational Health and Safety Administration
PA	Programmatic Agreement
PAL	Predetermined Action Level
P10	Particulate Matter of 10 Micrometers or Less in Diameter
PC	Process Control
QHP	Quality Hold Point
QMP	Quality Management Plan



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

RACS	Regulated Asbestos Contaminated Soil
RAMP	Remedial Action Management Plan
RCRA	Resource Conservation and Recovery Act
RFC	Release for Construction
RHM	Recognized Hazardous Material
ROD	Record of Decision
ROW	Right of Way
RTD	Regional Transportation District
SAP	Sampling and Analysis Plan
SB 40	Senate Bill 40
SCP	Stormwater Construction Permit
SHPO	State Historic Preservation Office
SPCC	Spill Prevention Control and Countermeasures
SSAP	Structure Survey Assessment Plan
SSAR	Structure Survey Assessment Report
SSCMP	Site Specific Preconstruction Mitigation Plan
SUDP	Sewer Use and Drainage Permit
SWMP	Stormwater Management Plan
TBD	To Be Determined
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
UF	Ultra Filtration
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WQCD	Water Quality Control Division



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

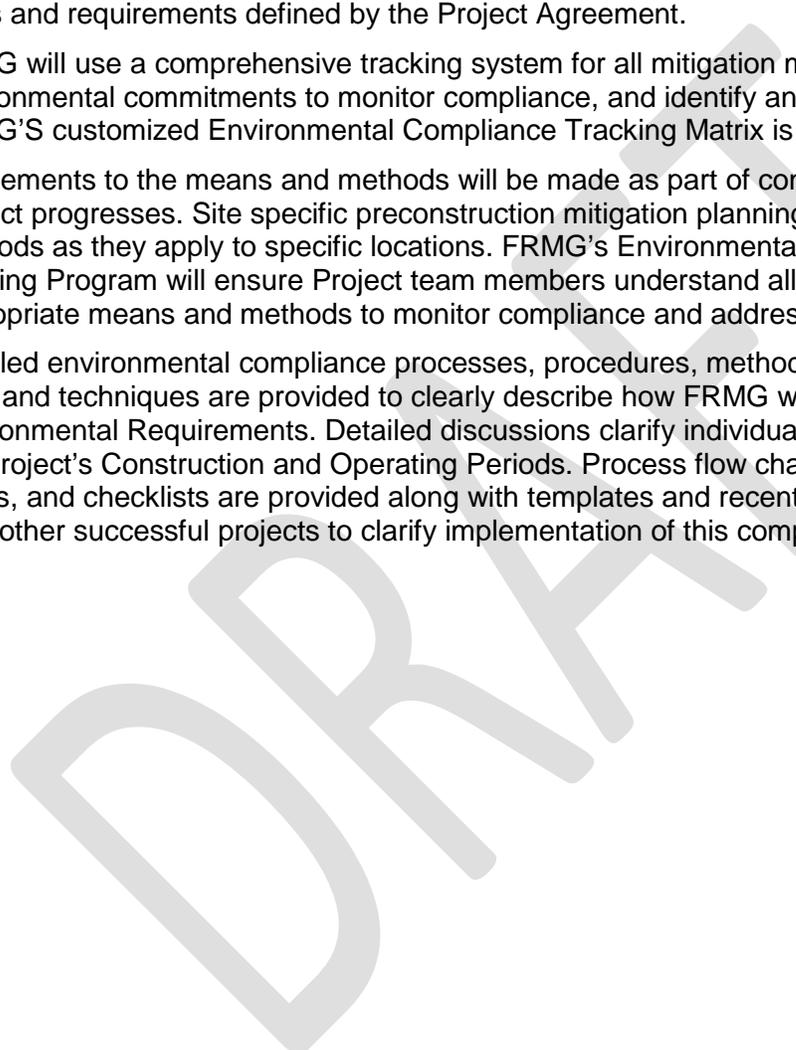
Executive Summary

The Front Range Mobility Group’s (FRMG) Draft Environmental Compliance Work Plan identifies the Environmental Requirements, commitments and goals for the Construction and Operating Periods of the Central 70 Project (Project) 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.

FRMG will use a comprehensive tracking system for all mitigation measures and other environmental commitments to monitor compliance, and identify and resolve noncompliance. FRMG’S customized Environmental Compliance Tracking Matrix is presented in Attachment 1.

Refinements to the means and methods will be made as part of continuous improvement as the Project progresses. Site specific preconstruction mitigation planning will apply the means and methods as they apply to specific locations. FRMG’s Environmental Compliance and Mitigation Training Program will ensure Project team members understand all applicable requirements and appropriate means and methods to monitor compliance and address noncompliance.

Detailed environmental compliance processes, procedures, methods, documents and other tools and techniques are provided to clearly describe how FRMG will comply with all Environmental Requirements. Detailed discussions clarify individual steps and requirements for the Project’s Construction and Operating Periods. Process flow charts, diagrams, summary tables, and checklists are provided along with templates and recent examples of deliverables from other successful projects to clarify implementation of this compliance program.



	<h1 style="margin: 0;">Central 70 Project</h1> <h2 style="margin: 0;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

1. Introduction

The Front Range Mobility Group’s (FRMG) Draft Environmental Compliance Work Plan (ECWP) identifies the Environmental Requirements, commitments and goals for the Central 70 Project (defined as Phase I: Partial Cover Lowered Alternative [Project]) and describes the means and methods to monitor compliance of work activities, deliverables and final outcomes to the applicable goals and requirements as specified in the Interstate-70 (I-70) East Record of Decision (ROD) 1: Phase 1 (Central 70 Project) and the Project Agreement. The FRMG approach acknowledges that the Department has delegated to FRMG all of the Colorado Department of Transportation’s (Department) obligations, commitments, and responsibilities for environmental management and environmental compliance in accordance with the requirements identified in the Project Agreement and all applicable Environmental Law and Environmental Approvals.

The Construction Period includes Construction Work in two stages:

1. The Final Design Stage as authorized under Notice to Proceed 1 (NTP1)
2. The Construction Stage as authorized with Notice to Proceed 2 (NTP2)

The Final Design Stage and Construction Stage will overlap during the Construction Period.

The Operating Period includes Operation and Maintenance (O&M) Work and Renewal Work. The operation of I-70 includes a variety of tasks necessary to keep the managed lanes and other existing and updated roadway facilities running properly after construction is complete. Renewal Work includes:

“maintenance, repair, reconstruction, rehabilitation, restoration, renewal or replacement of any Element (excluding any Element within or that forms part of the Limited O&M Work Segments) or part thereof that is not normally included, in accordance with Good Industry Practice, as an annually recurring cost in maintenance and repair budgets for transportation facilities (and associated equipment) of a similar nature and located in a similar environment to the Project.”

Environmental compliance for this Project will be tracked and documented during the Construction Period and Operating Period because this Project’s delivery method is Design-Build-Finance-Own-Maintain (DBFOM). DBFOM presents different environmental compliance protocol than traditional Design-Bid-Build delivery and Design-Build delivery. The major difference is that DBFOM delivery requires FRMG to handle Operating Period tasks.

The Project’s Final Environmental Impact Statement (FEIS) and Section 4(f) Evaluation, and ROD address a wide range of impacts and corresponding environmental commitments. This Draft ECWP describes how FRMG, working with the Department, the Federal Highway Administration (FHWA), City and County of Denver (CCD), other agencies, stakeholder groups, and the public will monitor compliance with all commitments to meet or exceed overall Project and environmental goals.

	<h1>Central 70 Project</h1> <h2>Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
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1.1. Project Overview

The following discussion provides background and descriptions of the Central 70 Project improvements.

Stakeholders of the Central 70 corridor have long been concerned about traffic congestion issues in the corridor, safety problems associated with the aging highway infrastructure, and continuing noise, air quality, and multimodal connectivity challenges faced by the adjacent residents and business community.

In 2003, the FHWA and the Department began preparation of an Environmental Impact Statement (EIS) for the I-70 Corridor from I-25 to Tower Road.

As stated in the EIS: “The purpose of the project is to implement a transportation solution that improves safety, access, and mobility and address congestion on I-70 in the project area.” Central 70, which was defined as Phase 1 of the I-70 East project, was allowed to advance as a stand-alone project because the segment has logical termini and operates with independent utility. The Project’s Phase 1 ROD, allowing the Project (Preferred Alternative: Partially Covered Lowered Alternative), to proceed to implementation, was signed on January 19, 2017.

I-70 is one of the most heavily traveled and congested highway corridors in Colorado. The EIS determined that four elements dictated the need for the Project: 1) transportation infrastructure deficiencies, 2) increased transportation demand, 3) limited transportation capacity, and 4) safety concerns.

The Project’s transportation infrastructure deficiencies are primarily a consequence of the aging viaduct. This structure was originally built in 1964 and has reached the end of its design life. The Metro Denver area continues to grow with the new National Western Center (NWC) complex; major redevelopment at Stapleton, Gateway, and Lowry; and high-density developments in the downtown Denver area resulting in increased transportation demands. East-west transportation corridors in this part of the Denver metro area are limited and are at capacity in the neighboring area. Safety concerns center on deficiencies created by the use of then current design standards which created inadequate acceleration and deceleration lengths, insufficient sight distance at entrance and exit ramps, insufficient shoulder widths, short traffic weaving areas, and inadequate roadway drainage.

The I-70 East project’s preferred alternative is the Partial Cover Lowered Alternative with Managed Lanes Option. The Central 70 Project implements the western segment of the I-70 East project. The 9.4-mile-long Project limits extend from just east of I-25 to just west of Chambers Road.

A signature feature of the Central 70 Project is the removal of the I-70 viaduct and reconstruction of I-70 as a lowered section between Brighton Boulevard and Colorado Boulevard. For approximately 1,000 feet, from Columbine Street to Clayton Street, the lowered



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

freeway is enclosed. In this area of the Project, known as the Lowered Section, the enclosed freeway will be constructed as a tunnel.

Tunnel-related safety features will be installed during construction including ventilation, fire suppression systems, continuous lighting, provisions for removal of surface drainage and groundwater, and traffic monitoring and control systems. On top of the Cover, park landscaping and outdoor recreational amenities will be installed for use by the community and the adjacent Swansea Elementary School.

To enhance connectivity of the neighborhoods north and south of I-70, multimodal and roadway connections will be constructed. Cross-connections are proposed at York, Josephine, Columbine, Clayton, Fillmore, Steele/Vasquez, Cook, and Monroe Streets, among others.

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		<h1>Central 70 Project</h1> <h2>Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0		
Approved by:	Revision Date:	Review by:	
Approved by:	Release Date: TBD		

From west to east, the Project corridor differs in the nature and complexity of the proposed improvements. To better understand the elements unique to each segment of the Project corridor, as shown **Figure 1**, FRMG has divided the Project into five Areas. Descriptions of each Area and its associated work elements during the Construction Period are discussed below. A discussion of the work elements during the Operating Period follow.

Figure 1. Project Corridor Areas.



Area 1 (I-25 to Colorado Boulevard)

Starting near the ramp gore east of I-25, Area 1 construction extends to just east of Colorado Boulevard. The first mile of the Project is the restriping of existing I-70 to develop the managed lane configuration. At this point, reconstruction of I-70 to create a lowered section continues for 1.6 miles to the east side of Colorado Boulevard. The total Project length in Area 1 is 2.6 miles.

The I-70 over Brighton Boulevard Bridge is where the elevated portion of I-70 begins to transition to the lowered section. FRMG’s Alternative Technical Concept (ATC) 65.2 shifts the alignment of I-70 to the north from that shown in the Project’s reference drawings. The realignment allows for the full construction of the lowered section of I-70 in a single phase by reducing overlap with the existing I-70 viaduct structure. Major Project features in Area 1 include:

- I-70’s managed lane is developed in the eastbound direction. The managed lane is on the inside of the general purpose lanes.
- Interchange improvements are constructed at Brighton Boulevard, Steele/Vasquez, and Colorado Boulevard. Brighton Boulevard and Colorado Boulevard will be full interchanges. Steele/Vasquez will be a half diamond interchange providing the eastbound exit ramp and westbound entrance ramp.



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- A portion of the lowered segment of I-70 will be enclosed. Recreational amenities will be constructed on the “Cover.” The I-70 design will accommodate an additional future Cover located between Steele and Cook Streets.
- In the lowered section, I-70 will be constructed with subsurface drainage barriers to limit the intrusion of groundwater.
- To preserve north-south multimodal neighborhood access, cross street connections will be provided at York, Josephine, Columbine, Clayton, Fillmore, Steele, Cook, and Monroe Streets. East-west connectivity of the community is accomplished by a couplet of 46th Avenue North (westbound) and South (eastbound, with some two-way segments). This connectivity of 46th Avenue North is broken at the Swansea Elementary School to provide direct pedestrian access to the Cover’s park from the school.
- The Union Pacific Railroad Bridge over I-70 near Brighton Boulevard will be constructed. The bridge serves the Railroad Company’s primary yards.
- Construction of a new bridge for the BNSF Railroad spur track next to Monroe Street.
- Implementation of a significant drainage system on the south side of I-70 to intercept and convey storm flows. The new drainage system will provide on-site detention and water quality features.

Area 2 (Colorado Boulevard to Sand Creek Bridge)

Area 2 of the Project begins immediately east of Colorado Boulevard. The profile of I-70 in Area 2 transitions from a lowered section to an at-grade portion ending at the Sand Creek Bridge. The total length of Area 2 is approximately 2.0 miles. Major Project features in Area 2 include:

- The I-70 alignment will be improved between Dahlia and Holly Streets to increase the highway’s design speed
- The frontage road system, Stapleton Drive North and South, is reconstructed. Bridges at Dahlia and Monaco Streets provide local connectivity between Stapleton Drive North and South.
- The Denver Rock Island Railroad crossing under I-70 east of Quebec Street is a switch yard for the railroad and will be maintained
- The I-70 bridges over Dahlia, Holly, and Quebec Streets are improved
- A new Holly Street Interchange provides full connectivity to I-70

Area 3 (Sand Creek Bridge to Havana Interchange)

Starting at the Sand Creek Bridge, Area 3 extends for approximately 1.5 miles to the Havana Interchange. Major Project features in Area 3 include:

- Mill and fill of the existing highway with full-depth widening along the edges
- Slope correction of the highway surface to provide proper drainage of the widened pavement section
- Reconstruction of the eastbound I-270 lanes to eastbound I-70

Area 4 (Havana Interchange)



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
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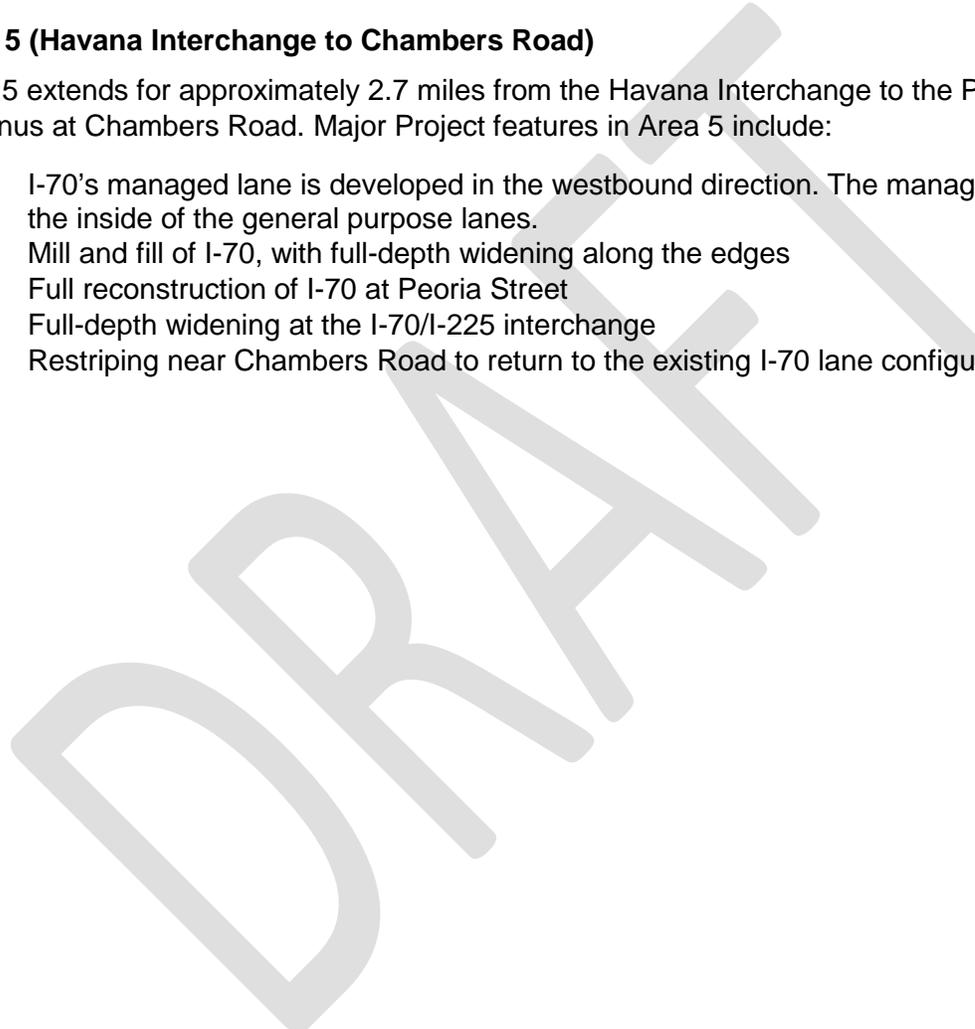
Area 4 is approximately six tenths (0.6) of a mile long and surrounds the Havana/I-70 Interchange which was recently reconstructed by the Department. Major Project features in Area 4 include:

- Restriping of I-70 to match the managed lane configuration of the Project
- Completion of roadway widening initiated on an earlier Colorado Department of Transportation (CDOT) project

Area 5 (Havana Interchange to Chambers Road)

Area 5 extends for approximately 2.7 miles from the Havana Interchange to the Project’s east terminus at Chambers Road. Major Project features in Area 5 include:

- I-70’s managed lane is developed in the westbound direction. The managed lane is on the inside of the general purpose lanes.
- Mill and fill of I-70, with full-depth widening along the edges
- Full reconstruction of I-70 at Peoria Street
- Full-depth widening at the I-70/I-225 interchange
- Restriping near Chambers Road to return to the existing I-70 lane configuration



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Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
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1.2 Organization and Content of the Draft Environmental Compliance Work Plan

The contents of FRMG’s Draft ECWP align with the organization and requirements of Schedule 17 of the Agreement and the sections headings specifically match the requirements defined in Section 2.1 General Requirements.

Section 1 Introduction summarizes the Project’s background, location and description and clarifies how the ECWP is organized.

Section 2 Plan Components is organized to match Schedule 17, Section 2.1.1, Subsections a. through k.

Section 2.1.1 Goals and Compliance Requirements provides the core elements of FRMG’s ECWP as follows:

- Sections 2.1.1 a, b and c: acknowledge all environmental elements and accept the final mitigation measures and commitments established by ROD 1: Phase 1, clarify responsibilities and present applicable environmental laws and approvals.
- Section 2.1.1 d provides details about FRMG’s overall compliance means and methods, introduces FRMG’s customized Environmental Compliance Tracking Matrix (ECTM), describes FRMG’s Environmental Compliance and Mitigation Training Program (ECMTP) and provides details about means and methods for individual technical disciplines. Landscape requirements are addressed under the individual means and methods discussions.
- Section 2.1.1 e provides an overview regarding FRMG’s compliance tracking and documentation processes and details about FRMG’s primary methods and discipline-specific means and methods during the Construction and Operating Periods. Section 2.1.1 e presents a summary of FRMG’s key environmental compliances processes and provides an ECWP section reference where related content is provided.
- Section 2.1.1 f clarifies environmental compliance process controls linking the environmental effort to the overall Process Control protocol established for the Project and corresponding linkages to the Project’s document control processes.
- Sections 2.1.1 g through k clarify how FRMG will communicate environmental progress and closeout, provide details about the roles, responsibilities and qualifications of the FRMG’s Environmental Manager (EM) and team members, clarify uses of the Discipline Specific Management Plans, provide details about field reviews and other site specific construction activities and how they ensure all Environmental Requirements will be met.
- A summary of the environmental deliverables is presented after Section 2.1.1 k.

The ECWP includes by reference all of the Discipline Specific Management Plans for Department Approval or Acceptance listed in Schedule 17, Section 2.1.2 and Table 17-5.

Attachment 1 presents FRMG’s ECTM. This matrix is a fundamental mechanism for tracking and reporting FRMG’s environmental compliance processes. Details about this tool are provided in Section 2.1.1.d Means and Methods to Meet Environmental Requirements and Section



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
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2.1.1.e Tracking and Documenting Environmental Compliance Status, Progress, and Completion.

Attachment 2 presents a selected set of environmental compliance documents referenced in this ECWP. Some of these documents are templates for FRMG deliverables and some of them are actual documents produced by FRMG’s environmental leaders for the ongoing C-470 Design-Build Project. The C-470 examples are presented in this ECWP to demonstrate the general nature and characteristics of anticipated Project deliverables. These examples are for illustrative purposes only and would be replaced in the Final ECWP and other as-needed updates of the ECWP, with customized versions of these documents developed in compliance with Project-specific requirements and protocol.

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2. Plan Components

2.1 General Requirements

The FRMG ECWP identifies the Environmental Requirements, commitments and goals for the Central 70 Project (Project) and describes the means and methods to monitor work activities, deliverables and final outcomes meet or exceed the goals and requirements defined by the Project Agreement.

As described in Section 1.1 of Schedule 17, FRMG and this ECWP 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 Project Agreement and all applicable Environmental Law and Environmental Approvals. FRMG is responsible for creating and communicating environmental awareness among all Project personnel, completing environmental tasks, implementing and monitoring environmental requirements, 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.

Section 2.1.1 Goals and Compliance Requirements, subsections a. through k. describe how FRMG will:

- a. Comply with all Environmental Law relevant to requirements of the Project Agreement
- b. Comply with all conditions and requirements imposed by all Environmental Approvals
- c. Comply with all conditions and requirements imposed by all other Governmental Approvals (including all Department Provided Approvals) and Permits
- d. Perform all commitments and mitigation measures set out in all Environmental Approvals, all other Governmental Approvals (including all Department Provided Approvals) and all Permits
- e. Monitor compliance with commitments and mitigation measures to meet or exceed project goals, and identify and resolve areas of noncompliance
- f. Pursuant to Section 8.4 of the Project Agreement, prepare all information and submissions required by, or necessary to maintain in full force and effect, all Department Provided Approvals and maintain in full force and effect all other Environmental Approvals

The ECWP complies with the environmental compliance requirements and commitments set forth in the following Contract Documents:

- Schedule 3 Commencement and Completion Mechanics
- Schedule 6 Performance Mechanism



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Schedule 8 Project Administration (Quality)
- Schedule 10 Design and Construction Requirements, specifically:
 - Schedule 10A (Applicable Standards and Specifications)
 - Schedule 10B (Contract Drawings)
 - Section 14.8.1 (Organization Chart)
 - Section 14.8.2 (Role of Process Control and Independent Quality Control Programs)
- Schedule 11 Operations and Maintenance Requirements
- Schedule 14 Strategic Communications
- Schedule 17 Environmental Requirements
- Schedule 18 Right-of-Way
- Schedule 29 Reference Documents associated with the ROD
- Applicable Standards, Data, Reports, and Reference Documents

As part of FRMG’s continuous improvement (Plan-Do-Check-Act) process for environmental management, FRMG will monitor and improve the effectiveness of this ECWP. Monitoring will occur informally on a daily, weekly, monthly and quarterly basis as the Project proceeds. Improvements to the environmental compliance process will be initiated immediately, as needed.

Examples of key improvements may involve:

- Refining individual compliance tracking line items in the ECTM to add new requirements and/or assure mutual agreement regarding what constitutes compliance during the Construction and Operating Periods and what completion/closeout requires
- Clarifying responsibilities and scheduling as the Project proceeds to ensure timely actions occur
- Updating applicable requirements if laws, regulations and/or guidance changes over time
- Modifying means and methods to improve compliance, Project delivery efficiency, and defensible documentation
- Adapting the ECTM and other efforts to streamline reporting or tightening tracking systems
- Adjusting quality procedures (e.g. corrective and preventative actions associated with potential nonconformance) or document control to improve process organization and processes associated with deliverables
- Updating staff expertise to address unanticipated issues or changes
- Developing of additional discipline specific details to assure technical accuracy and assure compliance

In accordance with Schedule 17, the ECWP will be updated if any of the following conditions develop:

1. A plan or procedure no longer adequately addresses the matters it was originally intended to address
2. A plan or procedure does not conform with the Project Agreement
3. An audit by FRMG or the Department identifies a deficiency in the ECWP requiring an update

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0		
Approved by:	Revision Date:	Review by:	
Approved by:	Release Date: TBD		

4. Organizational structure changes require revision to the ECWP
5. FRMG is undertaking, or about to undertake, activities that are not covered within the current ECWP

Interim needs for change are addressed at the monthly Environmental Task Force meetings. Attachment 2, Item 2 presents a template for an ECWP Monthly Addendum. All updates will clearly identify in a cover sheet what changes were made to expedite review and include a “redline” version of the ECWP, or the relevant parts thereof, together with an unmarked revised (“clean”) copy of the ECWP. The annual updates will occur upon the anniversary of initial Approval by the Department. When Project construction is completed, a Final ECWP will be submitted for Department Approval. As part of this submittal, the FRMG EM will certify that the Environmental Requirements have been completed. Additional updates, as needed, and reporting will continue through the Operating Period.

2.1.1 Goals and Compliance Requirements

FRMG is committed to delivering the Project in an environmentally responsible manner consistent with the Project’s goals and objectives as defined by the Department, while taking into consideration CCD interests and other stakeholder and public expectations. FRMG accepts the goals and objectives from the FEIS and related expectations, obligations, commitments and responsibilities for environmental management and environmental compliance in accordance with the requirements identified in the Project Agreement and all applicable environmental laws.

The Project Goals, as presented in the ITP, are as follows:

- Optimize the scope of transportation and supporting infrastructure delivered through the Project in order to promote corridor-wide economic and community vitality.
- Optimize operating and life cycle maintenance costs by delivering a Project using quality design, materials and techniques.
- Minimize impacts to the traveling public, businesses and nearby communities during and after construction.
- Once operational, ensure reliable travel speeds in the managed lanes and, for all lanes, a minimum appropriate standard of maintenance.
- Use a collaborative process to enhance community values and Project benefits.
- Protect the health and safety of the workforce and public.

These goals support the FEIS Project goals and objectives (as defined in the FEIS, Volume 1, Chapter 3, Exhibit 3-14) presented in **Table 1**.

Table 1. Project Goals and Objectives.

Goal	Objective	Responsive to Chapter 2, Purpose and Needs
Access <i>Provide for reasonable access to transportation facilities</i>	<ul style="list-style-type: none"> • Balance the need for access with adverse effects on system performance • Provide access to transportation facilities for a variety of users 	Increased transportation demand



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Goal	Objective	Responsive to Chapter 2, Purpose and Needs
	<ul style="list-style-type: none"> Facilitate connections between residential and business activity centers 	
Capacity <i>Provide for realistic capacity expansion and minimize future congestion</i>	<ul style="list-style-type: none"> Provide sufficient transportation system capacity to ensure the efficient movement of people Provide sufficient transportation system capacity to ensure the efficient movement of goods Minimize transportation system delay 	Limited transportation capacity
Community <i>Support community plans and avoid, minimize, and mitigate adverse effects to neighborhoods</i>	<ul style="list-style-type: none"> Maximize consistency with existing local, regional, and state plans Minimize adverse effects to residential, business, and institutional properties Minimize adverse economic effects to local businesses Address transportation-related community effects associated with air quality, water quality, hazardous materials, and noise 	Values: community concerns that may offset defined transportation needs
Environment <i>Avoid, minimize, and mitigate adverse effects to the natural, social, and cultural environment</i>	<ul style="list-style-type: none"> Minimize adverse effects to historic resources Ensure consistency with regional air quality model to help achieve federal and state air quality standards Minimize adverse effects on minority and low-income populations Minimize adverse effects to wetlands and other waters of the US Minimize adverse effects associated to recreational and open space resources Minimize public exposure to highway noise Minimize adverse effects associated with hazardous materials Incorporate design standards that minimize visual effects and enhance aesthetics 	Values: community concerns that may offset defined transportation needs
Implementation <i>Provide a cost-effective transportation solution that can be implemented</i>	<ul style="list-style-type: none"> Provide a cost-effective, long-term transportation solution Provide flexibility for future expansion and modification Provide technologies that are practical and implementable Maximize the opportunity that federal, state, local, and/or private funding will be available to fund improvements 	Limited transportation capacity
Infrastructure <i>Address deteriorating transportation infrastructure</i>	<ul style="list-style-type: none"> Address problems with maintenance and structural deficiencies on the I-70 viaduct and other structures Provide a transportation solution that addresses drainage and flooding effects 	Transportation infrastructure deficiencies
Mobility <i>Enhance mobility by providing transportation choices</i>	<ul style="list-style-type: none"> Enhance system reliability Balance the transportation needs of local, regional, and national users 	Increased transportation demand
Safety <i>Address safety needs and upgrade facilities to current standards</i>	<ul style="list-style-type: none"> Optimize safety and minimize crashes Conform with engineering design and safety standards and with standard practices for construction, maintenance, and operations Provide access for emergency response and evacuation situations 	Safety Concerns



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Goal	Objective	Responsive to Chapter 2, Purpose and Needs
Security <i>Provide a secure transportation system</i>	<ul style="list-style-type: none"> Minimize potential security threats to the National Interstate System Develop and maintain a transportation system that supports national homeland security objectives 	Safety Concerns

In support of the Project’s goals and objectives, FRMG identified the following environmental management and compliance goals in **Table 2**. These goals will be refined through discussion and mutual agreement with the Department at the start of the Project.

Table 2. FRMG Environmental Management and Compliance Goals.

Goal	Description
Partnership	Work cooperatively with FHWA, the Department, CCD and regulatory agencies to implement, track, monitor, and document compliance with all environmental mitigation measures and commitments as described in the Project Agreement and ROD through a comprehensive ECWP and ECTM (see Attachment 1) and work in partnership with stakeholders and the public to minimize impacts and develop understanding and project support
Deliver	Provide timely and high quality deliverables done right the first time for Department Acceptance and/or Approval
Specialize	Develop and implement means and methods to avoid, minimize and mitigate environmental impacts through collaboration, transparency and diligent performance
Collaborate	Coordinate with the design team to identify early any design changes that may result in additional environmental resource impacts and develop appropriate documentation in accordance with the Department, state and FHWA requirements
Comply	Assure fulfilment of commitments and that all environmental aspects of each Project period are completed in accordance with all applicable environmental laws and regulations, approvals and provisions of the Agreement. Identify and resolve areas of nonconformance.
Communicate	Create environmental awareness through effective communication to convey the importance of and requirements associated with environmental compliance are understood by all Project personnel
Innovate	Encourage feasible and cost-effective innovation to meet or exceed regulatory requirements
Lead	Fulfill FRMG’s stewardship responsibilities through communications, training, and awareness building among Project personnel, regulatory agencies, stakeholders, and neighbors

Table 3 on the next page presents FRMG’s specific ideas for exceeding Project goals and requirements. These proposed ideas require further elaboration and discussion with the Department. Following mutual agreement on any refinements, FRMG is committed to their implementation.

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0		
Approved by:	Revision Date:	Review by:	
Approved by:	Release Date: TBD		

Table 3. FRMG Ideas for Exceeding the Project Goals and Requirements.

FRMG Ideas For Exceeding Project Goals and Requirements	Description and Implementation Plan	Environmental and Community Benefits
Sustainability Plan	Prepare a Project Sustainability Plan that builds on CDOT’s sustainability program efforts, Environmental Stewardship Guide, and the Project’s standards and specifications as set forth in Schedule 10. Identify qualitative and quantitative metrics and goals. The Sustainability Plan would be implemented through agreeing on performance metrics and goals, and associated compliance monitoring and reporting. Refer to FRMG’s commitments to save energy in Section 2.1.1 d.	Reduced emissions, waste, energy use, water consumption and excessive use of materials through waste reduction, recycling, repurposing, and reuse
Construction and Demolition Debris Management Plan	As part of the Project Sustainability Plan described above, FRMG will implement requirements to promote the reuse, recycling and management of construction and demolition debris to divert from landfill disposal sites. The plan sets forth planning and reporting requirements to measure progress toward achieving construction and demolition debris diversion goals. It also sets forth certain required waste reduction measures. Specifically, the plan will: 1. Submit monthly Construction and Demolition Debris Recovery Worksheets; 2. Submit a final Construction and Demolition Debris Recovery Worksheet covering the entire Work; and 3. Implement waste reduction measures such as eliminating the procurement of unneeded supplies and reducing field office paper waste.	Reduce construction and demolition debris and promote the reuse, recycling and management of project-related debris
Construction and Operation Energy Conservation Plan	As part of the Project Sustainability Plan described above, FRMG will implement goals, policies and requirements to conserve energy during the Construction and Operation Periods. Specific elements of the plan will include: 1. Energy-Efficient Equipment And Energy-Saving Techniques; 2. avoidance of unnecessary idling of construction equipment; 3. consolidation and efficient scheduling of material deliveries; 4. promote commuting alternatives; 5. design and implement energy-efficient electrical systems for the project; and 5. ensuring proper maintenance of equipment and vehicles. The plan sets forth planning and reporting requirements to measure progress toward achieving construction energy conservation goals. Refer to Table 7 of this ECWP regarding additional commitments to conserve energy during the Construction and Operation periods	Reduce energy use and promote energy conservation during the Construction and Operation Period

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

2.1.1.a Environmental Elements of the Record of Decision: Mitigation Measures and Other Environmental Commitments

Central 70 Mitigation Measures

Exhibit 14 in Chapter 5 of ROD 1: Phase 1 presents the Central 70 Project mitigation measures status as of March 6, 2017 and corresponding responsibilities for implementation shared between the Department and FRMG. FRMG will use a comprehensive tracking system for all mitigation measures to ensure full compliance. FRMG will ensure that all mitigation commitments will be implemented, and the FRMG EM will track and report on their completion. The ECTM created for this Project incorporates and refines the basic CDOT Mitigation and Tracking Form and will use it through the design, construction, and operating and maintenance periods to monitor compliance with mitigation commitments.

Environmental compliance tracking and monitoring conducted during the Construction and Operating Periods are the primary means to effectively implement mitigation measures. If tracking and monitoring identify deficiencies, adjustments to the level, timing, and/or procedure of mitigation will be made accordingly. FRMG'S ECTM (Attachment 1) 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

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

Measures to Minimize Harm

The Measures to Minimize Harm in ROD 1: Phase 1 identify design commitments linked directly to the Project. These design commitments need to be considered when evaluating potential design changes. These commitments are summarized in **Table 4**.

Table 4. Measures to Minimize Harm from the Record of Decision: Phase 1

Subject	Commitment
Visual and Safety Impacts	<p>The final design for the Preferred Alternative will address visual impacts and increase safety, as follows:</p> <ul style="list-style-type: none"> • Reduce the visual presence of the existing viaduct in the neighborhoods, improve connectivity, and enhance safety. <p>Improve safety compared to the existing conditions by removing the viaduct. This eliminates the possibility for objects to fall from the structure, removes the dark space under the viaduct, and eliminates the unsafe crossings as they currently exist under the viaduct.</p>
Infrastructure and Neighborhood Disruption	<p>The final design for the Preferred Alternative will reduce infrastructure disruption, impacts to the surrounding community and the Project’s impact footprint, as follows:</p> <ul style="list-style-type: none"> • A 4% grade on I-70 will allow the highway to cross over Brighton Boulevard and under the UPRR Bridge without reconstructing the existing infrastructure west of Brighton Boulevard. A lower grade would cause additional impacts to the infrastructure west of Brighton Boulevard. • Reducing the typical section for 46th Avenue and Stapleton Drive to the greatest extent possible by removing excess width between I-70 and the frontage roads. • Adjusting the I-70 mainline geometry using a lower design speed as compared to the 2008 Draft EIS to minimize the highway footprint between Brighton Boulevard and Colorado Boulevard. [Note: This requires a change in posted speed as well]. • Using buffer-separated managed lanes rather than concrete barriers, because a concrete barrier requires additional shoulder width for both the general purpose lanes and managed lanes, but the striped buffer only requires a four-foot space between the two lane groups.” <p>Locating interchange ramps parallel to the I-70 mainline with walls to maintain adequate traffic operations while reducing impacts to the neighborhoods.</p>
Swansea Elementary School Impacts	<p>The final design for the Preferred Alternative will reduce impacts on Swansea School as follows:</p> <p>Reconnect the Elyria and Swansea Neighborhood, and improve community cohesion. This involves constructing the Cover over I-70, including an urban landscape on top with a base level of landscaping necessary to provide an active community space for surrounding residents and local neighborhoods, support social and pedestrian connections in the neighborhood, and provide additional space for the school.</p>
Right-of-Way/Relocation/Displacement (Funding and Financial Counseling for Displaced Persons) and Equity Impacts from Tolled Express Lanes	<p>The final design for the Preferred Alternative will reduce adverse effects on local residents and adhere to compensation commitments, as follows:</p> <ul style="list-style-type: none"> • To alleviate impacts to displacees who have inadequate financial resources, CDOT has provided funding to the Community Resources and Housing Development Corporation (CRHDC) for displacees who have inadequate financial resources. CRHDC will use these funds to assist residential and business displacees by providing financial counseling and helping them to procure financing for replacement properties and secure business and residential loans. All displaced residents and businesses will, in addition, be entitled to benefits provided under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act), as amended. <p>The financial burden of the tolled express lanes affecting the residents of Globeville, Elyria, and Swansea had led CDOT to determine there are potential equity impacts on low income and minority populations. CDOT will mitigate those impacts through the development of an</p>



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Subject	Commitment
	operational program and policies to reduce the burdens to those residents. The effort to address equity impacts for the financial burden of access to the tolled express lanes is CDOT's responsibility. As stated in the ROD, this <i>"will be mitigated by providing to eligible residents of Globeville, Elyria, and Swansea free transponders, pre-loading of tolls, or other means determined prior to the opening of the tolled express lanes. Eligibility and the duration of the program are expected to be determined based on factors including, but not limited to, residency, financial burden, number of vehicles per resident or household, etc. The entire program of I-70 East ROD will not go into effect immediately; however, the details of the program will be developed, with community involvement, nearer to tolling operations commencement. The initiation of these program actions is CDOT's responsibility and is anticipated to commence in the year 2022. As part of the program, all communities and stakeholders potentially affected will be invited to participate in the operational strategy development."</i>

Federal, State, and Local Permits and Approvals

Chapter 6 of ROD 1: Phase 1 clarifies how the Central 70 Project complies with federal and state environmental laws and regulations, permits, reviews, notifications, consultations, and other approvals. It also describes the federal determinations and other monitoring and enforcement requirements for the Project, including permitting and approval steps yet to be completed (see Section 2.1.1 c). ROD 1: Phase 1 Exhibit 17 provides a summary of permits and approvals necessary for the Project, but is not an exhaustive list. These permit and approval processes will be included in FRMG's ECTM presented in **Attachment 1**. As other permits and approvals are identified, they will be added to the ECTM.

Updates and Clarifications since Publication of the Final EIS

Chapter 9 of ROD 1: Phase 1 provides important technical updates and clarifications regarding the Project design, construction limits, environmental impact analyses and findings, and mitigation measures to address design conflicts and comments received during the National Environmental Policy Act (NEPA) public review period. The refined findings and commitments represent final conditions for incorporation into the design, and deserve special attention to ensure they are addressed.

The updates and clarifications added and modified the Project impacts and mitigation measures in the following technical areas:

- Transportation
- Environmental Justice
- Land Use
- Relocations and Displacements
- Historic Preservation
- Parks and Recreational Resources
- Biological Resources
- Floodplains and Drainage/Hydrology
- Wetlands and Other Waters of the U.S.
- Water Quality
- Hazardous Materials
- Utilities

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

2.1.1.b Environmental Elements Assigned to FRMG and the Department

Exhibit 14 in Chapter 5 of ROD 1: Phase 1 presents the Central 70 Project mitigation measures status as of March 6, 2017 and corresponding responsibilities for implementation shared between the Department and FRMG. The FRMG ECTM (provided in Appendix 1 and further described in Section 2.1.1.d Means and Methods to Meet Environmental Requirements) present this information and other applicable environmental compliance requirements regardless of the defined responsibility between FRMG and the Department. This comprehensive approach requires collaboration and is essential to Project delivery.

2.1.1.c Environmental Law and Environmental Approvals

As required by Schedule 17, FRMG will:

- a. Comply with all Environmental Law relevant to the requirements of the Project Agreement
- b. Comply with all conditions and requirements imposed by all Environmental Approvals
- c. Comply with all conditions and requirements imposed by all other Governmental Approvals (including all Department Provided Approvals) and Permits
- d. Perform all commitments and mitigation measures set out in all Environmental Approvals, all other Governmental Approvals (including all Department Provided Approvals) and all Permits
- e. Pursuant to Section 8.4 of the Project Agreement, prepare all information and submissions required by, or necessary to maintain in full force and effect, all Department Provided Approvals and maintain in full force and effect all other Environmental Approvals

To meet these expectations, FRMG’s ECWP includes federal and state environmental laws and regulations, permits, reviews, notifications, consultations, and other approvals with monitoring and enforcement requirements including:

- Air Quality Transportation Conformity - Air quality conformity will be assured through adherence to the baseline design, consistent with the transportation conformity regulations in 40 CFR§93 and with the conformity provisions of Section 176(c) of the Clean Air Act
- Section 106 Consultation - Section 106 requirements will be satisfied by addressing conditions of the April 2016 Programmatic Agreement, which determined appropriate mitigation for adverse effects to historic properties. This ECWP addresses compliance with the Programmatic Agreement.
- Section 6(f) of the Land and Water Conservation Fund Act - Mitigation measures stemming from Section 6(f) evaluation are addressed in this ECWP
- Section 4(f) of the Department of Transportation Act of 1966 - Mitigation measures stemming from Section 4(f) evaluation are addressed in this ECWP
- Environmental Justice - Environmental justice compliance will be addressed by ongoing public involvement activities and effective citizen engagement, continuing evaluation of potentially disproportionate effects as design refinements are made, and adherence to the mitigation measures and related commitments established in the ROD



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Clean Water Act Section 404 Permits - Section 404 permits will be secured during the final design process and this ECWP addresses their mitigation measures, approval conditions, and commitments
- Senate Bill 40 (SB 40) Certification - SB 40 certification will be secured during the final design process and this ECWP addresses their mitigation measures, approval conditions, and commitments

In addition to the Department provided approvals, the ROD and Section 4(f) Evaluation and Section 106 Programmatic Agreement, **Table 5**, **Table 6**, and **Table 7** list and clarify the primary applicable environmental laws, Executive Orders, and permits and approvals for the Project.

Table 5. Primary Applicable Environmental Laws.

Environmental Laws	Regulatory Agencies
Americans with Disabilities Act	US Department of Labor
Archaeological and Historic Preservation Act	US Department of the Interior, National Park Service
Civil Rights Act, Title VI	US Justice Department
Clean Air Act	US Environmental Protection Agency
Clean Water Act	US Army Corps of Engineers, US Environmental Protection Agency
Comprehensive Environmental Response, Compensation and Liability Act	US Environmental Protection Agency
Noxious Weed Control and Eradication Act	US Department of Agriculture
National Historic Preservation Act	State Historic Preservation Officer, Advisory Council on Historic Preservation
National Environmental Policy Act	Federal Lead Agencies
Endangered Species Act	US Fish and Wildlife Service
Migratory Bird Treaty Act	US Fish and Wildlife Service
Resource Conservation and Recovery Act	US Environmental Protection Agency
Safe Water Drinking Act	US Environmental Protection Agency
Solid Waste Disposal Act	US Environmental Protection Agency
Uniform Relocation Assistance and Real Property Acquisitions Policy Act	US DOT, CDOT
US Department of Transportation Act, Section 4(f)	US DOT, CDOT

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

Table 6. Applicable Environmental Executive Orders.

Executive Orders	Description
11514	Protection and Enhancement of Environmental Quality
11988	Floodplain Management
11990	Protection of Wetlands
12898	Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
13045	Protection from Environmental Health Risks and Safety Risks
13166	Improving Access to Services for Persons with Limited English Proficiency
13693	Planning for Federal Sustainability in the Next Decade/Federal Leadership on Climate Change and Environmental Sustainability

Table 7. Applicable Environmental Permits and Approvals.

Environmental Approvals	Purpose	Permitting Agency/ Approval Agency
Air Pollutant Emission Notice (APEN)	For determining whether an air quality permit is needed; identifies sources of and levels of emissions from new construction and whether any emission elements are regulated pollutants	Colorado Division of Public Health and Environment (CDPHE) Air Pollution Control Division (APCD)
Stationary Source Air Quality Permit	For emissions from portable units, rock crushers, generators, asphalt plants, and cement plants used during construction	CDPHE, APCD
Fugitive Dust Permit	For fugitive dust emissions due to construction activities	CDPHE, APCD
Asbestos Abatement Permit	For abatement of friable asbestos when the quantity of asbestos-containing material (ACM) exceeds the trigger levels	CDPHE, APCD
Demolition Permits	For demolition of any building and other structures	CDPHE and all applicable Governmental Authorities
Historic Structures Demolition Permit	For demolition of any structures that are at least 120 square feet and 1.5 stories in height which are located in the Denver city limits; the Landmark Preservation Office reviews the structure and determines whether the structure qualifies for landmark designation	City and County of Denver (CCD) Landmark Preservation Commission
Construction Noise Permit	For noise resulting from construction activities	All applicable Governmental Authorities
Temporary Noise Variance	For allowing a temporary variance for noise generated from construction activities to adhere to local noise ordinances	All applicable Governmental Authorities



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Environmental Approvals	Purpose	Permitting Agency/ Approval Agency
Clean Water Act Section 402 Construction Dewatering Permit	For groundwater or surface waters encountered during construction that must be discharged or dewatered	CDPHE Water Quality Control Division (WQCD)
Construction Activities Stormwater Discharge Permit (CASDP)	For stormwater runoff from construction activities that include clearing, grading, grubbing, and demolition that will exceed one acre of disturbance	CCD – Wastewater Management
Colorado Discharge Permit System (CDPS) Stormwater Construction Permit (SCP)	For stormwater discharges and erosion/sediment control	CDPHE WQCD
Municipal Separate Storm Sewer System (MS4) Discharge Permit (CDOT MS4 discharge requirements)	For discharges of stormwater from storm sewer systems of CDOT highway drainage systems; CDOT discharge requirements are outlined in Colorado Discharge Permit Regulations Permit COS-000005 and COR-030000	CDPHE WQCD
Municipal Separate Storm Sewer System (MS4) Discharge Permit (outside CDOT ROW)	For discharges of stormwater from regulated small municipal separate storm sewer systems (MS4s)	All applicable Governmental Authorities
Subterranean Groundwater Permit	For discharges of source water from subterranean structures (basement, foundation, footer drains, etc.) and/ or well development water to waters of the state	CDPHE WQCD
Construction Dewatering Permit	For discharges of groundwater from construction in wet areas or excavating; allows for groundwater to be discharged to surface water or back to the ground	CDPHE WQCD
Remediation Activities Discharging to Surface Waters Permit	For discharges of remediation activities to surface waters of the state	CDPHE WQCD
Remediation Activities Discharging to Groundwater	For discharges of remediation activities to groundwater	CDPHE WQCD
Substitute Water Supply Plan	For temporary subscription to water rights for use of wells operating within the South Platte River Basin	Colorado Division of Water Resources
Notice of Intent to Construct Dewatering Wells	For constructing or reconstructing a dewatering well; does not include water rights	Colorado Division of Water Resources
Notification as Resource Conservation and Recovery Act (RCRA) Generator	For any project that generates hazardous waste of three gallons or more in a calendar year of used solvents that are in the hazardous waste categories: F004, F002, or F005	CDPHE Hazardous Materials and Waste Management Division



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Environmental Approvals	Purpose	Permitting Agency/ Approval Agency
Stormwater Quality Discharge Permit for Construction Activities	For discharges of stormwater from construction sites disturbing greater than one acre	City of Aurora
Sewer Use and Drainage Permit	For each building and/or individual tenant in a project; permits must be obtained prior to construction	CCD
Well Abandonment Report (GWS-09)	For plugging and sealing of permitted wells, monitoring or other holes	State of Colorado, Office of State Engineer
Black Tailed Prairie Dog Removal Permit	For removal and relocation of black tailed prairie dogs	Colorado Parks and Wildlife (CPW)
SB 40 Certification/Approval	For projects funded by state monies or implemented by state agencies that will result in impacts to stream banks, stream channels, and riparian areas	CPW
Nest Take Permit	For removal or relocation of Bald or Golden Eagle nests	The United States Fish and Wildlife Service (USFWS)
Clean Water Act Section 404 Permit	For impacts to jurisdictional waters of the United States	US Army Corps of Engineers
Special Use Permit	For installation of utilities, or the performance of other types of work, within the state highway right-of-way	CDOT
Letter Request for Section 6(f) Properties	Approval for temporary nonconforming uses of Section 6(f) properties	CPW



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

2.1.1.d Means and Methods to Meet Environmental Requirements

FRMG’s ECTM provides initial details about FRMG’s means and methods to meet all applicable Environmental Requirements during the Construction and Operating Periods. Refinements to the means and methods will be made as construction strategies are developed and part of continuous improvement to the ECWP as the Project progresses. FRMG’s site specific preconstruction mitigation plans as well as pre-planning activities and processes (discussed further in Section 2.2.1.f Process Control and Independent Quality Control) will apply the means and methods as they apply to specific compliance activities and locations. FRMG’s ECTM will ensure Project team members understand all applicable requirements and appropriate means and methods for implementation of the mitigation compliance program. FRMG’s ECTM, means and methods for individual disciplines, and FRMG’s ECTM are described in this section of the ECWP.

FRMG’s ECTM

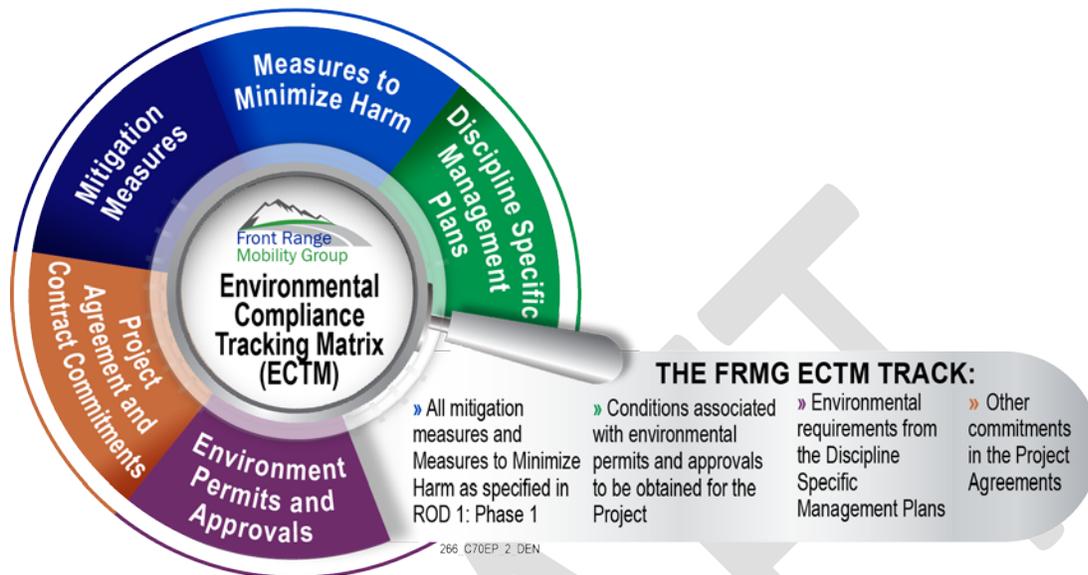
FRMG’s ECTM is a fundamental mechanism for tracking and reporting FRMG’s environmental compliance processes. As shown in Attachment 1, FRMG’s ECTM clarifies specific requirements for individual technical disciplines and characterizes the means and methods for compliance during the Construction and Operating Periods. The ECTM presents:

- Environmental requirements and commitments (as shown in **Figure 2** on the next page), including:
 - FEIS mitigation measures
 - Measures to Minimize Harm (ROD 1: Phase 1)
 - Environmental permit conditions
 - Discipline Specific Management Plan requirements
 - Other environmental commitments prescribed in the project agreement and contract documents
- FRMG staff member(s) responsible for implementation of compliance activities
- FRMG’s means and methods to verify and achieve compliance during the Construction and Operating Periods, such as:
 - Document and plan reviews
 - Field surveys, monitoring and inspections
 - Verification of compliance
- Timeframes and reporting frequencies for each activity
- Documentation required to verify and confirm environmental compliance for each activity, including, but not limited to:
 - Inspection/observation and testing results
 - Photographs
 - Reports and memorandums
 - Agency specific reporting documentation
 - Site Specific Preconstruction Mitigation Plans and Checklists

The final two columns of the ECTM address compliance status and whether or not changes to potential effects or mitigation trigger the need for further NEPA analysis and/or formal reevaluation.

		<h1>Central 70 Project</h1> <h2>Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

Figure 2. FRMG’s ECTM Environmental Requirements and Commitments.



The ECTM, with subsequent modifications and routine updates, is the primary tool FRMG uses to manage and report the Project’s environmental compliance status. The updated ECTM will be appended to each Environmental Status Report (ESR).

The monthly update of the ECTM and submittal to the Department with the ESR allows FRMG’s Environmental Management Team to communicate, collaborate and coordinate to address overall compliance. The FRMG ECTM lists the environmental mitigation topics in the order that they are addressed in the FEIS and ROD 1: Phase 1, with one difference. The difference involves adding landscape requirements to the visual and aesthetics discussion because these topics are interrelated. Details about means and methods are presented for the following individual technical disciplines:

- Air Quality
- Noise
- Historic Resources
- Swansea Elementary School Area
- Paleontology
- Parks and Recreation
- Vegetation
- Senate Bill 40 Wildlife Certification
- Integrated Noxious Weed Management Plan
- Visual and Aesthetic Qualities and Landscape Requirements
- Water Quality Control and Water Resources
- Wetlands and Waters of the U.S.
- Wildlife
- Recognized Hazardous Materials



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Energy

Means and Methods for Individual Technical Disciplines

The following discussions provide means and methods details for individual technical disciplines. Each discussion begins by highlighting the applicable Discipline Specific Management Plans, compliance documents and permits, where applicable, and then describes FRMG’s overall compliance approach in terms of means and methods for the Construction and Operating Periods.

These descriptions are in draft form at this time and will be revised when final design details and corresponding construction strategies are known, and provide information that can refine and enhance the anticipated environmental compliance means and methods. Some updates will be available prior to final Approval of the ECWP. Other changes will be provided later in ECWP updates. The EM, with assistance from FRMG’s technical discipline task leaders, will provide updates to these technical means and methods discussion.

FRMG’s Process Control (PC) and Independent Quality Control (IQC) programs and associated formal procedures apply to all technical disciplines and associated procedures and deliverables (Refer to Section 2.1.1 f).

Air Quality

Discipline Specific Management Plans and Permits:

- Air Quality Monitoring, Maintenance and Mitigation Plan
- Air Pollution Emission Notice, CDPHE APCD
- Stationary Source Air Quality Permit, CDPHE APCD
- Asbestos Abatement Permit, CDPHE APCD
- Fugitive Dust Permit, CDPHE APCD
- Demolition Permits, CDPHE and Other

Construction Period

FRMG’s means and methods for compliance with all applicable air quality standards during the Construction Period are described in the following discussion. FRMG’s means and methods for compliance with all applicable air quality standards will be resolved through completion and Approval of FRMG’s Air Quality Monitoring, Maintenance and Mitigation Plan (AQ3MP) prior to NTP2. The AQ3MP will be prepared using CDOT’s Air Quality Monitoring, Maintenance and Mitigation Template and will document the existing environment, means, methods, and reporting requirements. FRMG’s means and methods primarily involve minimizing fugitive dust generated from disturbed areas, particulate from stationary sources (batch plants, and crushers), and particulate generated from the combustion of fuel in Diesel Nonroad Construction Equipment (DNCE) (portable construction equipment and portable power generation).

Fugitive dust will be minimized through implementation of best management practices (BMPs) documented in the AQ3MP and designed to control fugitive particulate emissions and eliminate off-site transport of fugitive particulate emissions. The effectiveness of the BMPs will be measured through collection of robust continuous particulate matter of 10 micrometers or less in diameter (P10) measurements which adhere to 40 CFR Part 58 (Ambient Air Quality

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Surveillance), daily observations and responding to measurements above action limits and complaints from the public. The P10 monitoring network which will be fully documented in the AQ3MP will report hourly measurements and automatically alert stakeholders when measurements exceed action limits. Measurements will be collected at several locations along the corridor anticipated to experience the highest concentrations based on the construction activities occurring. In addition, air quality data from an independent monitoring site at Swansea Elementary School will be reviewed to ensure BMPs are effective.

Particulate from stationary source fuel combustion will be no more than that allowed by State and Federal rules and permits obtained (as needed) from the Colorado Department of Public Health and Environment (CDPHE) based on the specific equipment.

The effectiveness of this program will be measured by daily opacity measurements from all equipment subject to opacity limits in Section II.A of Air Quality Control Commission Regulation No. 1 (5 CCR 1001-3) and through compliance with applicable regulations and issued permits. The daily opacity measurement program will be fully documented in the AQ3MP.

Particulate from DNCE fuel combustion will be minimized through a robust tracking tool designed to ensure that all DNCE used on the Project for more than 10 total calendar days will meet US Environmental Protection Agency (USEPA) Tier 4 or equivalent requirements. FRMG understands that funding may be available from the Regional Air Quality Council as part of their Construction Equipment Emissions Retrofit Program. As required, FRMG will make a “reasonable” effort to participate in this program. If this occurs, FRMG will clarify and report on the construction equipment retrofits that are made to reduce emissions. If this doesn’t occur, FRMG will comply as described previously in this paragraph.

Conducting Construction Work, O&M Work and Renewal Work in accordance with the AQ3MP, using equipment meeting the USEPA standards for DNCE, and obtaining applicable permits and operating stationary equipment in accordance with those permits will ensure the Project will comply with applicable air quality standards.

Operating Period

FRMG’s means and methods for compliance with all applicable air quality standards during the Operating Period are described in the following discussion.

Key air quality issues during the Operating Period are focused on fugitive dust control and ongoing implementation of BMPs to control pollutant emissions during maintenance and repair work, and when reconstruction, rehabilitation, restoration and/or facility replacement activities occur. FRMG will expedite permitting and governmental approvals links to O&M Work and Renewal Work through maintaining previously established air pollutant emission reduction practices employed during Construction Work and through maintaining working relationships with CDPHE personnel.

Further details will be provided in the following documents and data sources:

- I-70 East Air Quality Monitoring, Maintenance, and Mitigation Plan (AQ3MP)
- Proposed Locations of P10 Monitors
- Various APENs obtained, as needed

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

- Various Stationary Source Air Quality Control Permits obtained, as needed

Noise

Discipline Specific Management Plans and Permits:

- Construction Noise Mitigation and Monitoring Plan (CNMMP)
- Noise Analysis
- Construction Noise Permit
- Temporary Noise Variance

Construction Period

FRMG’s means and methods for compliance with all applicable noise standards during the Construction Period are described in the following discussion. FRMG’s means and methods for noise compliance during the Construction Period address performing all required noise modeling, analysis, and reporting, mitigating and monitoring noise from construction, and ensuring that the final Project design will comply with CDOT and FHWA noise guidance and standards.

FRMG will develop and implement a CNMMP that incorporates the mitigation measures outlined in the FEIS, the ROD, and the procedures identified in the FHWA *Construction Noise Handbook* for Acceptance prior to NTP2.

The CNMMP will provide accurate and detailed information to minimize, monitor and mitigate construction-related noise and apply creative techniques, like those applied by CDOT and Regional Transportation District (RTD) on the I-25 Transportation Expansion project, where applicable and feasible to address construction noise.

The CNMMP will be based on a thorough understanding of sensitive receptors along the Project, and a characterization and modeling of construction-related noise. Model-predicted impacts from construction noise will be used to develop mitigation measures designed to allow construction to move ahead efficiently while complying with applicable state and local noise regulations.

A critical component of the CNMMP is defining a program designed to fully characterize the existing acoustic environment and a program for documenting noise impacts during construction, to measure the effectiveness of the CNMMP and provide for corrective actions if components of the CNMMP are found to be ineffective.

Equally important to developing and implementing the CNMMP to comply with applicable noise standards is building a final design that complies with the recommendations in the Final Noise Technical Report for the Project as Accepted by the Department. To satisfy the first part, FRMG will perform a noise analysis for the final design that is conducted at the same receiver locations and for any new receivers. The analysis will be based on the same model used and will be produced in accordance with the standards and procedures of the CDOT *Noise Analysis and Abatement Guidelines*.

All areas of the Project, including the 109 noise receptor locations that exceed the Noise Abatement Criteria (NAC) thresholds, as well as the Elyria area which requires noise

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

abatement, will be reanalyzed to be sure there are no new receptors and to document the impact of any design changes. Any new noise abatement will be documented. This reanalysis will also include optimizing the height of recommended noise abatement to make sure that the final barrier will provide all benefited receptors with the same modeled noise levels as those documented in the FEIS while maximize the number of receivers receiving a reduction of 5 decibels (dBA) or greater per CDOT/FHWA guidelines.

Once the Preliminary Noise Technical Report (reanalysis) is complete, fully documented and Approved by the Department, FRMG will conduct a Benefited Receptor Preference Survey (BRPS) in accordance with CDOT *Noise Analysis and Abatement Guidelines*. Prior to conducting, FRMG will submit for Approval the plan of the Benefited Receptor Survey to the Department. For Project locations where noise abatement has been recommended, the BRPS will serve to give benefited receptors the final say in the construction of new noise barriers. Documenting the results of this vote will be the final step in producing the Final Noise Technical Report. The Department will have the opportunity for ongoing over the shoulder review of all planning activities associated with the BRPS.

After the BRPS is completed, a Final Noise Technical Report will be completed to document the final design noise analysis, final geometry and details of the noise barriers. This report will be submitted to the Department for Acceptance prior to the issuance of Release for Construction (RFC) Documents. If any design changes are made that may affect eligible receivers, the Final Noise Technical Report will be updated and resubmitted for Acceptance. The Final Noise Technical Report will document that the final Project design is consistent with the FEIS/ROD requirements, complies with applicable State and Federal standards, analysis guidance, and local ordinances, and clarifies the results of BRPSs conducted in locations where noise abatement has been recommended.

Constructing the Project in accordance with the CNMMP and following recommendations in the Final Noise Technical Report will ensure the Project complies with CDOT and FHWA standards. In addition, all applicable local CCD sound control, and noise and vibration ordinances and regulations will be followed. Any existing noise abatement structures that are removed or damaged will be replaced.

Operating Period

FRMG's means and methods for compliance with all applicable state and local noise requirements during the Operating Period are described in the following discussion.

Key noise issues during the Operating Period are focused on noise generated during maintenance and Renewal work, and when reconstruction, rehabilitation, restoration and/or facility replacement activities occur. FRMG will apply previously approved noise control measures to streamline approvals for O&M Work and Renewal Work.

Details are and will be provided in the following documents:

- CNMMP
- Preliminary and Final Noise Technical Report

	<h1>Central 70 Project</h1> <h2>Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Historic Resources

Compliance Documents and Permits:

- Programmatic Agreement
- Section 4(f) Evaluation
- Historic Structures Demolition Permit, CCD Landmark Preservation Commission

Construction Period

FRMG’s means and methods for compliance with historic resource requirements during the Construction Period are described in the following discussion.

The Programmatic Agreement and the ROD and Section 4(f) Evaluation for this Project are Department provided approvals for historic resources. FRMG has a cooperative responsibility in terms of assuring that the mitigation measures and defined stipulations within these documents are implemented during the Construction Period. The Area of Potential Effect (APE) boundary will be provided on all design drawings. Any changes in the effects to historic and/or archaeological resources or to the APE will be documented and drawings updated, and consultation under Section 106 and Section 4(f) will occur in order to obtain necessary approvals. All identified historic resources will be protected in place through fencing and other means identified in the mitigation measures and PA.

The following discussions clarify FRMG’s role and means and methods for assuring compliance with the Programmatic Agreement (PA) Stipulations.

Stipulation I Impact Reduction: FRMG’s cultural resources team will work with the Department and FRMG designers to further reduce impacts during the design process by looking for specific design options, elements and features that can avoid, minimize and/or mitigate impacts on historic properties and districts and incorporate changes where feasible. State Historic Preservation Office (SHPO) and consulting parties will be notified of any changes in impacts.

Stipulation II Section 106 Consultation Process: FRMG will coordinate with the Department and FHWA on the need for any additional consultation with SHPO and other consulting parties to ensure processes described in the PA are addressed and corresponding requirements are met regarding resources, the APE, evaluation and reevaluation of eligibility, reevaluation of effects, resolution of effects, and mitigation as defined through the process. The final design process and possible design changes and construction activities that may influence Section 106 consultation will be shared with the Department as the Project moves forward. This communication ensures the consultation remains current and accurate.

Stipulation III Mitigation: The Department will prepare the specified archival documentation for the 13 identified resources with a determination of adverse effect. FRMG will prepare the required documentation for any additional resources identified during final design and/or due to a change in the APE. FRMG will collaborate with the Department to ensure that design imagery, character and details linked to the area’s history, as required by Section 106, are incorporated into Project design details through early interactions between the cultural resources team, the engineering design team and the landscaping team, and through Environmental Interdisciplinary



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Review processes, as further detailed below, that require specific plan set reviews by Section 106 specialists and Central 70 aesthetic design standard specialists. FRMG’s ECMTTP will reinforce to all FRMG designers that these are Project requirements. If impacts to brick-lined sewers, trolley tracks or other historic/archaeological resources outside those identified in the FEIS and ROD 1: Phase 1 are uncovered, FRMG will coordinate with the Department and SHPO and be responsible for the resulting mitigation.

Stipulation IV Coordination with NEPA: FRMG, in collaboration with the Department, will implement the requirements of the PA along with the specified cultural resources mitigation measures and will address cultural resources in NEPA Reevaluations for design changes, as appropriate.

Stipulation V Coordination with Section 4(f): FRMG, in collaboration with the Department will apply the requirements of the PA in relation to Section 4(f) requirements and will address Section 4(f) documentation requirements in NEPA Reevaluations for design changes, as appropriate.

Stipulation VI Construction Phase Post Review Discoveries: FRMG’s mitigation compliance tracking and Construction Period monitoring processes address the potential for encountering previously unidentified historic properties and following the applicable protocol as identified in the PA. As specified, work will immediately stop and will not proceed until the requirements of 36 CFR 800.13 have been satisfied.

Stipulation VII Emergency Situations: FRMG will apply the overarching emergency requirements set forth in the more general Section 106 PA (Stipulation XII) among FHWA, SHPO and the Department during construction, when applicable.

Stipulation VIII Administrative Provisions: FRMG will collaborate with the Department to prepare annual Section 106 Compliance Reports by June 30th. These reports will supplement monthly Environmental Task Force Reports and compile a complete characterization of Section 106 compliance requirements allowing FHWA, SHPO and the Department to evaluate compliance adequacy and determine what modifications to the Project and/or PA are needed.

Operating Period

FRMG’s means and methods for compliance with historic resource requirements during the Operating Period are described in the following discussion.

Key historic resource issues during the Operating Period are focused on avoiding, minimizing or mitigating impacts on previously impacted or identified historic resources in the corridor during O&M Work and Renewal Work. FRMG’s cultural resources experts will work with Department experts and SHPO to tailor the stipulations in the PA and develop additional controls to address incremental and cumulative effects on historic resources in the corridor.

Swansea Elementary School Area

Construction Period

FRMG’s means and methods for compliance with Swansea Elementary School area during the Construction Period are described in the following discussions.



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

FRMG’s means and methods for compliance with applicable mitigation measures and other commitments associated with the Swansea Elementary School and adjacent areas will begin with an interdisciplinary review of FRMG’s Swansea Elementary School area plan set. This plan set will be a subset of the Area 1 and Area 2 plan sets and will include special sheets for specialized environmental compliance notes and design details that match interdisciplinary environmental mitigation measures with the requirements unique to this location.

Approval of plans for the Swansea Elementary School area will be a major design milestone and will be fully documented for environmental field reviews. FRMG’s site specific preconstruction mitigation plans as well as pre-planning activities and processes for this area will be comprehensive and featured in FRMG’s ECMTP. During construction, the site specific preconstruction mitigation plans and pre-planning activities and processes for the Swansea Elementary School area will guide the weekly construction field review process, the monthly field review process with the Department and will be a special focus of the Environmental Task Force discussions and associated deliverables.

Operating Period

FRMG’s means and methods for compliance with Swansea Elementary School area during the Operating Period are described in the following discussion.

After construction, compliance in the Swansea Elementary School area will involve monitoring to assure that area construction and mitigation commitments met all applicable requirements, received applicable formal Acceptance, and were effective. In addition, specific efforts will be documented in appropriate resource plans and made to:

- Address air quality issues associated with the Cover ventilation system and associated emissions
- Verify proper handling of stormwater from roadway runoff and potential contaminants in water removed from the lowered section of the roadway
- Ensure proper restoration of disrupted natural areas and greenways through erosion control, revegetation, and weed abatement
- Monitor and control fugitive dust
- Address Construction and Operating Period noise

Paleontology

Construction Period

FRMG’s means and methods for compliance with paleontological requirements during the Construction Period are described in the following discussion.

FRMG’s means and methods for compliance with applicable paleontological monitoring and mitigation measures involves partnering with the Department’s paleontologist as part of environmental field reviews and the potential discovery of fossils during earthwork and excavations. Weekly spot inspections and daily visual inspections in key locations performed by FRMG’s paleontologist, supported by trained FRMG construction equipment operators and supervisors, will occur. Together, these measures are expected to proactively manage potential risks to paleontological resources and provide the ability to stop work and develop appropriate



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

mitigation measures if fossils in the Denver and Arapahoe Formations are discovered. Monthly and annual reports will document compliance.

Operating Period

FRMG’s means and methods for compliance with paleontological requirements during the Operating Period are similar to those that apply during the Construction Period. Most of the anticipated Renewal Work is likely to occur where previous construction occurred so the potential for impacts is well known and the probability of additional effects on paleontological resources is likely to be limited.

Parks and Recreation Resources

FRMG’s means and methods for compliance with applicable parks, recreation and Section 4(f) mitigation measures and requirements involve consultation and coordination with the Department and CCD, preconstruction environmental reviews to ensure that signage, notices, and plans for restoration are in place prior to construction and that follow through occurs during and after construction. FRMG field reviewers will conduct visual inspections in key locations to ensure compliance during Construction Work, O&M Work and Renewal Work.

Coordination with Denver Parks & Recreation for potential temporary impacts and detours to the South Platte River Greenway Trail, Sand Creek Greenway Trail, and Globeville Landing Park will be conducted prior to and during construction. All detours and signage will be compliant with Americans with Disabilities Act requirements. Coordination with Denver Public Schools will occur for impacts associated with Swansea Elementary School.

Vegetation, Senate Bill 40 (SB 40) and Noxious Weeds

Discipline Specific Management Plans and Permits:

- Integrated Noxious Weed Management Plan (INWMP)
- SB 40 Certification/Approval

Construction Period

FRMG’s means and methods for compliance with the requirements associated with vegetation, SB 40 resources and noxious weeds during the Construction Period are described in the following discussion.

FRMG’s means and methods for compliance with vegetation reclamation requirements, SB 40 requirements and noxious weeds and associated mitigation measures involves Final Design Stage environmental reviews to ensure that notes and details on the Project plans properly clarify disturbance limits, landscape planting and/or restoration requirements, tree replacement and other SB 40 requirements, and site specific elements of the INWMP. FRMG will conduct visual inspections during environmental field reviews in key locations by FRMG field reviewers to ensure Construction Period compliance.

Operating Period

FRMG’s means and methods for compliance with vegetation, SB 40 resources and noxious weeds during the Operating Period are similar to those associated with the Construction Period and are focused on how O&M Work and Renewal Work relates to restoration of disrupted

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0		
Approved by:	Revision Date:	Review by:	
Approved by:	Release Date: TBD		

natural areas (wetlands, riparian habitats, and greenways) through revegetation (groundcovers, shrubs and trees) and weed abatement.

Visual and Aesthetic Qualities and Landscape Requirements

Schedule 10, Section 14.8.1 and 14.8.2 describe the Project’s landscaping and aesthetics requirements and related ECWP content requirements. The Project’s Aesthetic Design Standards are described in Schedule 10B, Contract Drawings.

Construction Period

FRMG’s means and methods for compliance with visual and aesthetic issues during the Construction Period are described in the following discussion.

FRMG’s means and methods for compliance with visual impact mitigation measures and associated commitments, including measures to minimize harm, involve a dedicated design team that will address the following Project design elements and corresponding requirements:

- Replacement noise abatement structures
- Noise walls and other abatement measures
- Temporary walls at and near Swansea Elementary School area
- Reconfiguration of the Swansea Elementary School site and playground facilities
- New and replacement vegetation
- Tree and shrub mitigation for Senate Bill 40 impacts

Environmental compliance reviews performed as part of Interdisciplinary Plan Reviews will address each of these topics to verify compliance. The Project’s Aesthetic and Design Guidelines developed during the FEIS will be followed.

FRMG’s landscaping and aesthetics organization chart is presented in **Figure 3**.

Figure 3. FRMG’s Landscaping and Aesthetics Organization Chart (Construction Period)





Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Personnel will be assigned to manage seeding, fertilizer, soil conditioner, and sodding; mulching; planting; transplanting; soil retention; covering; herbicide treatment; and irrigation systems. Landscape personnel and qualifications are included in the Environmental Team described in Section 2.1.1 h.

The following discussion addresses the roles of PC and IQC as they relate to landscaping and aesthetics and requirements involving Quality Hold Points (QHP) and decision points in accordance with the following CDOT Standard Specifications:

- Section 212, Seeding, Fertilizer, Soil Conditioner, and Sodding
- Section 213, Mulching
- Section 214, Planting
- Section 215, Transplanting
- Section 216, Soil Retention Covering
- Section 217, Herbicide Treatment
- Section 623, Irrigation Systems

Prior to construction activities, the Department Environmental Representative, FRMG EM, applicable Environmental Management Team members, FRMG Construction Manager, and the FRMG Landscape Design Task Manager (or designee) will conduct field reviews to identify area-specific resources and the required mitigation measures for each type of work in a specific area.

During the field review, the FRMG EM and support staff complete the site specific preconstruction mitigation plans. The frequency of field reviews will vary based on Project conditions, lessons learned, and as agreed upon by the Department Environmental Representative, FRMG EM, and the FRMG Construction Manager.

In addition to QHPs identified in Schedule 8, Section 6, FRMG will establish the following QHPs with respect to landscape requirements:

- **School, Playground and Park:** A QHP will be in place prior to school, playground or park area disturbance until Approval of the final design plans by the Department
- **Sound Walls and Temporary Walls near Swansea School:** A QHP will be in place prior to installing above ground wall features until final Approval of the aesthetic characteristics of the walls
- **Weed Control and Eradication:** A QHP will be in place prior to ground disturbance until completion of the Integrated Noxious Weed Management Plan and approval via field inspection
- **Soil Treatment:** A QHP will be in place prior to soil treatment until approval via field inspection
- **Vegetation Installation:** A QHP will be in place prior to installation of vegetation until approval via field inspections linked to establishment points as defined in the Project specifications
- **Irrigation:** A QHP will be in place until final approval of the irrigation plans and field inspections confirm adequate performance

After each QHP Inspection is completed, the Department Environmental Representative, FRMG EM, and FRMG Construction Manager, or their designees, initial the site specific



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

preconstruction mitigation plans that the preconstruction action item was approved and completed in accordance with the Environmental Requirements. This occurs prior to the start of associated construction activities. The completed site specific preconstruction mitigation plans will be included in the ECWP and provided as part of the monthly ESR.

FRMG’s IQC Program includes a collection of all certifications and documentation required for landscape materials. It also includes inspection and verification that all planted material meets the requirements of the Project Agreement.

Environmental compliance reviews performed as part of Interdisciplinary Plan Reviews will address each of these topics to verify compliance. FRMG’s plans and design narratives for Swansea School, the Cover and ATC 65.2 were subject to environmental compliance reviews. FRMG’s deliverables landscape submittals are subject to similar environmental compliance reviews.

Operating Period

FRMG’s means and methods for compliance with visual and aesthetic issues during the Operating Period are similar to those described for the Construction Period.

Water Quality Control and Water Resources

Permits:

- Clean Water Act Section 402 Construction Dewatering Permit (or Individual Construction Dewatering Permit if contaminated groundwater is expected to be encountered), CDPHE WQCD
- Construction Activities Stormwater Discharge Permit (“CASDP”), City and County of Denver (CCD) Wastewater Management
- Colorado Discharge Permit System (“CDPS”) Stormwater Construction Permit (“SCP”), CDPHE WQCD
- Municipal Separate Storm Sewer System (MS4) Discharge Permit (CDOT MS4 discharge requirements), CDPHE WQCD
- Municipal Separate Storm Sewer System (MS4) Discharge Permit (outside CDOT ROW), All Applicable Government Authorities
- Subterranean Groundwater Permit, CDPHE WQCD
- Construction Dewatering Permit, CDPHE WQCD
- Substitute Water Supply Plan, CDWR
- Stormwater Management Plan (SWMP)
- Notice of Intent to Construct Dewatering Wells, CDWR
- Well Construction and Test Reports, CDWR
- Dewatering Systems Well Report, CDWR
- Stormwater Quality Discharge Permit for Construction Activities, City of Aurora
- Sewer Use and Drainage Permit (SUDP), CCD
- Well Abandonment Report (GWS-09), State of Colorado, Office of State Engineer

(Also refer to the remediation permits in the means and methods discussion for Recognized Hazardous Materials).

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0		
Approved by:	Revision Date:	Review by:	
Approved by:	Release Date: TBD		

FRMG’s means and methods for compliance with water quality and water resources involve a team of technical discipline specialists and Transportation Erosion Control Supervisory Certificate Training certified inspectors to prepare necessary plans, obtain all required permits, and manage the Project area’s surface drainage and groundwater recovered during dewatering activities during the Construction and Operating Periods of the Project. **Figure 4** presents FRMG’s organization chart for providing these services.

Figure 4. FRMG’s Organization Chart for Water Quality Services (Construction Period)



Construction Period and Operating Period surface drainage collection and conveyance are addressed with engineering solutions and facilities sized for calculated stormwater flows. Surface flows in the below-grade portion of the Project Area (Area 1) will be conveyed to inlets located in the shoulders and to the pump station at York Street. From the pump station, flows will be routed through a water quality pond prior to entering the existing storm drain network in York Street. In areas above the lowered section, flows will be conveyed to curb and gutter systems and inlets for capture. These captured flows will also be routed through a water quality feature (described below) prior to it entering the storm drainage system. The storm drainage system will convey drainage to flood control ponds on the south side of the Project and be released at allowable rates into existing systems. North of I-70 and above the lowered section, flows will be conveyed in curb and gutter to inlets and routed into existing systems.

Area 2 drainage will be captured by inlets along the shoulder of the roadway and flows will be conveyed in the storm sewer system to connections with existing storm sewer systems. Drainage in CCD streets will be conveyed in curb and gutter to inlets and routed in existing systems.

Drainage in Areas 3 through 5 will flow to existing swales and cross culverts to follow historic drainage paths. Permanent water quality features are provided at Havana and Quebec Streets and detention is provided at the I-225 interchange.

Water Quality Capture Volumes will be designed to meet the requirements of the affected jurisdictions MS4 permits. Water quality will be accomplished with fore-bays and micro-pools in



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

detention ponds. Stand-alone water quality ponds will be located at the Quebec North pond, Havana North #2 pond, Havana South pond, and added York North pond which will provide water quality for the lowered section in lieu of the on-site North pond. All water quality ponds will have fore-bays at inlets and micro-pools at outlets.

Additionally, for the lowered section, grit will be removed within the pump station by settling. Within CCD ROW, water quality will be achieved by use of bio-swales, hydrodynamic separators.

Water quality during the Construction Period will generally be maintained by adhering to accepted BMPs in accordance with CDOT, CCD, COA and the Urban Drainage and Flood Control District requirements. Construction Period and Operating Period groundwater recovery, treatment and discharge are addressed with traditional techniques within the corridor, except within the trench section. In the trench section, FRMG will construct a water management system that will allow for construction, water removal and treatment to address suspended solids and anticipated contaminants. The primary anticipated contaminants are metals that exist either at background levels or higher levels linked to Superfund site conditions. The following constituents of concern requiring treatment (based on anticipated discharge of treated effluent to the South Platte River) were identified: aluminum, arsenic, cadmium, trivalent chromium, copper, iron, lead, magnesium, nickel, selenium, and uranium.

In order to optimize capital investment, mobile equipment will be rented during the Construction Period, to address anticipated groundwater flow rates and accumulation within the trench. The equipment will be moved as necessary during the various construction activities. The Construction Period dewatering flow is assumed to be approximately 200 gallons per minute (gpm).

The permanent water treatment plant is designed to handle Operating Period groundwater discharge flow rates and the need to intercept groundwater seepage into the lowered section. The sustaining flow during the Operating Period is assumed to be a combination of the secant pile wall seepage (70 gpm) and the underdrain seepage (30 gpm) for a total flow of about 100 gpm.

The treatment technology to remove contaminants includes the following steps:

- **Equalization:** A tank provides equalization of groundwater to homogenize quality and stabilize flows
- **Chemical Addition:** Sodium hydroxide is added to increase the pH to approximately 10 standard units, which precipitates most metals as insoluble hydroxides. Sulfide is added to precipitate additional metals.
- **Filtration:** Solids are removed by an ultra-filtration (UF) membrane. Reject from the membrane is sent back for treatment through the concentration tank. A clean-in-place system will be required for periodic membrane maintenance to maintain flux rates. A two steps filtration system including a lamella plate clarifier and media filters is also being considered as a replacement of the UF membrane.
- **Polishing:** The remaining dissolved metals are removed through ion exchange. The columns operate in lead/lag configuration. The two columns are initially used in series and then the second resin column processes the water when breakthrough on the first stage vessel is observed.



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Sludge Handling:** A small portion of the membrane influent flow is sent to the sludge tank. Polymer is added to improve solids consolidation. A filter press dewateres the sludge. Filtrate is recycled back to the equalization tank, and solids are trucked off for disposal.

The treatment system design and permitting will meet the applicable Colorado Water Quality Control Commissions regulations 2 CCR 1002-43 and 5 CCR 1002-61. Separate discharge permits are being evaluated for the Construction Period and for the continuous dewatering process during the Operating Phase. Two permits would allow maximum operational flexibility and schedule optimization with minimum delays due to permitting. Additionally, local permitting requirements of City and County of Denver’s Department of Public Works will also be met.

Sludge handling will be addressed on-site in compliance with standard and BMPs.

Treated water that meets established water quality parameters is anticipated to be discharged into the South Platte River. The treatment system will be designed to meet the discharge requirements provided in Colorado Water Quality Control Commission regulation 5 CCR 1002-38 “Classifications and Numerical Standards for South Platte River Basin.” Reinjection into existing deep wells is being evaluated as another option. The installation of new deep wells for injection is not proposed.

Wetlands and Waters of the U.S.

Permits:

- Existing Wetland Delineation from the I-70 East FEIS
- Clean Water Act (CWA) Section 404 Permit (Nationwide 14)
- CWA Section 401 Certification
- Colorado Parks and Wildlife (CPW) SB 40 Wildlife Certification
- Memorandum of Agreement Between FHWA and CDOT Regarding the Programmatic Approval of Certain Wetland Findings
- CDOT/FHWA Checklist for Wetland Findings and Wetland Finding Amendments

FRMG’s means and methods for compliance with requirements for wetlands and Waters of the US during the Construction Period are described in the following discussion.

FRMG’s means and methods for compliance with requirements associated with permanent and temporary impacts to wetlands and waters of the U.S. are directly linked to implementation of BMPs for erosion, sediment control, and field practices near wetlands and surface waters. FRMG’s approach to completion of the required applications for Section 404 permits involves proven delivery practices and long-term relationships with US Army Corps of Engineers (USACE) and CDOT personnel involved with the associated processes. Past, early and continuous agency consultation by FRMG will ensure timely reviews and approvals. FRMG will include the conditions of approval associated with the Projects’ Section 404 permits in FRMG’s ECTM (Attachment 1). FRMG will work to separate the permit applications by watershed to avoid impact aggregation. This will streamline permit acquisition timing and simplify USFWS mitigation requirements. FRMG will work with the Department to determine wetland mitigation banking fees. FRMG provides proven personal to coordinate with the USACE through the Department, provide the application documentation and streamline the permitting process.

	<h1>Central 70 Project</h1> <h2>Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Environmental constraints mapping, wetland protection strategies, design review processes and environmental field reviews will address Construction Period and Operating Period issues.

Wildlife and Threatened and Endangered Species

Discipline Specific Management Plans, Compliance Documents and Permits:

- Black Tailed Prairie Dog (BTPD) Management Plan
- CDOT BTPD Policy
- BTPD Removal Permit, CPW
- Nest Take Permit, USFWS
- SB 40 Certification

FRMG’s means and methods for compliance with wildlife and threatened and endangered species during the Construction and Operating Periods are described in the following discussion.

FRMG’s means and methods for compliance with requirements associated with wildlife and permanent and temporary impacts to habitat and riparian areas involves timely consultation and coordination with key personnel from the Department, USFWS, and CPW in relation to planning and field necessary to managing BTPDs and the boundaries of their colonies, develop SB 40 compliance strategies, avoid conflicts with the Migratory Bird Treaty Act requirements prior to clearing vegetation and tree removal, performance specific surveys (Colorado butterfly plant, Ute ladies’-tresses orchid, burrowing owl) and reclamation of disturbed areas. FRMG’s environmental constraints mapping, supplemental surveys, design review processes, environmental field reviews and fieldwork will address Construction Period and Operating Period issues.

Recognized Hazardous Materials

Table 8 on the next page presents the Discipline Specific Management Plans and Permits that are anticipated and clarifies if they are applicable to the Construction and/or Operating Periods.

FRMG’s means and methods for compliance with applicable hazardous materials laws, regulations, and guidance within the Project’s area of disturbance and in particular at the hazardous materials sites, Superfund site, and landfill identified in the ROD, primarily involve the following:

- Managing soil impacted with contaminants of concern (COCs). These COCs may include arsenic, chromium, lead, total petroleum hydrocarbons (TPH) gasoline range organics (GRO), TPH diesel range organics, polycyclic aromatic hydrocarbons and asbestos in soil; and
- Managing contaminants and materials (e.g. lead-based paint, asbestos) found in structures to be demolished.

As part of FRMG’s means and methods for removal, management, and disposal of RHMs, FRMG will notify and coordinate with local, state and federal authorities, including CDPHE, USEPA, CCD Department of Environmental Health, Division of Oil and Public Safety, Colorado Division of Water Resources and Tri-County Health Department for obtaining permits and

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0		
Approved by:	Revision Date:	Review by:	
Approved by:	Release Date: TBD		

approvals. Specific processes and procedures for RHM management are outlined in the Discipline Specific Management Plans outlined below in Table 8.

Table 8. Discipline Specific Management Plans and Permits for Recognized Hazardous Materials.

Discipline Specific Management Plans and Permits	Construction Period	Operating Period
Materials Management Plan (MMP)	Yes	No
Long-Term Clean Up Plan(s)	As Needed	As Needed
Sampling and Analysis Plan (to be included in MMP)	Yes	No
Health and Safety Plan (HASP)	Yes	Yes
Spill Prevention Control Countermeasures (SPCC) Plan	Yes	Yes
Structure Survey Assessment Plan (SSAP)	Yes	No
Structure Survey Assessment Reports (SSARs)	Yes	No
Asbestos Project Design meeting the requirements of CDPHE, Air Quality Control Commission (AQCC) Regulation No. 8, Part B, Section III.C. (to be included in SSARs)	Yes	No
Residential Properties Sampling Plan	Yes	No
Remedial Plan (for Supervening Events)	As Needed	As Needed
Colorado Air Pollution Control Asbestos Abatement or Demolition Permits	Yes	No
Dewater or Remedial Management Plan (RAMP)	Yes	Yes
Remediation Activities Discharging to Surface Waters Permit, CDPHE WQCD (CDPS General Permit COG315000)	Yes	Yes
Remediation Activities Discharging to Groundwater, CDPHE WQCD	No	No
Notification as Resource Conservation and Recovery Act Generator (when FRMG is the Generator as determined pursuant to Section 23.6 of this Schedule 17; if the Department is the Generator as determined pursuant to Section 23.6 of this Schedule 17, the Department will submit this notification), CDPHE, Hazardous Materials and Waste Management Division	As Needed	As Needed

Management of Soil

Soil management including applicable Discipline Specific Management Plans and Permits are anticipated for the Construction Period only, with the exception of Long-Term Cleanup Plans that may potentially extend beyond the Construction Period and into the Operating Period. Using available environmental data, the quantities of soil to be handled as part of cut (excavation) and fill have been estimated and characterized based on anticipated levels of contamination.

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Disposal or reuse of soil removed or relocated as part of construction will be determined through sampling and characterization in accordance with the Final *Beneficial Reuse and Materials Management Plan* (BRMMP) for the Central 70 Project (CDOT, March 30, 2017). FRMG has identified Production of the MMP as a key work plan necessary for implementation of the excavation work on the Project. The MMP will be the technical execution plan for meeting the requirements of the BRMMP and will also include a Sampling and Analysis Plan (SAP) characterizing soil for beneficial reuse or disposal.

The MMP will include criteria for comparison of sampling and analysis data to Predetermined Action Levels (PALs) established in the BRMMP, which will lead to cut soil being classified as either:

- **Non-impacted/Unrestricted Reuse** (includes use as clean fill both inside and outside of the roadway right-of-way and on City and County of Denver property) – contaminant concentrations less than Residential PALs and Groundwater Protection and Residential Protection PALs;
- **Impacted/Restricted Reuse** (includes use as fill inside of the roadway right-of-way) – contaminant concentrations greater than Residential PALs, but less than the Worker Protection PALs. Note that this reuse scenario also includes material also includes material exceeding Groundwater Protection PALs, if it is used in areas at least 5 feet above the groundwater interface; or
- **Health Risk/Disposal** – applicable for all near surface soil (soil from ground surface to a depth of 1 foot), soil exceeding Worker Protection PALs, or soil suitable for impacted/restricted reuse that cannot be reused in the right-of-way. This material will be sent for off-site disposal at an approved receiving site (e.g., Denver Arapahoe Disposal Site).

Sampling protocol will be designed to meet the requirements of the BRMMP and to reduce uncertainties and inaccuracies in the soil characterization process for near surface soil, shallow unsaturated soil, unsaturated native soil, and saturated soil intervals. Based on available data, most of the soil will not meet the unrestricted reuse parameters due to constituents of concern (COC) exceeding Groundwater PALs. However, Toxicity Characteristic Leaching Procedure (TCLP) data may be used to show that restrictions on placement relative to the groundwater table are not needed for material exceeding Groundwater PALs or COCs without established Groundwater PALs. If TCLP concentrations do not exceed the Colorado Basic Standards for Groundwater (GWS), then the material may be placed at locations less than five vertical feet above the groundwater table. If TCLP data exceed any GWS, then the material must be placed at least five vertical feet above the groundwater table or disposed of off-site.

If contaminated soil requires off-site disposal, the soil will be sampled and assessed for hazardous waste determination. To determine if the impacted soil is a characteristic hazardous waste, it will be screened based on flash point (ignitability characteristic), pH (corrosivity characteristic), and toxicity characteristic data.

Toxicity characteristics can be evaluated in two ways – 1) by directly comparing TCLP data (mg/L) against the hazardous listing for the toxicity characteristic for a compound, or 2) by

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

comparing the total concentration data (mg/kg) to 20x the hazardous listing for the toxicity characteristic for a compound.

If results pass the hazardous waste determination screening, which existing data indicate it likely will for this Project area, then the soil is considered non-hazardous with regards to disposal. Soil handling and disposal activities for non-hazardous soil will be performed in accordance with applicable Colorado Solid Waste regulations (6 CCR 1007-2, Part 1).

If the results do not pass the screening, the soil will be handled and disposed as characteristic hazardous waste in accordance with applicable Colorado Hazardous Waste regulations (6CCR 1007-3), and Resource Conservation and Recovery Act (RCRA) Generator notification will be submitted to CDPHE, Hazardous Materials and Waste Management Division. When FRMG is the Generator as determined pursuant to Section 23.6 of this Schedule 17, then FRMG will submit this notification. If the Department is the Generator as determined pursuant to Section 23.6 of this Schedule 17, then the Department will submit this notification with support from FRMG. Based on the amount of hazardous waste generated, FRMG or the Department could be small- or a large-quantity generators. Applicable permits (e.g., USEPA Identification number) and fees will be determined and addressed.

Management of Regulated Asbestos-Contaminated Soil (RACS)

Soil containing asbestos (friable or non-friable), which is likely to be encountered in the Denver Coliseum area of the Project, will be addressed in accordance with the applicable Colorado Solid Waste regulations (6 CCR 1007-2, Part 1, Section 5), Air Quality Control Commission's Regulation 9, Part B, and the *Regulated Asbestos-Contaminated Soil Management Standard Operating Procedure* (CDOT, October 18, 2016).

The CDOT *Regulated Asbestos-Contaminated Soil Management Standard Operating Procedure* specifies procedures and requirements for:

- Roles and responsibilities for CDOT, contractors, and consultants;
- Personnel qualifications (training and experience);
- Materials and equipment;
- Sampling Regulated Asbestos Contaminated Soil (RACS) and/or ACM;
- Excavating known and suspect RACS;
- Air monitoring;
- Documentation;
- Equipment and worker decontamination;
- Disposal; and
- Reporting.

If unexpected RACS and/or ACM are discovered during excavation, then work will immediately be stopped. The Department's Representatives will be notified. Field personnel will secure the area and take actions to ensure that the suspect material is not disturbed. CDPHE will also be notified within 24 hours of unexpected RACS and/or ACM discovery utilizing a CDPHE Notification of RACS Disturbance Form. FRMG will notify the Department and if directed, FRMG may notify CDPHE or other agencies on behalf of CDOT.



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Additionally, the Department’s Certified Asbestos Building Inspector (CABI) will handle activities beyond initial discovery, including but not limited to:

1. Conducting inspections to assess the presence and extent of asbestos
2. Documenting, collecting, packaging, and transporting suspect asbestos
3. Directing qualified personnel to conduct items mentioned above

The CABI will meet the qualifications outlined in Section 4.0 of the *Asbestos-Contaminated Soil Management Standard Operating Procedure*, and will be a subcontractor independent of FRMG and FRMG’s abatement contractor. To eliminate work delays, CDPHE notification will be provided at least 10 Working Days prior to ground disturbance in areas with known or suspected Regulated Asbestos-Containing Material and/or ACM.

All RACS and ACM will be disposed of off-site in accordance with Section 5.5.8 of the Colorado Solid Waste Regulations. Specific disposal requirements are provided in Section 10.0 of the *Asbestos-Contaminated Soil Management Standard Operating Procedure*.

Managing Contaminants Found in Structures to be Demolished

Since demolition of structures is only planned to occur during the Construction Period, management of contaminants related to demolition and applicable Discipline Specific Management Plans and Permits will only be needed for the Construction Period. Managing asbestos, lead-based paint, storage tanks and other potential contaminants or materials associated with structure (e.g. buildings and bridges) demolition and site reclamation will follow applicable rules and regulations and BMPs applied in Colorado by CDOT, RTD and others on similar projects. Details about each site are provided in Environmental Site Assessments for acquired properties where demolition will occur. Coordination and collaboration with the Department, CDPHE, USEPA, Occupational Health and Safety Administration (OSHA) and other agencies will occur, as needed, to refine site specific protocol and/or management techniques where additional information is needed before demolition and site reclamation can occur. Information from this coordination and collaboration will be used to develop the Structure Survey Assessment Plan (SSAP) that will be used to perform inspections and create inventories of regulated materials in structures or on properties to be demolished. FRMG has identified the SSAP as a key work plan needed to assess structures and properties for demolition.

The SSAP will provide a rigorous set of procedures (including sampling and analysis) for confirming the presence or absence of potential hazardous materials. The resulting Structure Survey Assessment Reports (SSARs) will specify required abatement protocols for each structure (e.g., procedures for removal and disposal of construction materials with lead-based paint, asbestos project design for removal/abatement of ACM). To prevent delays, structure surveys will be completed in the order of the planned demolition, and required notifications for abatement of regulated materials (e.g., National Emission Standards for Hazardous Air Pollutants (NESHAPS) notifications for asbestos) will be prepared and submitted once the abatement contractor is selected and the SSAR for a structure has been produced. This will ensure that delays do not occur due to minimum lead times for submittals (e.g., 10 days for submittal of NESHAPS notifications).

Abatement and demolition permits and other applicable permits/approvals will be obtained prior to commencing demolition activities for each structure. Asbestos encountered in the structures



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

slated for demolition will be addressed under the SSAP and SSARs in accordance with the applicable Colorado Solid Waste regulations (6 CCR 1007-2, Part 1, Section 5) and AQCC Regulation 8, Part B. SSARs for structures to be demolished requiring abatement of greater than 1,000 linear feet or 3,000 square feet of asbestos-containing building material will include an Asbestos Project Design meeting the Project design requirements of AQCC Regulation 8, Part B, Section III.C.

Sampling for potentially impacted soil or at a structure slated for demolition will be performed in accordance with the approved SAP included with either the MMP or the SSAP. Additionally, sampling decisions related to materials excavated near the Superfund sites in the Project area will be made in consultation with CDPHE. Documentation and reporting of hazardous materials management will be completed in accordance with the MMP requirements. Field oversight, sampling, waste determination, waste handling and documentation will be performed by competent and experienced technician(s), who meet or exceed the Material Management Plan (MMP) requirements.

Energy

FRMG’s means and methods for compliance with energy requirements during the Construction and Operating Period are described in the following discussion and **Table 9**.

FRMG’s means and methods for compliance with the energy mitigation measures in the ROD “to the fullest extent practicable” involve submitting the required quarterly energy update within the corresponding ECWP updates and inclusion of “above and beyond” performance metrics. FRMG will include the energy requirements in Project specifications and/or within plan notes.

Interdisciplinary Review evaluations will occur at 60% and 90% design reviews to verify energy measures are addressed and meet the established performance metrics. FRMG will perform visual monitoring daily and weekly to check on compliance with idling and other requirements and report the results on a monthly basis. The ECWP updates will address documentation as follow-up to these steps and demonstrate and quantify energy savings, where feasible.

Table 9 lists the energy mitigation measures and identifies corresponding FRMG commitments to save energy.

Table 9. FRMG Commitments to Save Energy during the Construction and Operating Periods.

Mitigation Measure	FRMG Commitments: Construction and Operating Period Procedures and Program Elements
Construction Period	
Limit idling of construction equipment	FRMG’s practices will include limiting idling to five minutes or less in any 60-minute period
Encourage use of closest material sources	FRMG will seek materials suppliers from within 20 miles of the Project corridor when feasible and appropriate and within the Project region and state to the extent possible



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Mitigation Measure	FRMG Commitments: Construction and Operating Period Procedures and Program Elements
Encourage employee carpooling and vanpooling for construction workers	FRMG will establish a carpool and vanpool program for implementation during the entire Construction Period. The program will include preferential parking for high occupancy vehicles.
Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses	Staging areas will be selected and cleared prior to use. The site selection process will use a variety of criteria including proximity to work Areas, distance from sensitive receptors and environmental resources.
Encourage use of cleaner and more fuel efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies)	A large amount of FRMG's fleet of off road vehicles and equipment is capable of running on biodiesel, reducing fossil fuel consumption. FRMG will use a fleet of vehicles that includes a mix of cleaner and more fuel-efficient vehicles.
Encourage use of alternative fuels	FRMG will use alternative fuels where feasible.
Implement traffic management schemes that minimize delays and idling	FRMG's Construction Stage Maintenance of Traffic Plan will optimize traffic flow
Operating Period	
Implement energy conservation measures where appropriate, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation in accordance with CDOT's Lighting Design Guide (CDOT, 2006)	Specifications for lighting and other electrical equipment will encourage the selection and installation of energy-efficient systems
Encourage energy-efficient options for the Cover facilities	Cover lighting will be designed in accordance with CDOT's Lighting Design Guide. Measures to reduce energy use will be considered during the Cover master planning process.

Environmental Compliance and Mitigation Training Program

One of the key environmental compliance means and methods is FRMG's ECMT. This training will be based on the requirements, means and methods set forth in FRMG's ECTM.

FRMG will develop the ECMT for Department review and Acceptance, and will provide updates. Attachment 2, Item 1 presents the CDOT-approved ECMT for the C-470 project for illustrative purposes.

All FRMG personnel, including subcontractors, are required to complete the FRMG ECMT led by the FRMG EM to provide environmental awareness training. The ECMT is scheduled as part of the overall Project orientation, and is required for all employees prior to working in the field. In addition, IQC inspectors, supervisory staff, and Independent Quality Control Environmental Manager (IQCEM) will participate in the ECMT.

The awareness training is focused on identification of potential environmental resources, but not techniques to manage the resources. An environmental presentation is conducted as part of the



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

ECMTP and a fact sheet is provided to all individuals who attend the trainings as a quick reference guide while working on the Project. Personnel performing specific assigned tasks affecting environmental compliance will be trained in the specific plans, processes and procedures. For example, the AQ3MP and MMP training will be led by the FRMG EM with assistance from the Air Quality and Recognized Hazardous Materials technical discipline managers, respectively (Refer to Section 2.1.1.h Roles, Responsibilities and Qualifications of the Environmental Manager and Environmental Management Team for further information regarding personnel training and qualifications).

Records are kept for the number of sessions and staff who have completed the ECMTP through the use of sign-in sheets, employee-specific identification numbers, and hard hat decals. The sign-in sheets are included in the ECWP update. FRMG will report training information monthly in the ESR. Attendance logs will be maintained within the Engineering and Laboratory Vital Information System (ELVIS) and Aconex as described in Section 2.1.1.f Process Control and Independent Quality Control. Environmental Management Team personnel and inspectors/technicians certifications will be entered into the ELVIS technician certification module. This record keeping will show that environmental inspections and compliance activities are being performed by certified personnel. The training resources section of ELVIS will be used for the most up-to-date workflow explanations and other training aids.

FRMG will revise the ECMTP regularly to reflect the most current policies, rules, and regulations and provide annual updates to the ECMTP to the Department for Acceptance 30 Calendar Days after the end of each Contract Year.

Some of the key elements of the ECMTP will include:

- Water quality and stormwater requirements
- Wetlands and waters of the U.S.
- Wildlife and protected species
- 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 activities
- 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



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Additional topics as needed to maintain compliance with the Environmental Requirements
- Responsibilities of production supervisors and inspectors in connection with environmental compliance

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	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

2.1.1.e Tracking and Documenting Environmental Compliance Status, Progress and Completion

The following discussion addresses FRMG’s compliance tracking and reporting processes throughout the Construction Period and Operating Period of the Project. **Figure 5** on the next page presents a flowchart illustrating the overall compliance tracking and documentation processes. An overview of FRMG’s key environmental compliance tracking and documentation processes is presented in **Table 10** on the following page. FRMG’s ECTM (Attachment 1) provides the framework for the tracking and documenting process and corresponding means and methods for each environmental requirement and commitment.

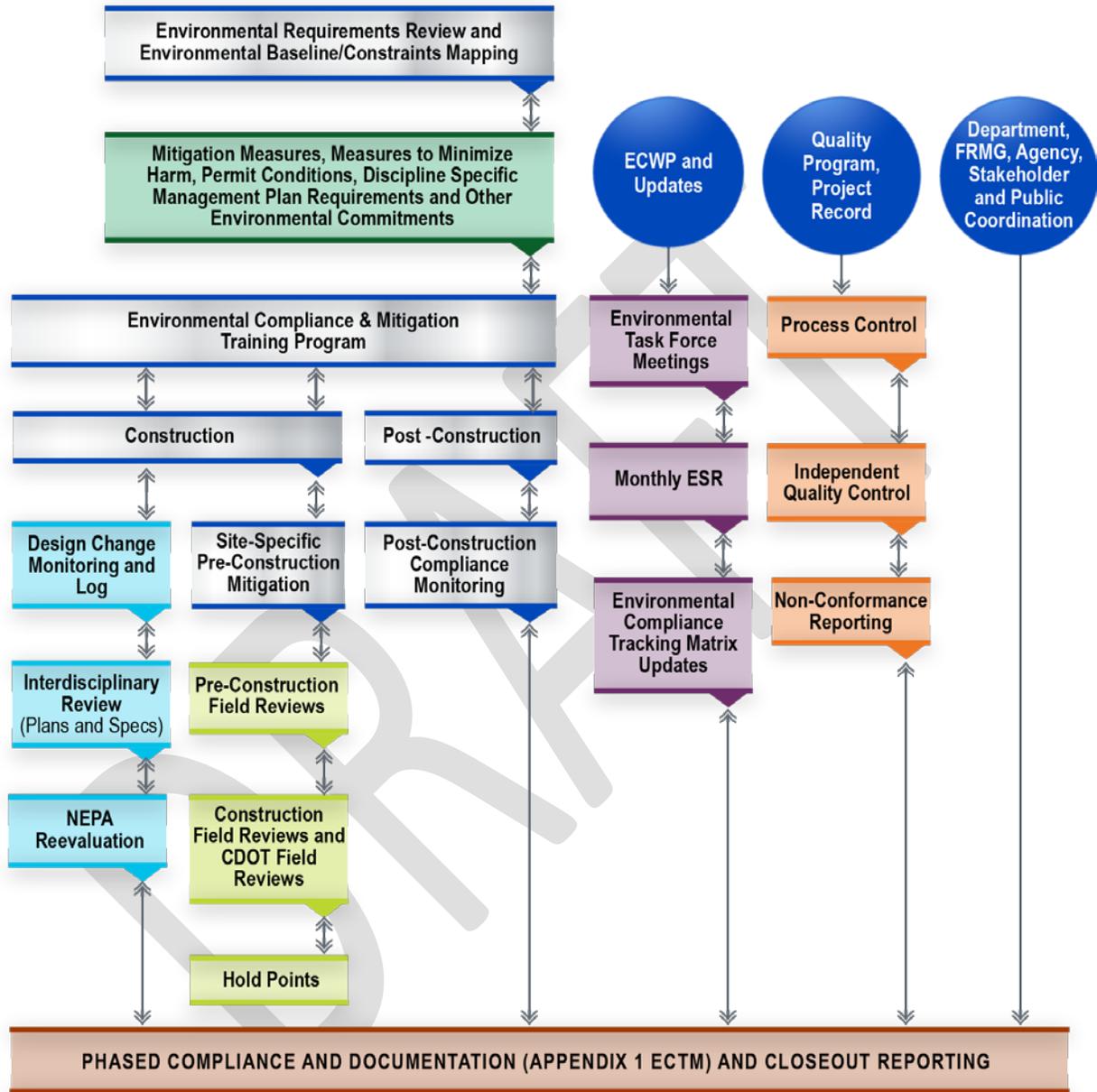
Primary Methods for Compliance Coordination and Collaboration

The primary methods FRMG will use to coordinate and collaborate with the Department and other Project stakeholders as part of the compliance tracking and documenting effort are described in the following discussions and shown in Figure 5 below:

- Clarification and Agreement on Compliance Requirements
- Monthly (Construction Period) and Quarterly (Operating Period) ESR
- FRMG’s ECTM (See Attachment 1 and as defined previously)
- Processes for Addressing Nonconformance
- Closeout Process: Approvals

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

Figure 5. Overall Compliance Tracking and Documentation Process Flowchart



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		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0		
Approved by:	Revision Date:	Review by:	
Approved by:	Release Date: TBD		

The following table provides a description of FRMG’s key environment management processes which corresponds to the colored headings shown in the Overall Process Flowchart (Figure 5).

Table 10. FRMG’s Overall Environmental Compliance Tracking and Documentation Processes.

Compliance Requirements (Compilation and Tracking): <ul style="list-style-type: none"> Mitigation Measures (FEIS and ROD) Permit Conditions Discipline Specific Management Plan Requirements Other Environmental Commitments 		Reference Location: 2.1.1 d, 2.1.1 e and Attachment 1	
Process Description: Compiling and maintaining all of the Project’s environmental requirements in one location is a fundamental process in tracking environmental compliance. FRMG will address all Environmental Requirements and commitments in a detailed environmental compliance tracking effort (referred to as the Environmental Compliance Tracking Matrix [ECTM]) and provide updates to the Department during all phases of the Project. Environmental requirements and commitments include: <ul style="list-style-type: none"> FEIS mitigation measures Measures to Minimize Harm (ROD 1: Phase 1) Environmental permit conditions Discipline Specific Management Plan requirements Other environmental commitments prescribed in the project agreement and contract documents The ECTM prescribes a process of “who-what-when-where and how” environmental compliance will be performed. Further, the ECTM provides the following information that is considered vital in successfully implementing, tracking and documenting the progress and completion of all environmental requirements and commitments for the Project: <ul style="list-style-type: none"> FRMG staff member(s) responsible for implementation of compliance activities FRMG’s means and methods to verify and achieve compliance during the Construction and Operating Periods Timeframes and reporting frequencies for each activity and location Documentation required to verify and confirm environmental compliance for each activity The monthly update of the ECTM and submittal to the Department allows FRMG to communicate, collaborate and coordinate to address overall environmental compliance. The ECTM is appended to each monthly Environmental Status Report (ESR).			
Environmental Compliance and Mitigation Training Program (ECMTP)		Reference Location: 2.1.1 d	
Process Description: FRMG’s ECMTP includes both environmental awareness training and resource-specific training. All FRMG personnel and construction management (i.e. Project foremen, superintendents, Project Engineers) including Subcontractors, are required to complete the FRMG awareness training as part of the on-boarding process for the Project and prior to working in the field. In addition, IQC inspectors, supervisory staff, and Independent Quality Control Manager (IQCM) will participate in the ECMTP. The EM will be the training lead for the ECMTP. Personnel performing specific assigned tasks affecting environmental compliance (e.g. air quality monitoring or management of hazardous substances) will be trained in the discipline specific plans, processes and procedures. <p>FRMG will report training information and attendance records on a monthly basis in the ESR to the Department. Attendance logs will be maintained within the Engineering and Laboratory Vital Information System (ELVIS) and Aconex. FRMG will revise the ECMTP regularly to reflect the most current policies, rules, and regulations and provide annual updates to the ECMTP to the Department for Acceptance after the end of each Contract Year.</p>			



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Design Monitoring, Interdisciplinary Review, Environmental Review and NEPA Reevaluation	Reference Location: 2.1.1 e and 2.1.1 f
<p>Process Description: FRMG’s interdisciplinary plan review processes will include environmental compliance reviews for individual plan sets to review original designs and identify design changes that could alter impact findings and/or corresponding mitigation measures or environmental commitments, and define processes to determine the appropriate level of environmental review.</p> <p>A summary of interdisciplinary review findings that require further action are included in the monthly ESR to the Department.</p>	
Environmental Field Reviews	Reference Location: 2.1.1 e, f and j
<ul style="list-style-type: none"> • Pre-construction Field Reviews • Construction Field Reviews/Department Field Reviews • Hold Points <p>Process Description: FRMG will perform pre-construction reviews (also referred to as Readiness Reviews relative to Process Control) to ensure Environmental Requirements and considerations are understood in the field before construction starts. Weekly field reviews will focus on active environmental compliance tracking, monitoring and reporting with the purpose of documenting compliance and/or nonconformance and if so, getting the project back into compliance. Hold points will be planned for and implemented as construction progresses to ensure that work is performed with the QMP and the Project Agreement</p> <p>Monthly reviews with the Department will occur to verify key issues with Project management and leadership. Monthly field reviews also focus on making sure that the issues raised at Environmental Task Force meetings and during the weekly field reviews are appropriately addressed in the field.</p>	
Team Coordination and Communications	Reference Location: 2.1.1. g and h, and Appendix 1
<ul style="list-style-type: none"> • Environmental Task Force Meetings • Monthly ESR and Mitigation Completion Reports • ECTM Updates • ECWP Updates <p>Process Description: FRMG’s communication processes involve weekly Environmental Task Force meetings, consultation and coordination with the Department, FHWA and other Project stakeholders and permitting agencies, design phase status reporting, construction phase environmental field reviews and Project record keeping. ESRs will provide the primary means of communicating compliance status activities and updates, environmental issues, stakeholder and agency communications, Environmental Task Force meetings. The ESR will also provide lessons learned during environmental field reviews and compliance management to improve monitoring and execution of compliance activities. The ECTM and Mitigation Completion Reports will be appended to the ESRs to provide a comprehensive status of all environmental requirements and commitments. FRMG will update the ECWP annually or as a result of monitoring and improving the effectiveness of the Plan. For certainty, the plan will be updated and submitted to the Department for Acceptance when new environmental compliance requirements for the Project are incorporated (e.g. through discipline specific management plans). Improvements to the environmental compliance process will be initiated immediately as needs arise.</p>	
Process Control and Independent Quality Control Programs (including non-conformance)	Reference Location: 2.1.1 f and Landscape Requirements
<p>Process Description: FRMG’s process control (PC) includes design- and construction-related procedures to assure that all activities related to environmental compliance are accomplished under controlled conditions and the requirements for inspection and monitoring are followed. Design and construction Work Plans (where design and construction personnel review the requirements and identify the need for PC and Independent Quality Control (IQC) inspection, monitoring and hold points) are a critical component of the PC and IQC activities in ensuring environmental compliance for the Project. FRMG’s IQC will verify and document conformance with</p>	



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

<p>Environmental Requirements as a part of environmental reviews and inspections. As part of the PC and IQC process, potential non-conformances with environmental requirements will be identified, documented, corrected and prevented from reoccurring (by way of corrective and preventative action reporting) and included in the summary of findings in the ESR. A summary of the PC and IQC findings, including non-conformances are included in the monthly ESR to the Department and reviewed via the established protocol defined in the Central 70 Project Quality Management Plans.</p>	
<p>Compliance Management Means and Methods: Overall and for Individual Technical Disciplines during the Construction and Operating Period</p>	<p>Reference Location: 2.1.1.d and Appendix 1</p>
<p>Process Description: FRMG’s ECTM includes means and methods for each Environmental Requirement and the ECWP describes detailed means and methods for individual technical disciplines. These methods include a variety of design, pre-construction, construction, and post-construction (operation and maintenance) compliance tracking and reporting techniques. When the Construction Work is considered complete, FRMG will provide a Mitigation Completion Report for Department review and Acceptance. The Mitigation Completion Report documents and certifies the completion of all Environmental Requirements applicable to the Construction and Operating Periods.</p> <p>FRMG’s EM team will document and report environmental inspection/monitoring activities and results as prescribed in the ECTM to verify and confirm environmental compliance. Inspection and monitoring reports will be uploaded to FRMG’s electronic records management system for receiving, storing, transmitting and tracking documents, transmittals, submittals and correspondence of quality records for the Project.</p> <p>Some of the key environmental compliance technical issues that carry forward into the Operating Period include:</p> <ul style="list-style-type: none"> • Ongoing management of stormwater facilities, flows, and discharges, including meeting general water quality requirements and water treatment plant requirements • Restoring disrupted natural areas and controlling erosion after Construction Work is completed • Managing the potential for encountering Hazardous Substances in soils and groundwater • Controlling fugitive dust in restoration areas and where new earthwork occurs from Renewal Work • Proper assessment of potential environmental impacts and developing appropriate mitigation methods for incidents which may cause unanticipated problems (i.e. such as fuel spills) <p>The monthly update of the ECTM and submittal to the Department allows the Environmental Management Team to communicate, collaborate and coordinate to address overall compliance. This ECTM is appended to each monthly ESR and Mitigation Completion Report.</p>	
<p>Landscape Requirements</p>	<p>Reference Location: 2.1.1 d (Visual) and Landscape Requirements</p>
<p>Process Description: FRMG will involve landscape architects in: 1) design of noise and major retaining walls 2) design of temporary walls at and near Swansea Elementary School area, 3) reconfiguration of the Swansea Elementary School site and playground facilities, 4) installation of new and replacement vegetation, and 5) tree and shrub mitigation for SB 40 impacts.</p> <p>FRMG’s landscaping and aesthetics program will address: seeding, fertilizer, soil conditioner, and sodding; mulching; planting; transplanting; soil retention covering; herbicide treatment; and irrigation systems.</p> <p>FRMG’s irrigation and noxious weed management efforts will be integrated into the landscaping designs and specifications.</p>	

Clarification and Agreement on Compliance Requirements

Compliance with individual mitigation measures and permit conditions can be simple and clear, or complex and involve uncertainties and room for interpretation. Most compliance requirements

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

are simple and self-explanatory. If compliance details require discussion or confirmation with the Department, CCD, and/or other stakeholders, the FRMG’s EM discusses the issues with the Department CCD, and/or other stakeholders and secures agreement on what constitutes compliance. Agreement and related understandings with the Department Environmental Representative, CCD, and/or other stakeholder representatives are recorded in the Environmental Task Force meeting minutes or other written documentation.

Once general agreement is established, the next steps involve determining the extent to which documentation for the Environmental Project Record (described below in Section 2.1.1 g Communication and Environmental Progress, Completion and Compliance and Document Control) is required for a specific measure, and then to close out the compliance tracking process for that measure.

Documentation may simply be Department concurrence in the form of a signoff or acknowledgement in the ECTM on a given date, or it could be a formal Approval of a document. In some instances, especially during Construction Period compliance, other records may be needed.

The Department Environmental Representative, FRMG EM, and, as appropriate, CCD and stakeholder representatives collaborate to resolve what constitutes compliance, what documentation is needed, and when compliance is anticipated. These outcomes are added to the ECTM.

Environmental Status Reports (ESR)

The FRMG EM will submit an ESR monthly for Acceptance from NTP1 through the Substantial Completion of the Project as defined in Schedule 17, Section 4.1.1 b Environmental Elements Assigned to FRMG and the Department. The FRMG EM will submit an ESR quarterly during the Operating Period. As specified in Schedule 17, the ESRs will include and document:

- a. Include status of compliance with Environmental Requirements
- b. Include a section devoted specifically to water quality
- c. Document any pertinent environmental issues and narrative of compliance actions and environmental activities that have occurred during the reporting period
- d. Summarize any stakeholder communications and Governmental Authority communications
- e. List the plan sets and submittals which have undergone environmental cross-disciplinary review since last ESR
- f. Include dated photos documenting environmental compliance and activities
- g. Include any other content requirements from Schedule 17 or other sections of the Project Agreement
- h. Include summary of weekly Project field reviews (see 5.1.1.d)
- i. Activities performed by environmental professionals will be reported in the ESR and include resumes of those performing the work (see 5.1.1.g)
- j. Include summary of environmental cross-disciplinary reviews of all design submittals in the ESR (see 5.1.1.h)
- k. Include a summary of reviews of proposed changes (Change Notices) for compliance with Environmental Requirements in the ESR (see 5.1.1.i)



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- l. Include summary of findings on the number and severity of nonconformances with Environmental Requirements and the implemented improvement strategies in the ESR (see 5.1.1.k and 5.1.1.l)
- m. Include summary of conformance with Environmental Requirements as part of monitoring work (see 5.1.1.m)
- n. Report ECMTTP sessions and attendees in the ESR (see last paragraph of Section 6)
- o. Provide monthly air quality report and log of data collected in ESR (see 10.1.4.a)
- p. Include paleontologists monthly summary of activity in the ESR (see 14.1.3)
- q. Submit water quality dewatering info in ESR (see 20.1.9 and 20.1.10) for activities during Construction and Operating Periods

FRMG’s ESR will also include:

- Specific summary statements, as needed (Monthly Statement of Recognized Hazardous Materials Management, Black Tailed Prairie Dog Field Oversight Tracking Log, Migratory Bird Treaty Act and Sensitive Species Form, Wetland and Other Waters Tracking Matrix, (see Attachment 2, Items 5 through 8)
- Lessons learned during environmental field reviews and compliance management to improve monitoring and execution of compliance activities
- Environmental Task Force meeting minutes

The ESR will be submitted 10 Working Days following the end of the reporting period (monthly during the Construction Period; quarterly during the Operating Period).

FRMG’s Environmental Compliance Tracking Matrix (ECTM)

As described in Section 2.1.1 d. Means and Methods to Meet Environmental Requirements, FRMG’s ECTM is a fundamental mechanism for tracking and reporting its environmental compliance processes. The ECTM provides a comprehensive framework for presenting compliance requirements, tracking compliance with those requirements, and reporting on the status/completion/closeout of each requirement during the Construction and Operating Periods. The monthly update of the ECTM and submittal to the Department allows the Environmental Management Team to communicate, collaborate and coordinate to address overall compliance. This ECTM is appended to each ESR.

Processes for Addressing Nonconformance

The FRMG EM is responsible for compliance during the Construction and Operating Periods. As stated in Schedule 17, Section 5.1.1, FRMG will implement improvement strategies to reduce the number and severity of nonconformances with the Environmental Requirements and include a summary of the findings in the ESR. Improvement strategies to reduce or preclude environmental-related nonconformance include corrective action and preventative action reporting, consistent with the procedures outlined in the Stage 1 and 2 QMPs. Compliance will be assured through a variety of mechanisms, including Process Control and Independent Quality Review (Refer to Section 2.1.1 f Process Control and Independent Quality Control).

If noncompliance occurs, the FRMG EM is responsible for identifying, reporting and resolving nonconformance. The reporting will include the number and severity of nonconformances with the Environmental Requirements.

	<h1 style="margin: 0;">Central 70 Project</h1> <h2 style="margin: 0;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Administrative nonconformance, failure to adequately address issues on plan sheets identified through interdisciplinary reviews and procedural errors that may occur through the design process that do not comply with known requirements, are identified and discussed at Environmental Task Force meetings and during design review meetings. These discussions evaluate how these nonconformance issues arose and ultimately identify steps to prevent similar nonconformances from occurring in the future.

Nonconformances, such as failure to protect environmental resources according to applicable procedural requirements and design details, are identified by the FRMG EM and supporting team members as part of comprehensive oversight of activities within construction sites. These nonconformances are recorded on the site inspection forms and details are provided in associated reports. Errors of this type are minimized through the ECMTP.

If nonconformance occurs during field observations and/or inspections, immediate action in the field occurs to stop and/or minimize the consequences and the Department Environmental Representative and FRMG EM are notified. The FRMG EM, Department Environmental Representative and FRMG field personnel have the authority to issue a Stop Work Order.

If a Stop Work Order is issued, the FRMG EM will:

1. Notify the Department Environmental Representative
2. Make sure the right individuals are contacted to address the immediate issue
3. Work with the Department Environmental Representative to set cure periods and establish rectification times, and
4. Develop updated and/or new protocol to prevent a similar occurrence.

The FRMG EM is responsible for successful implementation of updated and/or new protocol applicable to the Construction and Operating Periods. This protocol may include updating the ECWP or the ECMTP and may call for more specific and targeted corrective action.

Closeout Process: Approvals

The closeout process allows individual mitigation and commitment progress to occur over time. The following is an example of a mitigation measure where compliance is achieved at the final design point, but full compliance is verified later:

Mitigation Measure # 123 Consider environmentally friendly techniques to provide water quality treatment

This measure can be completed once the relevant Release for Construction package is Accepted by the Department. However, compliance would also be confirmed by ensuring that the requirements in the plans are, in fact, implemented in the field.

The following measure cannot be closed out until the Construction Work has been completed, but there is an element associated with the Release for Construction documents for a specific location that should be shown on the Project plans:

Mitigation Measure # 102 Build a south off-site drainage system to reduce the risk of flooding within the lowered section of I-70, as well as the portion of the watershed between I-70 and the South Platte River

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0		
Approved by:	Revision Date:	Review by:	
Approved by:	Release Date: TBD		

FRMG’s approach clarifies separate final design compliance documentation requirements, and closeout when the Release for Construction documents are Accepted by the Department.

When the Construction Work is considered complete, FRMG will provide a Mitigation Completion Report for Department review and Acceptance. The Mitigation Completion Report documents and certifies the completion of all Environmental Requirements applicable to the Construction Period.

Operating Period compliance is discussed later in this section of the ECWP.

Compliance Methods for the Construction and Operating Periods

Other methods used by FRMG for tracking and documenting compliance efforts associated with the Project are discussed below (also See Figure 5) in the following order:

Construction Period

Final Plan Packages

- Environmental Baseline Mapping and Documentation
- Environmental Task Force Meetings
- Design Change Review
- Interdisciplinary Plan Set and Specification Review

Release for Construction Packages

- Environmental Compliance and Mitigation Training Program
- Preconstruction Field Review and Hold Points
- Construction Field Reviews
- Department Field Reviews

Operating Period

- ECWP, ECTM and Updated Environmental Compliance Monitoring Program

Construction Period: Final Plan Packages

Environmental Baseline Mapping and Documentation

FRMG began by using the Department-provided data containing environmental resources base mapping information to include environmental data layers in the design files. The environmental layers allow for rapid issue identification during the interdisciplinary review process (see Attachment 2, Item 12). FRMG updates these environmental layers, as appropriate, during the course of the Project and adds new information as it becomes available.

The environmental resources layers on a particular plan sheet include the appropriate combinations of the following topics:

- Wetlands and waters of the United States
- Riparian habitat and SB 40 delineated areas
- 100-year floodplain



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Black Tailed Prairie Dog habitat
- Parks and recreational areas
- Raptor nests
- Restricted dewatering sites
- Limits of construction relative to right-of-way, parcel and the cultural resources Area of Potential Effect (APE) boundaries

General notes are provided in plan sets that specify overarching Environmental Requirements from the Project Agreement and local, state, or federal requirements.

The environmental resource exhibits are a tool to demonstrate compliance when the Final Plan Packages are delivered and to communicate with the construction team. The environmental resource exhibits are an integral part of the design plans and will be reviewed in the field prior to and during construction. The exhibits provide spatial information that show where construction fencing must be placed and how and where to avoid sensitive resources.

The baseline mapping will be supplemented with preconstruction photography and video documentation, and supplemental photography and video during construction. This documentation will be obtained and used to document compliance as needed.

Environmental Task Force Meetings

Environmental Task Force meetings are held on a weekly basis during the Construction Period to discuss upcoming/ongoing work activities and specific Environmental Requirements during the Construction and Operating Periods. These meetings are led by the FRMG EM and include the appropriate team members depending on the topics. The purpose of the meeting is to be the conduit for the environmental, design, construction, and the Department teams to discuss Environmental Requirements and concerns for design and construction tasks. In addition, the meetings help to create a feedback loop so that all parties are actively coordinating and that Project processes are being continually refined to improve environmental compliance.

Environmental Task Force meetings may result in the need for additional coordination with design, construction, and quality management personnel. Meetings minutes, including a record of meeting attendees, will be provided to the Department within four working days following the meeting. Environmental Task Force meetings will be held on an as-needed basis during the Operating Period. During the Operating Period after the required term for the appointment of the FRMG EM, FRMG’s PM (or an approved designee) will coordinate and lead the Environmental Task Force meetings as described in Schedule 17, Section 5.3.3.

Design Change Review

If FRMG creates design changes beyond the basic configuration, these changes will be tracked, assessed, and documented to determine whether or not they have resulted in a new impact or impacts to an environmental resource and/or require changing one or more mitigation measure. If necessary and upon Departmental approval, FRMG will perform a NEPA Reevaluation for design changes, as specified in the Project Agreement reevaluation guidance, Schedule 17, Section 8.1.5 and in compliance with the change procedure described in Schedule 24.

Three FRMG ATCs include design changes:



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

1. ATC 65.2
2. ATC 21.1
3. ATC 26.1



ATC 65.2 involves the Cover. ATC 65.2 shifts the alignment of I-70 to the north from that shown in the Project’s reference drawings. The realignment **allows for the full construction of the lowered section of I-70 in a single phase by reducing overlap with the existing I-70 viaduct structure.** Additional details are provided in FRMG’s ATC submittal and will be provided during the design process.

ATC 65.2 was subject to environmental compliance reviews and the findings were described in FRMG’s submittals to the Department. FRMG anticipates that ATC 65.2 will require further, more formal environmental review because the implications have not been discussed with other agencies and the public. The anticipated reevaluation for ATC 65.2 will be created for those purposes and for the Project record. Based on the previous analysis of ATC 65.2, FRMG does not expect the reevaluation to identify new or modified adverse environmental impacts or mitigation measures relative to those disclosed in the FEIS and ROD, however, due to the sensitivity of the Project and the location of the changes associated with ATC 65.2, FRMG believes it is prudent to prepare a Level 2 Reevaluation. The Level 2 Reevaluation will describe the beneficial effects of ATC 65.2 as described by FRMG and mutually agreed upon by the Department. FRMG is ready to complete the required environmental documentation for ATC 65.2 based on previous experience preparing Reevaluations for design changes.



ATC 22.1 involves drainage system outfall modifications. With this ATC **FRMG proposes to eliminate the 72” Storm Sewer and bridge structure MISC-E-17-IU crossing I-70 just east of York Street. This would include the elimination of the North Drainage Outfall System, which includes the on-site detention pond at Race Court.** The design includes upsizing the storm sewer paralleling the south side of I-70 south of 46th Avenue from a 7’ x 6’ concrete box culvert to a 9’ x 6’ concrete box culvert from York Street to the UPRR, dual 78” reinforced concrete pipes under the UPRR, then back to a 9’x6’ concrete box culvert to the Brighton East Pond. Additional details are provided in FRMG’s ATC submittal and will be provided during the Final Design Stage.



ATC 26.1 an alternative ventilation approach in the Central 70 Cover section. ATC 26.1 **proposes the use of a semi-transverse mechanical ventilation system with exhaust air ducted from the tunnel via dedicated exhaust ductwork and fan(s) with fresh air drawn into the tunnel via the portals.** The ventilation equipment would be located in a plant room located below-grade on 46th Avenue North between Fillmore and Clayton Streets.

ATCs 22.1 and 26.1 were subject to environmental compliance reviews and the findings were described in FRMG’s submittals to the Department. FRMG anticipates that both of these ATCs will require Level 2 Reevaluations.

Additional reevaluations may be necessary as the final design effort refines engineering and other details. Each design change will be evaluated and discussed with the Department to determine how to proceed. The following discussion describes this process.

The FRMG EM, or the FRMG EM’s representative, attends internal FRMG meetings and other FRMG Task Force meetings on a regular basis. The FRMG EM’s focus is interdisciplinary. As
Draft Environmental Compliance Work Plan
for Central 70

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

described in 8.1.5, if a proposed design modification reflects any change to the Project not described in the Preferred Alternative and/or the Reference Documents or a possible changed element of the Project is subject to any agreements CDOT or the Enterprises has or have made with State and local Governmental Authorities in connection with the Project these would require Department Approval prior to proceeding with new or modified Environmental Approval.

A Design Change Log will be maintained by the FRMG’s Lead Engineer. This summary of design changes will be shared at the Environmental Task Force meetings. The FRMG EM will identify changes that present the potential to modify impact findings or mitigation. With each design change, the FRMG EM makes an initial assessment regarding the required environmental documentation necessary and works with the rest of the FRMG team to seek concurrence with the Department.

One of the following types of findings will apply to each design change:

- **Minor Changes/Effects:** The anticipated changes would result in inconsequential changes and effects. There is no need for further documentation or disclosure. For example, design changes that involve a different foundation type for a retaining wall would not change the footprint of the Preferred Alternative as addressed in the FEIS/ROD or change impacts or mitigation measures.
- **Moderate Changes/Effects:** The anticipated changes require identification and disclosure of potential effects that are different from those reported previously or are new, and these effects may or may not require modified or new mitigation. If a design refinement creates modified effects and/or may modify mitigation), a focused environmental reevaluation will be prepared. For example, design changes that modify the limits of grading alter the footprint of the Preferred Alternative and may cause impacts on resources that have not been addressed.
- **Substantive Changes/Effects:** If several technical issues are raised and the design change is expected to result in new or modified effects and/or mitigation measures; the need for a comprehensive environmental reevaluation is discussed and details are developed to guide compliance with the applicable NEPA process. For example, design changes such as relocation of an interchange ramp that increase the size the Project footprint, cause potential effects on one or more resources, and/or modify the applicable mitigation measures.

FRMG will follow these general guidelines and the more specific change procedures defined in Schedule 17, Section 8.1.5 and Schedule 24.

FHWA criteria for a NEPA Reevaluation fall in four categories as described in CDOT Reevaluation Form 1399. Form 1399 describes Levels 1, 2, 3, and 4 as follows:

- **“Level 1:** Less than three years since last major step to advance the action (e.g., approval of NEPA document, authority to undertake final design, authority to acquire significant portion of right-of-way (ROW), approval of plans specifications and estimates and there are no changes in Project scope, environmental conditions, environmental impacts or regulations and guidelines. - OR - The document being re-evaluated is a programmatic Categorical Exclusion regardless of time since the last major step to advance the action (as long as the Project would still be covered by a programmatic



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Categorical Exclusion). All decisions in the prior NEPA document remain valid. No FHWA concurrence is required. A note to the Project file and standard distribution as shown in the CDOT 1399 Form is considered sufficient.”

- **“Level 2:** Less than three years since last major step to advance action and there are only minor changes in the Project scope and/or updates or explanation needed for one or more resource areas. FHWA concurrence is required. [CDOT Reevaluation Form 1399].”
- **“Level 3:** More than three years since last major step to advance action and there are only minor changes in the Project scope and/or updates or explanation needed for one or more resource areas. FHWA concurrence is required.”
- **“Level 4:** Major changes in Project scope or environmental commitments, or for EISs when greater than three years have elapsed since the last major Project action. Updates or new studies maybe required. A Level 4 Reevaluation may require a separate document. FHWA concurrence is required.” (CDOT Reevaluation Form 1399, refer to Attachment 2, Item 11).

The following approaches will apply to changes to the Central 70 Project:

- **Level 1:** There are two Project scenarios (A and B) that may be eligible for clearance with a Level 1 reevaluation. Scenario A is for RFC packages that would result in no change to environmental impacts or mitigation requirements compared to the impacts and mitigation identified in the ROD. Scenario B is for RFC packages that have only negligible changes to environmental impacts or mitigation, and where all decisions in the ROD remain valid. For such RFC packages meeting either of the Level 1 scenarios above, FRMG will provide a brief technical memorandum summarizing the design changes that resulted in changes to the environmental impacts and/or mitigation. If the Department agrees that the changes warrant Level 1 processing, FRMG will complete the CDOT Form 1399 for reevaluation and subsequently prepare and provide clearance for construction. Multiple RFC packages can be covered by a single reevaluation, and it is in the best interest of the Project to keep the total number of reevaluations and subsequent environmental clearances to a minimum.
- **Level 2:** An RFC package involving design changes that result in one or more of the following may require a Level 2 Reevaluation: more than negligible change to environmental impacts and/or mitigation, updates or explanation needed for one or more resource areas, a change to decisions in the EIS, or new environmental impacts and/or mitigation. In such cases, FRMG will prepare the Form 1399, providing a summary of the design changes and their associated environmental impact and/or mitigation changes compared to the design package utilized for the EIS. Level 2 reevaluations require FHWA review and approval, which typically requires at least four weeks for each instance. FRMG is aware that the Department will need to review Level 2 Reevaluation documents before submitting the package to FHWA.
- **Level 3:** An RFC package involving new conditions (minor impacts) that have developed over time may or may not require a reevaluation. In this situation, FHWA, the Department and FRMG will evaluate specific conditions associated with the change and make a mutually agreed upon determination for handling the NEPA requirements for the anticipated change.

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Level 4:** A Level 4 reevaluation is only expected to occur if new scope elements are added to the Project, changes to the Project scope result in major changes to environmental impacts and/or mitigation and/or if major and substantive public controversy develops. This level of scope change would require new analysis of the significance of environmental impacts as a result of the Project, and determination of whether or not the EIS remains valid. In such cases, FRMG will coordinate with the Department and FHWA to determine the process to be followed for completion of this work.

The FHWA review and approval must occur prior to the Department’s Approval and before the Work proposed in the Reevaluation Form #1399 can be performed. But as required by 8.1.5, FRMG will obtain Department Approval before pursuing the reevaluation. FRMG will secure required permits and track modified or new mitigation and/or conditions resulting from impacts associated with any Project change addressed in a NEPA Reevaluation.

Even if there are no changes, FRMG will complete a final environmental certification prior to construction approval. This certification is documented via the CDOT Form #128. While the Department is responsible to populate the form, FRMG is responsible to submit documentation and obtain necessary approvals that support this certification.

Interdisciplinary Plan Set and Specification Review

The interdisciplinary plan set review process is an internal FRMG review and a formal component of the Project’s quality procedures. The environmental portion of the process begins with an interdisciplinary review using the environmental constraints layers in the computer-aided design (CAD) system and .kmz files that overlay the base design with the current design at key milestones. This process highlights key environmental resources for the particular plan set and identifies potential compliance issues for reviews by environmental specialists. The following plan set types will be subject to interdisciplinary review at key milestones.

- | | | |
|---------------------|--------------------------|--------------------|
| • Drainage | • Geotechnical | • ITS/Tolling |
| • Landscape | • Maintenance of Traffic | • Power & Lighting |
| • Roadway | • Roadway/Drainage | • Structures |
| • Toll Coordination | • Traffic | • Utilities |

Key independent design review milestones include the 30%, 100% and pre-RFC complete plan sets. It should be noted that independent design reviews will be performed at the 30%, 60% and 100% design milestones for the railroad properties affected by the Project. FRMG’s EM will participate in these design reviews with all three of the project-affected railroad

The Environmental Interdisciplinary Reviewer has an environmental background and is instructed by the FRMG EM on areas of sensitivity and focus. The EM and Environmental Interdisciplinary Reviewer records their signature of review as part of the review process. The FRMG is informed of substantive comments by the Environmental Interdisciplinary Reviewer.

The Design Change Log records design changes, key issues, implications, how they have been addressed (No Documentation Required, Limited Memorandum to the File, Technical

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

Memorandum, or NEPA Reevaluation), and the other items in the Design Change Environmental Documentation Form.

Review records are kept to guide as standard practice as plan sets move from 30% to RFC. One of the primary responsibilities of the process is to define whether or not substantive changes have been made in the plan since the FEIS/ROD and previous plan sets and reviews were completed.

Table 11 illustrates the number and nature of interdisciplinary reviews anticipated per area, as well as some key issues that may arise as the plans progress toward RFC stages.

Table 11. Representative Schedule for Interdisciplinary Plan Review

Plan Set (Areas 1-5)	30%	100%	Key Issues
MOT	TBD	TBD	Unanticipated detour routes and site disturbance
Bridges and Standards	TBD	TBD	Design change: foundations and alignments that change disturbance footprint
Roadway and Drainage	TBD	TBD	Design change: alignments and features that change disturbance footprint
ITS	TBD	TBD	Design Change: features that change disturbance footprint
Notes:			
<i>The interdisciplinary review is conducted on each plan set, by discipline (e.g., Roadway, Bridges, etc.), and by Area (Area 1 through 5). This table is updated and discussed at Environmental Task Force Meetings, as needed.</i>			
<i>ITS Intelligent Transportation Systems</i>			
<i>MOT Maintenance of Traffic</i>			
<i>RFC Ready for Construction</i>			
<i>TBD To be determined</i>			

A summary of interdisciplinary review findings that require further action or Environmental Resources Exhibits changes are included in the monthly ECWP updates (see **Attachment 2**, Item 12).

Construction Period: Construction Stage

Environmental Compliance and Mitigation Training Program

As described previously, FRMG will develop the ECMTTP for the Project and provide the associated training.

All FRMG personnel, including subcontractors, are required to complete the FRMG ECMTTP led by the FRMG EM to provide environmental awareness training to all workers. The ECMTTP is scheduled as part of the overall Project orientation, and is required for all employees prior to working in the field. In addition, IQC inspectors, supervisory staff, and Independent Quality Control Manager (IQCM) will participate in the ECMTTP.

Preconstruction Field Reviews and Hold Points

Prior to construction activities, the Department’s Environmental Management Representative, FRMG EM, Environmental Management Team members, FRMG Construction Manager, and



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

the FRMG construction discipline lead will conduct field reviews to identify area-specific resources and the required mitigation measures that need to be implemented for each type of work in a specific area. The discussion during these field reviews is focused on the construction means and methods of the proposed work and applicable environmental BMPs or mitigation measures (i.e., wetland fencing, stormwater BMPs) that need to be completed prior to or during the construction activity based on the ECTM.

During the preconstruction field review, the FRMG EM completes the site specific preconstruction mitigation plans for inclusion in the ECWP update following approval as noted below. The frequency of environmental field reviews may change based on lessons learned and/or need, and as agreed upon by the FRMG EM, Department Environmental Representative and the FRMG Construction Manager.

Before construction occurs, and after implementation of site specific BMPs and environmental controls or mitigation per the Environmental Requirements, the construction may enter a Quality Hold Point (QHP) as defined in Schedule 8, Section 6 (Quality Management). The Department Environmental Representative, FRMG EM, Environmental Management Team, FRMG Construction Manager, and the FRMG discipline lead, visit the site and confirm the conformance of work to that point. At least 24-hours’ notice is provided for the QHP Inspection.

At a minimum, FRMG will establish QHPs at the following stages of construction:

- After the establishment of water quality BMPs, and prior to initial ground disturbance
- Upon completion of surveys for nesting birds and protected species, prior to ground disturbance, in accordance with Project Special Provision 240, Schedule 17 Environmental Requirements
- Upon completion of protection of environmental resources, in accordance with Schedule 17 Environmental Requirements, where fencing or other appropriate protection mechanism is required, prior to ground disturbance
- At the end of each month to review FRMG’s weekly and post-storm inspections

After each QHP Inspection is complete, the Department’s Environmental Management Representative, FRMG EM, and FRMG Construction Manager (or their designee) initial the site specific preconstruction mitigation plan that the preconstruction action item was approved and completed in accordance with the Environmental Requirements, prior to the start of construction activities. The completed document is included as part of the ECWP update for each reporting period.

Construction Field Reviews

The FRMG EM, or approved designee, will conduct informal daily visual observations and formal weekly construction field reviews of the areas of the Project where construction has started. The daily visual observations will be performed by trained construction workers. The weekly field review will focus on environmental compliance topics identified by issues and concerns raised during the Preconstruction Field Reviews, relevant topics raised during Environmental Task Force meetings, input and feedback provided by Project team members, and/or as a result of nonconformances. Field review observations are summarized in a Field Review Site Form (see Attachment 2, Item 3), including a photographic log documenting

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

environmental compliance activities. A summary of these reviews will be presented in the ESR and the Environmental Task Force minutes.

Monthly Field Reviews

The FRMG EM leads a monthly field review with the Department’s Environmental Management Representative and other team members, as needed, to review the Project and discuss environmental issues during the Construction Period. The monthly field review with the Department may be counted as a substitute for the Environmental Management Team’s weekly field review, if appropriate and agreed upon by the Department’s Environmental Management Representative.

The monthly field visit focuses on active construction areas that the group decides they want to review and focuses on all environmental resources. During the monthly field review, the FRMG EM is responsible for completing the Field Review Site Form, including a photographic log documenting environmental-related compliance activities. The Field Review Site Form is included in the monthly ESR.

Operating Period

FRMG’s ECWP, ECTM and other practices and protocol during the Construction Period will carry forward as the Construction Work is completed and the Construction Period transitions into the Operating Period where O&M Work and Renewal Work will occur. These practices and protocols will be updated, as needed, to reflect the nature of the work that occurs throughout the Operating Period in ECWP and ECTM revisions that are subject to Department review and Approval.

Some of the key environmental compliance technical issues that carry forward into the Operating Period include:

- Ongoing management of stormwater facilities, flows, and discharges, including meeting general water quality requirements and water treatment plant requirements
- Restoring disrupted natural areas and controlling erosion after Construction Work is completed and assuring that wetlands, riparian habitats, greenways and revegetated areas meet reestablishment requirements through revegetation (groundcovers, shrubs and trees) and weed abatement
- Managing the potential for encountering previously known and/or unanticipated hazardous substances in soils and groundwater during earthwork or other required activities
- Controlling fugitive dust in restoration areas and where new earthwork occurs
- Using sand, salt and deicing chemicals properly to address winter traction safety requirements
- Proper assessment of potential environmental impacts and developing appropriate mitigation methods for incidents which may cause unanticipated problems (i.e. such as fuel spills)

The FRMG EM will submit an ESR to the Department and CCD quarterly during the Operating Period.

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

2.1.1.f Process Control and Independent Quality Control

The following discussion describes how the Process Control (PC) and Independent Quality Control (IQC) programs will function to assure compliance with environmental requirements and commitments. This summary is focused on PC and IQC as it relates to environmental compliance and is consistent with the quality management system processes procedures outlined in the Stage 1 QMP and Stage 2 QMP.

Process Control Program

FRMG has incorporated industry best practices and lessons learned in the development of PC procedures. PC procedures are implemented during the Project’s Construction and Operating Periods to assure that all activities related to environmental compliance are accomplished under controlled conditions and the requirements for inspection and monitoring are followed. The purpose of PC inspections, monitoring and tests are to verify and document that all Work performed for the Project conforms to the Environmental Requirements of the Project.

Design Process Control

The Design Process Control Manager (DPCM) will implement and manage the overall design quality program. The DPCM will manage the team of design discipline experts (e.g., geotechnical, landscape/aesthetic, drainage) to schedule design quality reviews, both discipline specific and cross-disciplinary, and to coordinate environmental reviews. Reviews will be conducted at each stage (percent complete milestones and RFC of document production and at final submittal. Key PC procedures relative to environmental compliance during the design period include:

- Checking Plans and Design Drawings
- Checking Calculations
- Review of Reports
- Review and Checking of Specifications
- Notice and Documentation of Design Change
- Comment/Resolution and Tracking Process
- Design Work Planning

Construction Process Control

The Construction Process Control Manager (CPCM) will perform selected inspections of the Work to verify the effectiveness of the Stage 2 QMP. Key construction quality procedures relative to environmental compliance during the Construction Period include:

- Work Planning
- PC Inspection Process
- PC Initial Inspection Report
- PC Completion Inspection Report
- Readiness Review Meeting Agenda
- PC Daily Inspection Report
- PC Completion Inspection Log



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- PC Daily Inspection Instruction Sheet

In general, the following inspection phases will be performed on the Project for all major construction activities. The Readiness Review, Initial, Follow-up and Completion Inspections are described below as they relate to environmental compliance.

- **Readiness Review:** FRMG will participate in readiness reviews prior to the start of specific critical work activities so that all personnel involved have the same understanding of the intent, design criteria, specifications, special details or environmental compliance requirements that need to be followed
- **Initial Inspection:** Initial inspections will be performed as work begins. The initial inspection confirms that the information agreed to during the Readiness Review meeting is effective and the environmental compliance requirements are clear and reflect overall and site specific conditions and considerations.
- **Follow-up Inspection:** Follow-up inspections are performed as needed during definable features of Work to confirm corrective actions identified in the Initial Inspection are in place and effective
- **Completion Inspection:** The completion inspection is performed at the completion of all work in a designated area or associated with a definable phase of the work

PC Work Planning

Design Work Plans will be developed to organize the production of design products, including the required coordination meetings, quality reviews, and submittal packages. The Design Work Plans include the process controls for performing the Work and completing the quality procedures. Participation by discipline experts, construction staff, operations and maintenance staff, environmental compliance staff, Department staff, and other individuals are included in the Design Work Plans.

Construction Work Plans are a major tool in the Project’s Quality Management System. The Construction Work Plan addresses safety, quality, schedule, and productivity, in addition to environmental compliance requirements.

FRMG will prepare Construction Work Plans to identify the inspection, monitoring and compliance activities to be performed by the FRMG PC construction management staff, and the subcontractors during the performance of the Work. The Construction Work Plan includes identifying pertinent environmental compliance requirements, which will include the following:

- Identification of the individuals or groups responsible for performing the inspection or monitoring activity
- Item to be inspected
- Location of the inspection (on- and off-site)
- Identification of characteristics and activities to be inspected
- A description of the method of inspection
- Process Control criteria
- Identification of required procedures, drawings, and specifications
- The frequencies of the required inspections
- Identify hold points for PC and IQC inspection and testing



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- IQC requirements
- Testing frequencies

Where mandatory inspection or test hold points are required, construction will not proceed without the specific consent of the PC. The specific hold points related to environmental compliance will be indicated in the Construction Work Plan and communicated during Readiness Review meetings. Acceptance at specified hold points will be recorded and will include documentation of the FRMG’s EM, discipline lead(s) and Construction Manager, CPCM’s, Independent Quality Control Manager’s (IQCM), the Department’s Environmental Representative (or their representative’s), as appropriate, consenting to the Acceptance, prior to continuation beyond the designated hold point.

Independent Quality Control (IQC) Program

FRMG’s PC and IQC operations are separate. PC procedures are split from the IQC Procedures in the QMP. There is coordination and communication between the two groups, but each entity has its own responsibilities and commitments. IQC will not perform PC activities.

Engineering and Laboratory Vital Information System (ELVIS)

The Independent Quality Control Firm (IQCF) will utilize ELVIS as FRMG’s primary Electronic Records Management System for receiving, storing, transmitting, and tracking documents, transmittals, submittals, and correspondence of quality records (including environmental compliance records) for the Project.

ELVIS is a secured Web-based application, accessible through computers or tablet devices, with controlled user access, which is based on https protocol. Each user’s level of access is controlled by individual security permissions to allow access appropriate for each user’s position. ELVIS provides a variety of functions that are available based on users’ security settings. These functions include Daily Inspection Reports and Test Results, Technical Review of Test Results, Material Quantity Tracking, Minimum Sampling and Testing Requirements Module, NCR Tracking, file storage, sharing, versioning, and transmittal and retrieval of documents in a read-only format.

Individuals identified as recipient will receive a system generated email that provides notification that documents are ready for download. ELVIS will also populate a log to capture the individual, date, and time when the upload occurred. A powerful search engine is also available to assist in finding and retrieving relevant documents.

Using ELVIS, Daily Inspection Reports (or other documentation required to verify and confirm environmental compliance, such as inspection/observation and testing results, reports and memorandums or agency specific reporting documentation) will be marked as a pass or fail and tracked to closure and used to show that we are meeting the environmental compliance requirements.

As required, when Environmental Requirements and environmental activities associated with the Project are complete, FRMG will prepare a Mitigation Completion Report to document compliance completion.

Independent Quality Control (IQC)



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

The IQC program includes elements associated with the design and construction of the Work required by the Project Agreement. These activities are independent of the actual design and construction activities and the IQC staff have no involvement in, or responsibility for, the performance of design or Construction Work.

The Independent Design Quality Manager (IDQM) is responsible for all design quality control activities for the Work. FRMG's IDQM is a registered professional engineer who is employed by the IQCF. The IDQM will see that the methods and procedures contained in the Approved Stage 1 QMP related to Environmental Requirements are implemented and followed by FRMG's design team in the performance of the Work. The IDQM will perform periodic audits of the Designer's quality activities. The audits will address alignment with the QMP and compliance with Project Agreement requirements. FRMG will invite the Independent Quality Control Environmental Manager (IQCEM) to attend Task Force Meetings and Design Progress Review Meetings as well as to participate in scheduled quality reviews for design products. FRMG will require, at a minimum that an environmental review be part of the 100% level design reviews. Environmental comments showing how FRMG's design meets the Environmental Requirements, including FRMG's commitments under Schedule 17 Environmental Requirements will be included in the tracking process.

IQC inspections and monitoring, and tests for environmental compliance requirements will be performed by the IQCF, under the direction of the IQCM and the IQCEM. The IQCEM will verify and document conformance of the Work to the Environmental Requirements of the Project Agreement, the RFC documents, and the referenced rules and regulations. The IQCF inspection and monitoring, and tests results will be captured electronically using ELVIS and uploaded to Aconex as previously discussed.

The IQCEM performs IQC Environmental Inspections to ensure compliance of Environmental Requirements during construction. IQC Environmental Inspections are performed in accordance with the Stage 2 QMP, daily inspection report processes and the following list of associated IQC Environmental Inspection Checklists from the Stage 2 QMP:

- Inspection Checklist - Air Quality
- Inspection Checklist – Landscape Planting
- Inspection Checklist – Environmental Preconstruction
- Inspection Checklist – Environmental Screening and Monitoring
- Inspection Checklist – Stormwater Management
- Inspection Checklist – Discharge Monitoring Report
- Inspection Checklist – Water Quality
- Inspection Checklist – Spill Response Report
- Western Burrowing Owl Survey Checklist
- Asbestos-Containing Soils Inspection Checklist
- Asbestos Abatement Inspection Checklist
- Contaminated Soils Disposition Report
- Contaminated Groundwater Disposition Report
- Environmental Unexpected Asbestos Discovery Report
- Asbestos Building Manifest Report

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

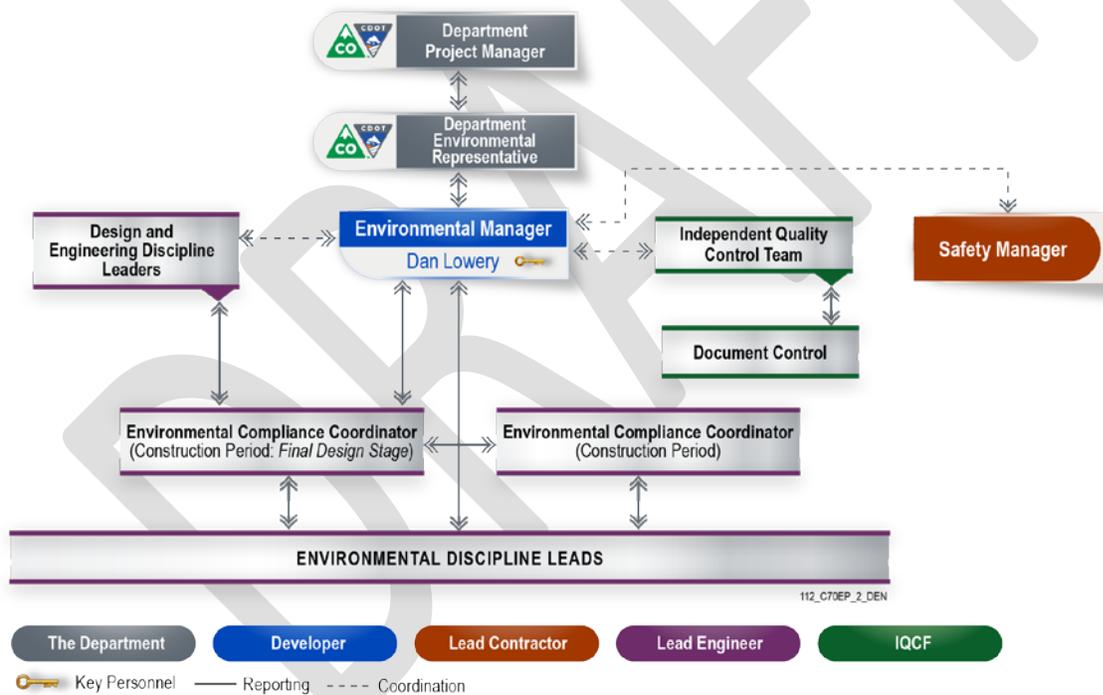
- General Soil Disposition Report
- Construction Noise Monitoring
- Environmental Sodding Inspection Checklist
- Environmental Seeding Inspection Checklist
- Environmental Hardscapes Inspection Checklist
- Noxious Weed Inspection Checklist

2.1.1.g. Communication of Environmental Progress, Completion and Compliance and Document Control

General Communication Protocol

FRMG’s environmental compliance team communication tree is presented in **Figure 6**.

Figure 6. Environmental Compliance Team Communication Tree.



Environmental compliance progress (incremental steps and completion) will be communicated to the Department and CCD through agency consultation and coordination and Environmental Task Force discussions and associated progress reporting. Processes and procedures for communicating progress, completion, and compliance with Environmental Requirements are summarized below.



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Agency Consultation and Coordination

All coordination, consultation, and contact with federal agencies, including the FHWA, will be coordinated through the Department. The responsibility for coordination with Colorado State agencies are generally led by FRMG, since the Construction Contractor is responsible for these permit requirements; however, prior to contacting a state agency all parties will confirm coordination protocols with the Department (e.g., all remediation activities with the CDPHE are coordinated through the Department. Coordination with local jurisdictions is the responsibility of FRMG.

Environmental Task Force and Associated Progress Reporting

The FRMG EM will lead weekly Environmental Task Force meetings with the Department and others where the issues raised in the ESR will be discussed along with the ECTM and the Mitigation Completion Report. The FRMG's ECTM has been customized based on CDOT's most recent commitment tracking spreadsheet template and Project-specific conditions and commitments. The matrix presents each commitment described in the FEIS and ROD (mitigation measures) and has separate line items for tracking compliance with discipline specific management plans and permits and their associated conditions. The matrix compliance entries will clarify design, construction and operational compliance conditions with status updates. This matrix, with subsequent mutually agreed upon modifications and routine updates, is the primary tool used to manage and summarize the Project's environmental compliance status and is appended to each ESR.

The FRMG EM will submit Environmental Task Force meeting minutes weekly and provide an ESR to the Department and CCD monthly for Acceptance during the Construction Period. The FRMG EM will submit an ESR to the Department and CCD quarterly during the Operating Period.

Construction Period Environmental Field Reviews

The FRMG EM will lead field reviews with the Department to identify issues and report environmental compliance conditions (See previous Section 2.1.1.e Tracking and Documenting Environmental Compliance Status, Progress, and Completion and 2.1.1.j Frequency and Purpose of Environmental Field Reviews).

Compliance Completion/Closeout

As required, when all Environmental Requirements and environmental activities associated with the Construction Work are complete, FRMG will prepare a Mitigation Completion Report to document and certify the completion of all Construction Period mitigation and other Environmental Requirements. FRMG will submit the Mitigation Completion Report to and obtain Acceptance from the Department prior to Final Acceptance.

Document Control

The Department and FRMG have designated staff member who will make sure all transmittals, comments and other relevant correspondence items, including approvals, are correctly entered and tracked in Aconex. The document control staff distributes information to other parties, as needed. Any contract-related deliverable required by the Project Agreement, and comments

	<h1 style="margin: 0;">Central 70 Project</h1> <h2 style="margin: 0;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

associated with deliverables are transmitted to the reviewing parties through Aconex; comments are then returned through Aconex, as well.

All substantive environmental communications (emails, letters, etc.) for the Project are tracked for the Environmental Project Record, as described below. When these items are generated, they are sent to the FRMG EM who distributes them to the appropriate parties and copies the Department’s Environmental Management Representative, and Construction Manager following the established Project-specific Document Control Process. Aconex is being used for document control and correspondence between the Department and FRMG. Compliance document will cite Aconex reference numbers, as needed, to verify when and how key approvals occurred.

The Environmental Project Record includes the documents and communications that are used to identify environmental compliance requirements, as well as monitor and report on compliance through completion of Project construction.

In general, the contents include:

1. FEIS and ROD 1: Phase 1
2. Relevant Contract Documents
3. Final Project deliverables
4. Compliance management and reporting documents
5. Relevant internal and external communications and correspondence: Email messages, meeting minutes, telephone records, etc.

2.1.1.h Roles, Responsibilities and Qualifications of the Environmental Manager and Environmental Management Team

Environmental Manager

Daniel Lowery is FRMG’s EM and has over 25 years of experience managing environmental impact assessments and compliance plans for heavy civil infrastructure and highway construction projects. His management experience includes: pre-design environmental constraints and planning, detailed technical studies, agency interaction required to secure environmental permits and approval and compliance during construction. Daniel has an extensive understanding of the environmental commitments made during the NEPA phase, current environmental laws and permits, their applicability during design and construction, and the close monitoring of all construction activities to ensure full compliance with contract requirements. As the FRMG EM, Daniel’s primary roles and responsibilities are summarized as follows:

Coordination and Leadership

- Primary liaison between FRMG and the Department on environmental issues
- Develops site specific procedures/plans to meet the Environmental Requirements
- Provides support to the IQCM to ensure compliance with Environmental Requirements is included in design review and inspections
- Coordinates the implementation of procedures to meet all Environmental Requirements
- Ensures full compliance with all Environmental Requirements in the Work



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Ensures that environmental tasks are performed by qualified environmental professionals and provide the resources to perform the work needed to meet the Environmental Requirements
- FRMG’s primary environmental point of contact and liaison between FRMG and the Department on environmental issues per Section 17 and associated requirements
- Coordinates the participation of the appropriate members of the FRMG’s team for, and leads, Environmental Task Force meetings

Design Review

- Leads environmental cross-disciplinary reviews of all design submittals in order to confirm compliance with all Environmental Requirements and environmental design commitments

Training

- Plans and implements the ECMTTP described in Schedule 17

Monitoring of the Work

- Monitors all Work for conformance with Environmental Requirements
- Leads a weekly field review of environmental issues for the entire Project with the Department
- Provides a monthly summary in the ESR

Change Monitoring and Response

- Performs reviews of proposed FRMG design changes and field design changes to confirm compliance with all Environmental Requirements
- Performs these reviews prior to submittal to the Department of any related FRMG Design Change Notice pursuant to Schedule 24 (*Change Procedure*)
- Performs reviews equivalent to those described in Section 5.1.1.i of Schedule 17 with respect to any Enterprise Change as required by the terms of an Enterprise Change Notice

Quality

- Provides support to the IQCF and IQCEM to ensure compliance with Environmental Requirements is included in environmental field reviews and inspections

Nonconformance Monitors Work for Conformance with Environmental Requirements

- Lead responder to any nonconformance findings (nonconformance notices – NCNs and NCRs) for Environmental Requirements issued by the Department
- Measures the number and severity of nonconformances with the Environmental Requirements
- Implements improvement strategies to reduce the number and severity of nonconformances with the Environmental Requirements

Public Involvement



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

- Attends public and stakeholder meetings related to the Project
- Ensures appropriate environmental materials are available
- Secures involvement from environmental specialists, as needed

Mitigation Completion Report and Certification

- Provides the Mitigation Completion Report documenting and certifying completion of Environmental Requirements
- Certifies the completion of all Environmental Requirements with a signature

Environmental Management Team

The organizational structure, management control, functional responsibilities, levels of authority, lines of communication, and interfaces for activities affecting environmental management and compliance are identified and documented for assigned work tasks in the following sections.

Activities affecting environmental management and compliance include, but are not limited to, training, inspecting, observation, verifying/validating, preparing and reviewing technical calculations, environmental records processing, and data collection and analysis during the Construction and Operating Periods. The responsibilities of all personnel who manage, perform, and ensure environmental management and compliance include:

- Initiate action to prevent the occurrence of adverse environmental effects
- Identify, evaluate, and document environmental successes and problems
- Recommend or initiate environmental improvement solutions through established organizational channels
- Ensure the implementation of environmental improvement solutions
- When adverse environmental effects from Project work are identified, stop work until the deficiency is corrected.

FRMG’s principle Environmental Management Team participants during the Construction and Operating Periods include:

- Environmental Manager (EM)
- Environmental Compliance Coordinators (ECC)
- Technical Discipline Task Leaders

Daniel Lowery is FRMG’s EM. During the Construction Period, Mr. Lowery is supported by two ECCs. One ECC will focus on the Work performed as the design packages are being prepared; and the second will focus on compliance during the Construction Period and Operating Periods.

A number of Technical Discipline Task Leaders and other environmental professional representatives, who are members of the FRMG’s Environmental Management Team, will also provide environmental management and compliance services. Project-based (on-site) representatives, including Project Managers, Site Superintendents, Field and Project Engineers, and workers, will perform their specific duties with environmental management and compliance in mind based on team member training requirements.

In addition, FRMG’s IQCF personnel (as required in Section 6.2.7 of Schedule 8, Quality Personnel), will perform specific duties with respect to document review and approval prior to

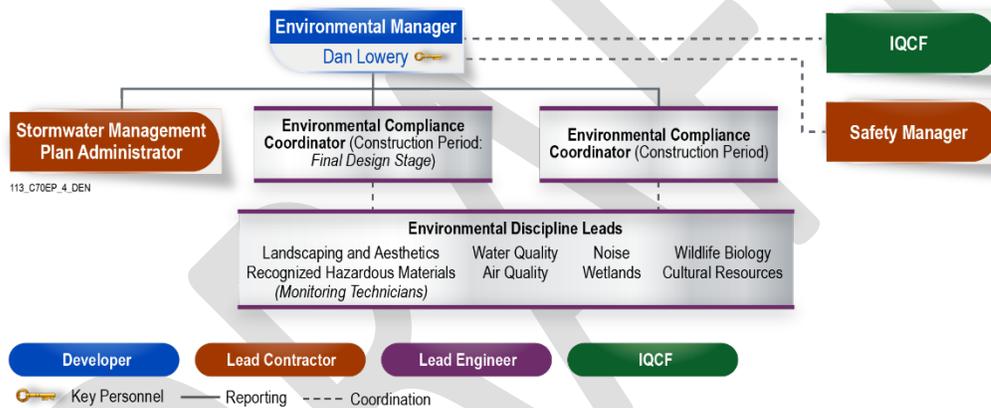
		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

distribution. The independent quality management personnel (IQCEM and inspectors) will collaborate with the FRMG EM and the Environmental Management Team through the procedures and methods as described in the QMP (see Section 2.1.1 f Process Control and Independent Quality Control).

An overall Environmental Management Team organization chart is presented in **Figure 7**. Figure 7 presents the FRMG personnel responsible for implementing the landscape, irrigation, and noxious weed control programs for the Project.

Any changes to the Environmental Management Team participants in the organization chart are subject to Approval by the Department. The names of key personnel and their contact information, title, role description, and qualifications are presented in **Table 12**.

Figure 7. Overall Environmental Management Team Organization Chart (Construction Period)



		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

Table 12. Key Project Environmental Personnel.

Name/Company/ Contact Information	Title, Role Description, Qualifications
Department	
Department Environmental Representative <i>TBD by the Department</i>	The Department’s Environmental Representative approves and/or accepts the environmental deliverables. Attends the monthly site visits and the weekly task force meetings.
FRMG	
FRMG Environmental Manager (EM)	Refer to Environmental Manager heading for detailed description
Environmental Compliance Coordinator <i>(Construction Period: Final Design Stage)</i>	<p>Supports the FRMG EM and provides technical work oversight assistance for environmental deliverables, technical support for Final Design Stage environmental services.</p> <p>Supports the FRMG EM for interdisciplinary review of all design discipline plan sets to address environmental compliance and evaluate environmental resource conflicts.</p>
Environmental Compliance Coordinator <i>(Construction Period: Construction and Operating Period)</i>	Supports the FRMG EM and provides technical work oversight assistance for field-oriented compliance processes
Independent Quality Control Team <i>Refer to the Quality Plan for personnel and their qualifications</i>	The Independent Quality Control Team is responsible for implementing the Process Control (PC) and Independent Quality Control (IQC) programs; executing quality functions for the Project Disciplines during all phases; and providing independent quality control support to the Environmental Manager and environmental compliance team.
Environmental Interdisciplinary Reviewer	Supports the FRMG EM for interdisciplinary review of all design discipline plan sets to address environmental compliance and evaluate environmental resource conflicts
Health and Safety Officer (HSO)	Responsible for compliance with CDOT Standard Specification 250.03, including: Recommending and supervising actions to minimize the risk of hazardous substance related injury to the workers; Preparing written procedures for monitoring of confined spaces and working in or near excavations; and Assisting with contaminated materials related testing.
Recognized Hazardous Materials (RHM) Manager	Responsible for addressing Recognized Hazardous Materials, complying with regulations and requirements, designs and manages remediation activities. Details regarding the responsibilities are included in the Materials Management Plan.
Landscaping and Aesthetics Lead	Responsible for oversight/checking of design documentation of landscape architecture documents by others, verifying content meets related environmental requirements during the Final Design Stage, Construction Stage and Operating Period (post-construction operations and maintenance). Responsible for review of design documents by others, in regard to compliance with CDOT Standard Specifications: Sections 212-217, and Section 623.



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Name/Company/ Contact Information	Title, Role Description, Qualifications
Air Quality and Noise Technical Discipline Lead	Qualified Highway Noise Specialist, responsible for construction and operational noise analysis and mitigation refinement and design. Responsible for air quality management and mitigation compliance.
Wetlands and Vegetation Technical Discipline Lead	Wetland delineations and delineation reports, wetland findings, and USACE 404 permit applications. Implements the Noxious Weed Management Plan.
Wildlife Biology Technical Discipline Lead	Responsible for compliance with CDOT Revision of Section 240 Project Special Provision (Schedule 17 – Technical Requirements, Section 22) including completing Migratory Bird Treaty Act (MBTA) surveys (clearing/grubbing, burrowing owl, vegetation remove and raptor).
Cultural Resources Discipline Lead	Responsible for compliance involving historic, archaeological and paleontological resources.
Monitoring Technicians	Responsible for the monitoring of Recognized Hazardous Materials and notifying the team of any hazardous condition in accordance with CDOT Standard Specification 250.03. Details regarding the responsibilities are included in the Materials Management Plan.
SWMP Administrator	<p>Stormwater Management Plan [SWMP] Administrator responsible for management of erosion/sediment control program, including:</p> <ul style="list-style-type: none"> • Maintaining the stormwater log • Revises the SWMP Site Map as necessary based on actual construction activities throughout the duration of the Colorado Discharge Permit System (CDPS-SCP) • Completes the duties defined in the CDOT Standard Special Specifications, Section 208.03 (c) • Directs the removal of sediment, trash and debris from the construction best management practices (BMPs) and drainage facilities • Performs the required inspections, daily, at least every 14 days and immediately after an event that results in stormwater runoff, including at least once every 30 days and within 48 hours after each event during work stoppages until final stabilization is achieved and the permit is closed • Performs inspections as required by local jurisdictions. • Writes reports after required inspections and ensures findings from inspections are corrected within 48 hours of the inspection. • Responsible for addressing surface and water quality including produced water and water discharge
Erosion Control Inspector and TECS Inspector(s)	Erosion Control Inspector and TECS Inspectors will report to the SWMP Administrator (<i>see Figure 4 FRMG's Organization Chart for Water Quality</i>). One TECS certified inspector shall be required for every 40 acres of total disturbed area, or portion thereof, which is at any time actively receiving temporary and interim stabilization measures as defined in Section 208.04(e) of Section 2.08.

	<h2 style="margin: 0;">Central 70 Project</h2> <h3 style="margin: 0;">Draft Environmental Compliance Work Plan</h3>	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

2.1.1.i Uses of the Discipline Specific Management Plans

The following Discipline Specific Management Plans are required to be Accepted prior to NTP2 and will be prepared following NTP1. Discipline Specific Management Plans are technical environmental resource documents that provide further detailed analyses, guidance and environmental requirements associated with the project. The requirements that are prescribed in the plans will be incorporated into the ECTM for subsequent implementation, tracking and reporting. Attachment 2, Items 13 A and B provides examples of Discipline Specific Management Plans from AECOM's C-470 project for illustrative purposes.

The referenced Discipline Specific Management Plans include:

- Air Quality Monitoring, Maintenance, and Mitigation Plan (AQ3MP)
- Construction Noise Mitigation and Monitoring Plan (CNMMP)
- Integrated Noxious Weed Management Plan (INWMP)
- Materials Management Plan
- Sampling and Analysis Plan
- Residential Soils Sampling Plan
- Health and Safety Plan (HASP)
- Spill Prevention Control and Countermeasures (SPCC) Plan
- Structure Survey Assessment Plan

This ECWP hereby incorporates these Discipline Specific Management Plans by reference.

Additional plans that will be prepared as needed include:

- Long-Term Clean Up Plan
- Remedial Plan
- Dewatering or Remediation Plan
- BTPD Management Plan

The environmental compliance requirements prescribed in each of these plans have been incorporated into the FRMG ECWP in two primary ways:

1. **Training:** Each of these plans helps guide the ECMTMP. The proposed training program addresses Construction Period and Operating Period compliance issues and is required for construction management (i.e. project foremen, superintendents, project engineers), workers and selected personnel with environmental compliance leadership (e.g. environmental technical discipline managers) and technical responsibilities. The training program will be conducted as part of the on-boarding process for the Project.
2. **Environmental Compliance Tracking and Reporting:** Each of these plans establishes environmental compliance requirements that are included in the FRMG's ECTM (Attachment 1). The discipline specific compliance requirements are added when each plan is approved by the Department along with the Project's permit conditions as they are established through approvals by associated regulatory agencies.

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

2.1.1.j Frequency and Purpose of Environmental Field Reviews

As described previously in Section 2.1.1.e Tracking and Documenting Environmental Compliance Status, Progress, and Completion, under the subheading for construction, there are three environmental field review types with a specific purpose, also shown in **Table 13**).

Table 13. Frequency and Purpose of the Environmental Field Reviews

Name	Frequency	Primary Purpose
Preconstruction Field Reviews	The number of these reviews will be based on the final construction sequence and spatial limits associated with individual construction area approvals.	Preconstruction Field Reviews will be performed prior to construction starting in specific corridor locations to make sure environmental compliance will be achieved as construction is initiated and proceeds
Construction Field Reviews	Weekly	Construction field reviews focus on active and live environmental compliance tracking, monitoring and reporting with the purpose of documenting compliance and/or nonconformance and if so, getting the project back into compliance
Department Field Reviews	Monthly	Monthly field reviews focus on making sure that the issues raised at Environmental Task Force meetings and during the weekly field reviews are appropriately addressed in the field

2.1.1.k How Site Specific Construction Activities will meet all Environmental Requirements

Site specific construction activities will be addressed as part of the overall compliance effort, but two key elements will assure that construction activities are compliant:

1. Environmental Field Reviews
2. Site specific construction mitigation plans and checklists

The three types of environmental field reviews described in Sections 2.1.1 e and j will address site specific conditions prior to initiation of construction, weekly during construction and monthly with the Department during construction to assure compliance with overall requirements and the unique requirements in specific locations. Individual site specific construction mitigation plans and checklists will be prepared prior to commencing Construction Work and will be modified after Construction Work begins, as needed, to focus the environmental field reviews. These elements and associated reporting, documentation and reviews at Environmental Task Force meetings will ensure that all Construction Work in individual locations meet all applicable requirements.

Summary of FRMG Environmental Compliance Deliverables

Schedule 17, Section 25, Table 17-5 summarizes the minimum environmental compliance management deliverables for information, Acceptance or Approval and the corresponding

		<h1 style="text-align: center;">Central 70 Project</h1> <h2 style="text-align: center;">Draft Environmental Compliance Work Plan</h2>	
Document Owner:		Revision – 0	
Approved by:		Revision Date:	Review by:
Approved by:		Release Date: TBD	

schedule. **Table 14** presents this list of deliverables and includes FRMG refinements including some additional deliverables and a heading for tracking the submittal status (this is currently noted as TBD and will be refined prior to NTP). Additional environmental deliverables proposed by FRMG for discussion with the Department are presented in **Table 15**.

Table 14. Minimum Environmental Compliance Management Deliverables for Information, Acceptance or Approval and the Corresponding Schedule.

Deliverables	Information, Acceptance, or Approval	Schedule	Status
ECWP and supporting documentation and Discipline Specific Management Plans	Approval Acceptance (with respect to any Discipline Specific Management Plans incorporated into the ECWP that requires Acceptance and not Approval)	Prior to issuance of NTP2 and annually thereafter in accordance with Section 2.1.3 of Schedule 17	TBD
Environmental Status Report (ESR) and supporting documentation, including any required Corrective Action Plans for approval (Includes FRMG's ECTM)	Acceptance	10 working days following the end of the reporting period; monthly during the Construction Period; quarterly during the Operating Period	TBD
Mitigation Completion Report	Acceptance	Prior to Final Acceptance	TBD
Environmental Compliance and Mitigation Training Program	Acceptance	Prior to issuance of NTP2	TBD
Environmental Compliance and Mitigation Training Program Annual Update and Report	Acceptance	Annually 30 calendar days after the end of the Contract Year	TBD
Air Quality Monitoring, Maintenance, and Mitigation Plan ("AQ3MP")	Acceptance	Prior to issuance of NTP2, updated annually	TBD
Proposed Locations of P10 Monitors	Acceptance	Two weeks prior to operating the monitor	TBD
Environmental Approvals (all)	Information	Per the requirements of Environmental Law and this Agreement	TBD



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Deliverables	Information, Acceptance, or Approval	Schedule	Status
Migratory Bird Nest Survey	Information	Prior to impacting existing structures or vegetation that may contain active bird nests and prior to specific activities (e.g., clearing), consistent with CDOT and CPW guidance and policy	TBD
Preliminary Noise Technical Reports	Acceptance	Prior to conducting Benefited Receptor Preference Survey	TBD
Benefited Receptor Preference Survey supporting material	Approval	14 calendar days prior to conducting Benefited Receptor Preference Survey	TBD
Preliminary and Final Noise Technical Reports	Acceptance	Prior to issuance of RFC Documents and at the time of any update required pursuant to Section 11.3.5 of Schedule 17	TBD
CNMMP	Acceptance	Prior to issuance of NTP2, updated annually	TBD
Paleontological Annual Reports	Acceptance	Annually, 60 calendar days after the end of the reporting period	TBD
Paleontological Summary Report	Acceptance	60 calendar days after earthwork is completed	TBD
SB 40 Certification Application Package	Approval	Prior to Construction Work in SB 40 area	TBD
Integrated Noxious Weed Management Plan (INWMP)	Acceptance	Prior to issuance of NTP2, updated annually	TBD
Wetland Finding Report (if required)	Approval	Prior to impacting wetlands	TBD
Materials Management Plan (MMP) including any changes relative to the Beneficial Reuse and Materials Management Plan (BRMPM)	Approval	Prior to issuance of NTP2, updated annually	TBD
Long-Term Clean Up Plan(s)	Acceptance	As and when required pursuant to Section 23.9 of Schedule 17	TBD
Sampling and Analysis Plan (SAP)	Approval	Prior to issuance of NTP2, updated annually	TBD
Residential Soils Sampling Plan	Acceptance	Prior to issuance of NTP2, updated annually	TBD



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Deliverables	Information, Acceptance, or Approval	Schedule	Status
Health and Safety Plan (HASP)	Acceptance	Prior to issuance of NTP2, updated annually	TBD
Spill Prevention Control and Countermeasures Plan (SPCC Plan)	Acceptance	Prior to issuance of NTP2, updated annually	TBD
Structure Survey Assessment Plan (SSAP) (Project-wide document)	Acceptance	Prior to the demolition of any structure or other relevant components of the Project	TBD
Structure Survey Assessment Report (SSAR) (per parcel or structure)	Acceptance	Prior to the demolition of any structure	TBD
Structure Survey Completion Report (SSCR) (per parcel or structure)	Acceptance	Within 30 calendar days after completion of abatement activities	TBD
Import Materials Documentation	Acceptance	Prior to bringing the materials on to the Site	TBD
Remedial Plan	Acceptance	As part of Schedule 21 (Form of Supervening Event Submission)	TBD
Monthly Statement of Recognized Hazardous Materials Management	Acceptance	10 working days after the end of each month as per Section 23.15 of Schedule 17, followed by submittal to CDPHE	TBD
Recognized Hazardous Materials Management Completion Report	Acceptance	60 calendar days after Substantial Completion	TBD
Schedule of Planned Noxious Weed Management Activities	Information	Monthly, five calendar days prior to the beginning of each month (March through October)	TBD
Noxious Weed Survey and Summary of Treatment Activities Report	Acceptance	Monthly, within 10 Working Days of the end of each month (March through October) during the Construction Period. Three times per year during the Operating Period	TBD
Protected Environmental Resources shown in all Plan Sets	Acceptance	To be included with each plan set submittal	TBD
Asbestos, Lead-Based Paint and Regulated Materials Survey Report	Acceptance	15 working days prior to demolition	TBD
Dewatering or Remediation Plan	Acceptance	Prior to discharge as required by the permit	TBD



Central 70 Project Draft Environmental Compliance Work Plan

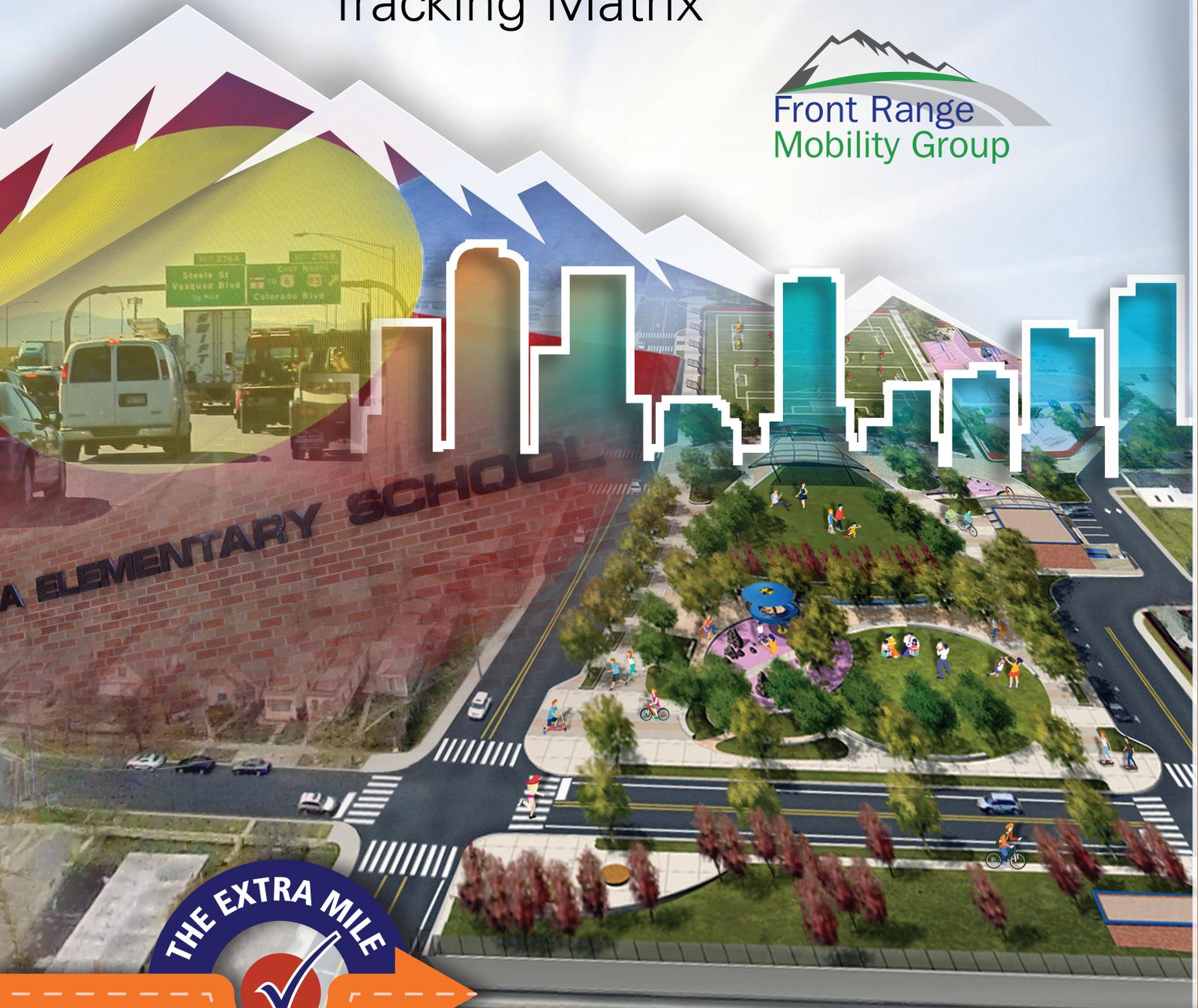
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

Deliverables	Information, Acceptance, or Approval	Schedule	Status
Summary Report of IQC Water Quality Documentation Audit	Information	Monthly, within 7 calendar days of the end of the month	TBD
Diesel Nonroad Construction Equipment (DNRCE) Report	Information	Quarterly, within 10 Working Days of the end of the reporting period	TBD
BTPD Management Plan	Acceptance	Prior to conducting activities that could potentially impact BTPD, updated annually	TBD
Level II Historic Archival Photographs and Measured Drawings (One submission per resource)	Acceptance	10 working days prior to demolition or construction activities on affected parcels	TBD
Level II Historic Documentation for Submittal to SHPO (One submission per resource)	Acceptance	Within 6 months of demolition of the resource	TBD

Table 15. Additional Deliverables Anticipated from FRMG.

Deliverable	Information, Acceptance, or Approval	Schedule	Status
Sustainability Plan	Acceptance	Prior to issuance of NTP2, updated annually	TBD
Construction and Demolition Debris Management Plan	Acceptance	Prior to issuance of NTP2, updated annually	TBD
Construction & Operation Energy Conservation Plan	Acceptance	Prior to issuance of NTP2, updated annually	TBD

Attachment 1 Environmental Compliance Tracking Matrix



CONNECTING COMMUNITIES



Central 70 Project Draft Environmental Compliance Work Plan

Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

ATTACHMENT 1

FRMG'S ENVIRONMENTAL COMPLIANCE TRACKING MATRIX

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017				FRMG Means and Methods				FRMG Compliance Tracking Input		
#	Impact from ROD	Mitigation Commitment	Status/Resolution	Responsible Party for Implementation (Environmental Manager Verifies Compliance)	Construction Period: Design Stage Means and Methods Inspection Checklist – Environmental Pre-Construction)	Construction Period: Construction Stage Means and Methods (Inspection / Monitoring Method and Frequency) (Inspection Checklist – Environmental Screening and Monitoring)	Operating Period Means and Methods (If Different from Construction Period)	Reporting Format	Compliance Status (Updated Regularly after NTP1 and NTP2)	Impact or Mitigation Altered (For ReEval Tracking)

TRANSPORTATION

Mitigation Measures

1	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with RTD for phasing of improvements to minimize disruptions to transit operations	Developer: Shall coordinate with RTD and include RTD Representative as member of the MOT Task Force. (Schedule 10, Section 2.2 - Maintenance of Traffic) Developer: Shall minimize RTD disruption and maintain RTD access. (Section 2.7)	FRMG's Traffic Task Force Leader	Meet with RTD planners monthly to establish transit access and performance requirements as construction phasing details are developed Integrate RTD service requirements into Maintenance of Traffic (MOT) planning process and plans	NA	NA	Meeting Minutes and/or Memoranda	Input Format Pre-Construction Phase Status: Complete, Pending or Incomplete: Details Construction Phase Status: Complete, Pending or Incomplete: Details Post-Construction/ Operation Status: Complete, Pending or Incomplete: Details See Air Quality, APEN for Example Entries	Input Format Change in Setting (Affected Environment) Yes/No: Explanation Change in Impacts Yes or No: Explanation Subject to NEPA Reevaluation Yes or No: Explanation See Air Quality, APEN for Example Entries
2	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained	Developer: Coordination with RTD shall be done far enough in advance to allow 30 Calendar Days' notification to transit users. (Schedule 10, Section 2, Maintenance of Traffic, 2.7.1 RTD Transit System)	FRMG's Traffic Task Force Leader	Meet with RTD planners monthly to establish transit access and performance requirements as construction phasing details are developed Integrate RTD service requirements into Maintenance of Traffic (MOT) planning process and plans	Visual Weekly, as needed, during construction activities	NA	Meeting Minutes and/or Memoranda	TBD	TBD
3	Temporary impacts to rail facilities will result from the construction of railroad bridge structures and/or the relocation of track operations	Coordinate with UPRR, BNSF, and DRIR for phasing of improvements to minimize disruptions to railroad operations	Developer: Shall obtain required written specifications, standards of practice, and construction methods from the Railroads. Developer: Shall comply with the requirements of the Railroad Agreements in performing the Construction Work. (Schedule 10, Section 10.2 Railroads)	FRMG's Railroad Task Force Leader	Meet with railroad representatives to establish performance requirements as construction phasing details are developed Integrate railroad operation requirements into MOT Plans	Visual Monthly, as needed, during construction activities	NA	Meeting Minutes and/or Memoranda	TBD	TBD
4	Impacts to local traffic volumes caused by removal of the York Street interchange and changes to the Steele Street/Vasquez Boulevard interchange and the Colorado Boulevard interchange	Coordinate with Denver to determine appropriate truck routes on city streets	Developer: Shall prepare a Transportation Management Plan (TMP) including Temporary Traffic Control Plan (TCP) and Transportation Operations (TOP) Strategies. (Schedule 10 Section 2.2) Developer: Shall involve all affected agencies in the development of the TMP and associated plans. (Schedule 10 Section 2.2.3)	FRMG's Traffic Task Force Leader	Meet with CCD traffic engineering representatives to establish roadway access and performance requirements as construction phasing details are developed. Verify approval of identified plans.	Visual Weekly	NA	Meeting Minutes and/or Memoranda	TBD	TBD
5	Temporary road closures and traffic detours may have impacts on access to certain public services	Develop and implement a Transportation Demand Management (TDM) program during construction, which could include items such as working with RTD on enhanced transit service and including ITS	Developer: Shall develop and implement a comprehensive TDM program during the construction period. (Schedule 10, Section 2.2.5 a and h)	FRMG's Traffic Task Force Leader	Meet with RTD planners monthly to establish transit access and performance requirements as construction phasing details are developed. Integrate RTD service requirements into planning process and TDM Program. Verify approval of TDM program.	Visual Monthly, as needed.	NA	Meeting Minutes and/or Memoranda	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

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6	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with affected local governments, residents, and businesses to minimize disruptions during construction	(1) Developer: Shall be coordinated with the school and Denver Public Schools Department of Transportation. (Schedule 10, Section 2.2.5e) (2) Developer: Shall provide a detailed approach to coordinate the TMP Activities with performance of the Developer's obligations under Schedule 14 Strategic Communications (Schedule 10, Section 2.2.6) (3) Developer: Shall coordinate with CCD and other Local Agencies to develop mitigation for delays before, during and after Special Events (Schedule 10, Section 2.5.1) (4) Developer: Shall coordinate with Department, 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 (Schedule 10, Section 2.8) (5) Developer: Shall work with the property owner to coordinate access restrictions. (Schedule 10, Section 2.9) (6) Developer: Shall coordinate with DPS for all closures and operational impacts in the area of the school and include an approach to pedestrian and bicycle movements and school traffic circulation. This plan shall be coordinated with CCD and the DPS Department of Transportation. (Schedule 10, Section 2.11.7)	FRMG's Traffic Task Force Leader	Meet with CDOT, CCD, DPS, RTD traffic engineering representatives to establish roadway access and performance requirements as construction phasing details are developed	Visual Weekly, as needed, during construction activities	NA	Meeting Minutes and/or Memoranda	TBD	TBD

SOCIAL AND ECONOMIC CONDITIONS

Mitigation Measures										
7	56 residential relocations 18 business relocations (includes 1 non-profit relocation)	Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended	Department: All relocations will be conducted in accordance with the Uniform Act. Developer: Acquisition of additional Right-of-Way and Temporary Easements shall be conducted in accordance with the Uniform Act. (Schedule 18, Section 3.1.1 and Section 3.6.1)	Department and FRMG Right of Way Lead	CDOT to follow standard Uniform Act procedures FRMG to address acquisition of additional Right-of-Way and Temporary Easements in accordance with the Uniform Act (Schedule 18, Section 3.1.1 and Section 3.6.1) CP	NA	NA	NA	TBD	TBD
8	Temporary road closures and traffic detours may have impacts on access to certain public services	Provide safe and efficient connections through neighborhoods during construction for all modes of transportation, including bicycles and pedestrians	Developer: Shall include pedestrian and bicycle requirements in the Temporary Traffic Control Plans. (Schedule 10, Section 2.11.2) Developer: Shall include Safe Routes to School solutions; meeting the requirements included in the Safe Routes to School Online Guide. (Schedule 10, Section 2.11.7)	FRMG's MOT Task Force Leader	Verify approval of Temporary Traffic Control Plan. IDR reviews at 60% and 90%	Visual Monthly, as needed, during construction activities	NA	Monthly Report	TBD	TBD
9	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with emergency service providers during construction to minimize effects on response times	Developer: Shall maintain emergency access and coordinate with emergency responders. (Schedule 10, Section 2, Maintenance of Traffic and Schedule 14, Strategic Communications)	FRMG's MOT Task Force Leader	Verify approval of MOT Plans and implementation of strategic communications	Visual Monthly, as needed, during construction activities	NA	Monthly Report	TBD	TBD
10	Temporary effect to the regional economy from construction-related traffic congestion	Use standard measures—such as phased construction, advance notice of road closures and detours, and fixed and variable signage—to reduce effects on local residents, businesses, and services and on I-70 motorists	Developer: Shall adhere to Schedule 10, Section 2, Maintenance of Traffic, requirements to minimize construction-related traffic congestion.	FRMG's MOT Task Force Leader	Coordinate with CCD during the MOT Task Force meetings to provide advance notice of road closures and detours, and fixed and variable signage to reduce effects on local residents, businesses, and services and on I-70 motorists	Visual Monthly, as needed, during construction activities	NA	Monthly Report	TBD	TBD
11	Temporary road closures and traffic detours may have impacts on access to certain public services	Use standard measures—such as phased construction, advance notice of road closures and detours, and fixed and variable signage—to reduce effects on local residents, businesses, and services and on I-70 motorists	Developer: Shall adhere to Schedule 10, Section 2, Maintenance of Traffic, requirements to maintain access to public services.	FRMG's MOT Task Force Leader	Coordinate with CCD during the MOT Task Force meetings to provide advance notice of road closures and detours, and fixed and variable signage to reduce effects on local residents, businesses, and services and on I-70 motorists					
12	Temporary road closures and traffic detours may have impacts on access to certain public services	Provide a robust and context-sensitive communications and outreach plan throughout construction to ensure residents are kept informed	Developer: Shall implement Construction Work Communications Plan, Maintenance and Operations Communications Plan, and Crisis Communications Plan. (Schedule 14, Strategic Communications)	Public Involvement Program Lead	Refer to Public Involvement Plan	Refer to Public Involvement Plan	NA	Monthly Report	TBD	TBD
13	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained	Developer: Coordination with RTD shall be done far enough in advance to allow 30 Calendar Days' notification to transit users. (Schedule 10, Section 2, Maintenance of Traffic, 2.7.1 RTD Transit System)	FRMG's Construction Manager FRMG's MOT Task Force Leader	NA	Visual Monthly, as needed, during construction activities Invite RTD to the weekly Construction coordination meetings	NA	Monthly Report	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

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14	Temporary road closures and traffic detours may have impacts on access to certain public services	Use signs and notifications to reduce adverse effects on access to homes, businesses, and services during the construction period from detours	Developer: Shall maintain public and private access to the local street system. (Schedule 10, Section 2.2.4 Temporary Traffic Control Plan Strategies)	FRMG's MOT Task Force Leader	Verify approval of MOT Plans IDR reviews at 60% and 90%	Visual Monthly, as needed, during construction activities	NA	Monthly Report	TBD	TBD
15	Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School	Removing the viaduct, lowering the highway, and covering portions of the highway to include space for community and neighborhood activities	Department and Developer: Shall implement the Preferred alternative as described in the Record of Decision. Developer: Design changes that alter the ROD or RFP Reference Design shall require all applicable New Environmental Approvals. (Schedule 17, Section 8)	Department FRMG's Environmental Manager	IDR reviews at 60% and 90% Review design changes and complete applicable environmental clearance processes	NA	NA	NA	TBD	TBD
16	Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School	Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover	Department and Developer: Shall implement the Preferred alternative as described in the Record of Decision. Developer: Shall construct these project elements in accordance with the Project Agreement including the I-70 Cover Plans and I-70 Cover and Swansea Elementary School Outdoor Areas Design Narrative. (Schedule 10B)	Department FRMG's Environmental Manager	Department and FRMG to implement the Preferred Alternative as describe in the ROD Review cover design plans for conformance with the requirements for Schedule 10B	NA	NA		TBD	TBD

ENVIRONMENTAL JUSTICE

Mitigation Measures

17	17 business relocations (includes 1 non-profit relocation)	Provide targeted assistance to encourage businesses that are crucial to low-income and minority populations to find new locations in the same neighborhoods	Department will perform this mitigation.	Department	Verify CDOT has provided targeted assistance	NA	NA	NA	TBD	TBD
18	56 residential relocations (includes 1 non-profit relocation)	Provide funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans; CDOT has already provided funding to CRHDC as early mitigation	Department: Completed.	Department	Verify CDOT has provided support in the form of counseling and financing	NA	NA	NA	Completed	TBD
19	Potential for disturbing hazardous materials sites during construction	Collect representative soil samples of three or four recently cleaned-up residential properties pre-during, and post-construction to test for lead and arsenic to ensure that the properties aren't recontaminated due to construction activities	Developer: Shall implement Residential Properties Sampling Plan. (Schedule 17 Section 23.18)	FRMG's Environmental Manager	Implement the Residential Properties Sampling Plan and demonstrate compliance with applicable requirements	NA	NA	Sampling Report	TBD	TBD
20	Increase noise and dust during construction	Provide residents close to the highway construction between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs during construction	Department: Will implement this mitigation.	Department	Verify installation and assistance	Verify assistance	NA	Memoranda	TBD	TBD
21	Increase noise and dust during construction	Provide residents close to the highway construction between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—interior storm windows	Department: Will implement this mitigation.	Department	Verify installation	NA	NA	Memoranda	TBD	TBD
22	Increase noise and dust during construction	Provide residents close to the highway construction between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—furnace filters	Department: Will implement this mitigation.	Department	Verify installation	NA	NA	Memoranda	TBD	TBD
23	17 business relocations (includes 1 non-profit relocation)	Facilitate opportunities to promote hiring individuals from the communities, such as job fairs with contractors	Developer: Shall implement the requirements of the Construction Period Workforce Development Goals Compliance including the local hiring component. (Schedule 15, Appendix B)	FRMG	Verify implementation of workforce program and results	Verify implementation of workforce program and results	NA	Monthly Report	TBD	TBD
24	17 business relocations (includes 1 non-profit relocation)	Execute geographic-based hiring preferences (CDOT has submitted an application and received approval under Special Experiment Project 14 (SEP-14) for the US DOT pilot program)	Developer: Shall meet the requirements of the local hiring goal. (Schedule 15, Section 6.3.1b.)	FRMG	Verify implementation of local hiring program and results	Verify implementation of local hiring program and results	NA	Monthly Report	TBD	TBD
26	Increasing noise and dust during construction at the school	Provide a new HVAC system, doors, and windows for Swansea Elementary School	Department: Swansea School Project Phase 1 - Complete.	Department	NA	NA	NA	NA	Phase 1 Complete	TBD
27	Moving the highway closer to Swansea Elementary School	Prior to the start of roadway construction, build two new classrooms at Swansea Elementary School to enhance the overall quality of the school	Department: Swansea School Project Phase 2 – Construction in progress.	Department	Verify completion of the new classrooms	NA	NA	Memoranda	Phase 2 Underway	TBD
28	Improving Safety of north-south pedestrian and bicycle connectivity compared to the existing conditions by eliminating unsafe crossings underneath the viaduct	Remove the viaduct, lower the highway, and covering portions of the highway to include space for community and neighborhood activities	Department and Developer: Shall implement the Preferred alternative as described in the Record of Decision which will eliminate dark passages under the existing I-70.	FRMG Environmental Manager	IDR reviews at 60% and 90% (Review urban design plans, lighting designs)	NA	NA	NA	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

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29	Displacing Stop N Shop and Pilot Travel Center truck stop	Provide \$100,000 toward the Denver Office of Economic Development's GES Healthy Food Challenge that will help facilitate access to fresh food.	Department: Will implement this mitigation.	Department	Verify completion.	NA	NA	NA	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

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30	Moving the highway closer to Swansea Elementary School	Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover	Department: Enter into agreements with Denver Public Schools for new playground plan and to allow playground activities on the new highway cover. Developer: Shall construct these project elements in accordance with the Project Agreement including the I-70 East Cover and Swansea Elementary School Master Plan, Schedule 29.	FRMG's Environmental Manager	Verify that project elements are designed in accordance with the Project Agreement IDR reviews at 60% and 90%	NA	NA	NA	TBD	TBD
31	Relocating 56 residences	Provide \$2 million in funding to support affordable housing in the Elyria and Swansea Neighborhood through available programs	Department: Will implement this mitigation.	Department	Verify delivery of support funding	NA	NA	Memoranda	TBD	TBD
32	Creating a financial burden to the low income community, who may not be able to afford to use the tolled express lanes	Eligible residents of Globeville, Elyria, and Swansea will be provided mitigation for the financial burden of access to the tolled express lane through either free transponders, pre-loading of tolls, or other means determined prior to the opening of the tolled express lane. Eligibility and the duration of the program are expected to be determined based on factors including, but not limited to, residency, financial burden, number of vehicles per resident or household, etc.	Department: Will implement this mitigation.	Department	Verify delivery of means to address financial burden	NA	NA	Memoranda	TBD	TBD
NA	NA	Swansea Elementary School: 13.1.1. Prior to beginning Construction Work in the Swansea Elementary School area, the Developer shall construct the temporary wall as described in Section 14 (Landscaping and Aesthetics) of Schedule 10 (Design and Construction Requirements). The temporary wall shall remain in place until the Cover Planning Area 2 (as depicted in the I-70 Cover Plans) is open to the public. 13.1.2. The Developer shall minimize construction activities and construction impacts around Swansea Elementary School during school hours. The Developer shall include mitigation activities associated with Swansea Elementary School in the CNMMP, the AQ3MP and all other applicable plans. The Developer shall include the Swansea Elementary School Principal and appropriate Denver Public School District personnel in all relevant activities to be conducted by the Developer pursuant to Schedule 14 (Strategic Communications) and keep them fully informed of all activities adjacent to the school. 13.1.3. Construction staging shall not occur within 500 feet of Swansea Elementary School except during the period of active construction of Cover Planning Area 1 (as depicted in the I-70 Cover Plans)	NA	FRMG's Construction Manager	Verify that the project elements are included in the project design and schedule. IDR reviews at 60% and 90%	Weekly	Monthly, as needed, during construction activities	NA		

LAND USE

Mitigation Measures										
33	56.2 acres converted to transportation use	Continue to coordinate with local jurisdictions to ensure compatibility with land use plans and to address any inconsistency that may arise	Department: ROD and RFP have been developed in compliance with land use plans. Developer: Design changes that alter the ROD or RFP Reference Design shall require all applicable New Environmental Approvals. (Schedule 17, Section 8)	FRMG's Environmental Manager	IDR reviews at 60% and 90% If land uses change during design coordinate with local jurisdictions to ensure compatibility with land use plans	NA	NA	Meeting Minutes and/or Memoranda	TBD	TBD

RELOCATIONS AND DISPLACEMENTS

Mitigation Measures										
34	56 residential relocations, 17 business relocations (includes 1 non-profit relocation)	Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended	Department: All relocations will be conducted in accordance with the Uniform Act. Developer: Acquisition of additional Right-of-Way and Temporary Easements shall be conducted in accordance with the Uniform Act. (Schedule 18, Section 3.1.1 and Section 3.6.1)	Department FRMG's Right of Way Manager	Department to complete all relocations in accordance with the Uniform Act FRMG to verify all Right-of-Way and Temporary Easements are acquired in accordance with the Uniform Act.	NA	NA	Memoranda	TBD	TBD
35	56 residential relocations, 17 business relocations (includes 1 non-profit relocation)	Provide all impacted owners notification of the acquiring agency's intent to acquire an interest in their property, including a written offer letter of just compensation specifically describing those property interests; assign a right of way specialist to each property owner to assist them with this process	Department: Will perform this mitigation for applicable properties identified in the ROD. Developer: Shall perform this mitigation for any additional properties that are acquired.	Department FRMG's Right of Way Manager	Department to complete all relocations in accordance with the Uniform Act FRMG to track the need to add Right-of-Way and Temporary Easements are verify compliance with Uniform Act requirements	NA	NA	Memoranda	TBD	TBD

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36	56 residential relocations, 17 business relocations (includes 1 non-profit relocation)	Provide bilingual services for any of the relocated and displaced businesses or households that need them	Department: Will perform this mitigation for applicable properties identified in the ROD. Developer: Shall perform this mitigation for any additional properties that are acquired.	Department FRMG's Right of Way Manager and Bilingual Translator	Department to complete all relocations in accordance with the Uniform Act FRMG to track the need to add Right-of-Way and Temporary Easements are verify compliance with Uniform Act requirements	NA	NA	Memoranda	TBD	TBD
37	56 residential relocations, 17 business relocations (includes 1 non-profit relocation)	Meet directly with those owners and occupants who would be relocated as a result of the proposed project; conduct multiple meetings with these individuals to provide an introduction and overview of the process associated with the Uniform Act; provide information on resources available, including assistance from local, state, and federal agencies, and private agencies in the community; identify individual eligibility for benefits	Department: Will perform this mitigation for applicable properties identified in the ROD. Developer: Shall perform this mitigation for any additional properties that are acquired.	Department FRMG's Right of Way Manager	Department to complete all relocations in accordance with the Uniform Act FRMG to track the need to add Right-of-Way and Temporary Easements are verify compliance with Uniform Act requirements	NA	NA	Memoranda	TBD	TBD
Other Commitments										
NA	NA	<p>Measures to Minimize Harm:</p> <ul style="list-style-type: none"> -Using a 4-percent grade on I-70 will allow the highway to cross over Brighton Boulevard and under the UPRR Bridge without reconstruction of the existing infrastructure west of Brighton Boulevard; a lower grade would cause additional impacts to the infrastructure west of Brighton Boulevard -Reducing the typical section for 46th Avenue and Stapleton Drive to the greatest extent possible by removing excess width between I-70 and the frontage roads -Adjusting the I-70 mainline geometry using a lower design speed as compared to the 2008 Draft EIS to minimize the highway footprint between Brighton Boulevard and Colorado Boulevard -Locating interchange ramps parallel to the I-70 mainline with walls to maintain adequate traffic operations while reducing impacts to the neighborhoods <p>Design changes that increase infrastructure disruption and the project's impact footprint would be inconsistent with these Measures to Minimize Harm.</p>	NA	FRMG Design Team	Evaluation of design changes for compliance and assessment of compliance as part of the final design process and related commitments	NA	NA	Design Review: NEPA Reevaluation, as needed.	NA	NA
NA	NA	<p>Measures to Minimize Harm (Continued):</p> <ul style="list-style-type: none"> -To alleviate impacts to displacees who have inadequate financial resources, CDOT has provided funding to the Community Resources and Housing Development Corporation (CRHDC). CRHDC will use these funds to assist residential and business displacees by providing financial counseling and helping them procure financing for replacement properties and secure business and residential loans. All displaced residents and businesses will, in addition, be entitled to benefits provided under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act), as amended. -Using buffer-separated managed lanes rather than concrete barriers, because a concrete barrier requires additional shoulder width for both the general-purpose lanes and managed lanes, but the striped buffer only requires a four-foot space between the two lane groups 	NA	FRMG's Environmental Manager	Evaluation of design changes for compliance and assessment of compliance as part of the final design process and related commitments	NA	NA	Design Review: NEPA Reevaluation, as needed.	NA	NA

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017				FRMG Means and Methods				FRMG Compliance Tracking Input		
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NA	NA	<p>Measures to Minimize Harm (Continued)</p> <p>-As described in the Final EIS, the financial burden of the tolled express lanes affecting the residents of Globeville, Elyria, and Swansea have led CDOT to the determination that there are potential equity impacts on low income and minority populations. CDOT has decided to mitigate those impacts through the development of an operational program and policies to reduce the burdens to those residents. Equity impacts for the financial burden of access to the tolled express lanes will be mitigated by providing to eligible residents of Globeville, Elyria, and Swansea free transponders, pre-loading of tolls, or other means determined prior to the opening of the tolled express lanes. Eligibility and the duration of the program are expected to be determined based on factors including, but not limited to, residency, financial burden, number of vehicles per resident or household etc. The entire program of I-70 East ROD 1: Phase 1 (Central 70 Project) Measures to Minimize Harm will not go into effect immediately; however, the details of the program will be developed, with community involvement nearer to tolling operations commencement. The initiation of these program actions is anticipated to commence approximately 2022. As part of the program, all communities and stakeholders potentially affected will be invited to participate in the operational strategy development.</p> <p>Project changes that create additional effects on local residents or reduce compensation commitments would be inconsistent with these Measures to Minimize Harm.</p>	NA	FRMG's Environmental Manager	Evaluation of design changes for compliance and assessment of compliance as part of the final design process and related commitments	NA	NA	Design Review: NEPA Reevaluation, as needed.	NA	NA

HISTORIC PRESERVATION AND HISTORIC SECTION 4(F)

Mitigation Measures										
38	Adverse Effect—13 historic resources	Provide Level II archival documentation for adversely affected resources	Department: Will perform this mitigation for applicable properties identified in the ROD. Developer: Shall perform this mitigation for any additional properties that are acquired.	Department FRMG's Cultural Resources Team	Department to complete Level II archival documentation for adversely affected resources FRMG to verify and complete Level II archival documentation for adversely affected resources	NA	NA	NA	TBD	Technical Documentation
39	Adverse Effect—13 historic resources	Provide funding and participate in the creation of a documentary covering the history of I-70 East and its relationship to the Elyria and Swansea and Globeville Neighborhoods (mitigation has been completed, and is available to view at www.i-70east.com).	Department: Will perform this mitigation. (Complete.)	Department	NA	NA	NA	Documentary Film	Complete	NA
40	Adverse Effect—13 historic resources Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	Implement other mitigation measures, as identified, in consultation with SHPO and consulting parties as described in the Programmatic Agreement	Developer: Shall protect in place all identified historic resources that are to remain through the Construction Period. (Schedule 17, Section 12, Historic Resources.)	FRMG's Cultural Resources Team	Identify historic resources that are to remain and be protected in place. Map resources and associated construction limits on project plans. List protections on plans and include in contractor training program. Interdisciplinary Plan Review.	Visual	NA	Monthly Report	TBD	TBD
41	Discovery of cultural materials related to Indian occupation during construction	Contact consulting Indian tribes if Indian cultural materials are identified at any time during construction	Department: Will facilitate communication with SHPO and Tribes if Unexpected Historically Significant Remains are discovered. Developer: Shall stop work in the area of discovery and protect the resource as required by the Programmatic Agreement and Schedule 17, Section 12, Historic Resources.	Department with FRMG's Cultural Resources Team	NA	Visual	NA	Monthly Report	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

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42	Potential for construction activities to discover unanticipated, sub-surface historic resources during the course of construction, including, but not limited to, trolley tracks, sewer systems, building foundations, or historic artifacts	Refer to the Section 106 PA, Stipulation VI, Construction Phase Post-Review Discoveries, which sets forth a process for review of unanticipated resources uncovered during construction	Department: Will facilitate communication with SHPO if Unexpected Historically Significant Remains are discovered. Developer shall stop work in the area of discovery and protect the resource as required by the Programmatic Agreement and Schedule 17, Section 12, Historic Resources.	Department with FRMG's Cultural Resources Team	NA	Visual Daily, as needed, during construction activities Oversee construction activity at stop work order site, Document resource, Develop protections, Add to PA requirements	NA	Monthly Report	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

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43	Potential for construction activities to discover unanticipated, sub-surface historic resources during the course of construction, including, but not limited to, trolley tracks, sewer systems, building foundations, or historic artifacts	If trolley tracks or any other potential historic resources are discovered during construction and the impact on the resource is determined to be adverse, CDOT will follow I-70 East Corridor Programmatic Agreement Mitigation Stipulation III (6) to determine appropriate mitigation measures.	Department: Will facilitate communication with SHPO if Unexpected Historically Significant Remains are discovered. Developer: Shall stop work in the area of discovery and protect the resource as required by the Programmatic Agreement and Schedule 17, Section 12, Historic Resources.	Department with FRMG's Cultural Resources Team	NA	Visual Daily, as needed, during construction activities Oversee construction activity at stop work order site, Document resource, Develop protections, Add to PA requirements	NA	Monthly Report	TBD	TBD
Other Commitments										
A	NA	Programmatic Agreement (Refer to Schedule 17, Section 12)	NA	NA	Evaluate design options, elements and features that can avoid, minimize and/or mitigate anticipated impacts on historic properties and districts and incorporate changes where feasible.	Address unanticipated discoveries and relate them to the PA requirements and/or update the PA, as needed.	NA	Monthly Report Annual Section 106 Compliance Reports	TBD	TBD
B	NA	Historic Structures Demolition Permit City and County of Denver Landmark Preservation Commission	NA	NA	Collaborate with project design team, CDOT Environmental and SHPO	Visual Daily, as needed, during construction activities	NA	Monthly Report	TBD	TBD
PALEONTOLOGICAL RESOURCES										
Mitigation Measures										
44	Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	Perform an intensive preconstruction paleontological survey (Refer to Schedule 17, Section 14.1.1)	Department: Will perform this mitigation.	Department	Verify survey performance and address results	Track and document compliance as specified	NA	Monthly Report	TBD	TBD
45	Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	Perform spot-checking of excavations by a qualified paleontologist in areas of high paleontological potential during all phases of construction until bedrock is reached, then perform continuous paleontological monitoring	Developer: Shall perform this mitigation. (Schedule 17, Section 14, Paleontology)	FRMG Paleontologist	NA	Visual Daily, as needed, during construction activities (excavation in areas where fossils may be present)	NA	Monthly Report	TBD	TBD
46	Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	Cease work immediately upon discovery of any paleontological resources, fence off the area, and allow the paleontologist to conduct sampling or excavation of specimens by hand or with mechanized equipment; do not resume work in the area until receiving formal notification from the paleontologist allowing work to resume (Refer to Schedule 17, Section 14.1.5)	Developer: Shall perform this mitigation. (Schedule 17, Section 14, Paleontology)	FRMG Paleontologist	NA	Visual Daily, as needed, during construction activities Oversee construction activity at Stop Work order site, Document resource, Develop protections	NA	Monthly Report	TBD	TBD
VISUAL RESOURCES AND AESTHETIC QUALITIES										
Mitigation Measures										
47	Ground-level noise walls or safety barriers are less intrusive to viewers' eyes compared to the No-Action and Revised Viaduct Alternatives, but they also introduce a new visual impact by blocking the view across the highway.	Use Attachment O, Aesthetic and Design Guidelines of the Final EIS, developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction.	Developer: Shall design and construct the project in accordance with Schedule 10, Section 14, Landscaping and Aesthetics, and with Central 70 Project Aesthetic Standards (Schedule 10B) which were developed based on Attachment O of the Final EIS.	FRMG's Landscape Design Team	IDR reviews at 60% and 90%	NA	NA	Monthly Report	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

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48	Views for drivers traveling eastbound and westbound will be entirely different from the existing conditions	Use the Aesthetic and Design Guidelines (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction.	Developer: Shall design and construct the project in accordance with Schedule 10, Section 14, Landscaping and Aesthetics, and with Central 70 Project Aesthetic Standards (Schedule 10B) which were developed based on Attachment O of the Final EIS.	FRMG's Landscape Design Team	IDR reviews at 60% and 90%	NA	NA	Monthly Report	TBD	TBD
49	Tolled express lanes infrastructure will create new visual impacts along the project corridor	Use the Aesthetic and Design Guidelines (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction.	Developer: Shall design and construct the project in accordance with Schedule 10, Section 14, Landscaping and Aesthetics, and with Central 70 Project Aesthetic Standards (Schedule 10B) which were developed based on Attachment O of the Final EIS.	FRMG's Landscape Design Team	IDR reviews at 60% and 90%	NA	NA	Monthly Report	TBD	TBD

Other Commitments										
NA	NA	<p>Measures to Minimize Harm:</p> <ul style="list-style-type: none"> The Preferred Alternative was introduced originally as an alternative to reduce the visual presence of the viaduct in the neighborhoods, improve connectivity, and enhance safety. Removing the viaduct improves safety compared to the existing conditions by eliminating the possibility for objects to fall from the structure, removing the dark space under the viaduct, and eliminating the unsafe crossings as they currently exist under the viaduct. <p>Design changes that increase visual impacts or reduce safety would be inconsistent with these Measures to Minimize Harm.</p>	NA	FRMG	Evaluation of design changes for compliance and assessment of compliance as part of the final design process and related commitments	NA	NA	Design Review: NEPA Reevaluation, as needed.	NA	NA

PARKS AND RECREATION RESOURCES

Mitigation Measures										
50	South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction	Provide adequate notice and signing to Greenway users prior to construction	Developer: Appropriate public notifications shall be provided. (Schedule 10, Section 2.11.19 Trail and Pedestrian Impacts) (Refer to Schedule 17, 15.1.2)	FRMG's Public Involvement Team and Environmental Manager	Verify coordination effort occurred with trail managers during the design phase to addresses notice, detour routes, detour signage, construction period access, accessibility, impact avoidance, and restoration, including surface transitions.	Visual Daily, as needed, during construction activities	NA	Monthly Report	TBD	TBD
51	South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction	Coordinate with Denver Parks and Recreation and provide trail detours and ADA-compliant detour signage during construction consistent with the 2007 Denver Construction Detour Standards for Bikeways and Multi-Use Trails	Developer: Shall prepare a Transportation Management Plan (TMP) including Temporary Traffic Control Plan (TCP) and Transportation Operations (TOP) Strategies. (Schedule 10 Section 2.2) Developer: Shall involve all affected agencies in the development of the TMP and associated plans. (Schedule 10 Section 2.2.3)	FRMG's MOT Task Force Leader	Verify coordination effort occurred with trail managers during the design phase addresses notice, detour routes, detour signage, construction period access, accessibility, impact avoidance, and restoration, including surface transitions.	Visual Daily, as needed, during construction activities	NA	Monthly Report	TBD	TBD
52	South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction	Return Greenway to pre-construction or comparable state following construction	Developer: Any reconstructed trail segment shall be rebuilt to match the existing facility. (Schedule 17, Section 15.1.3)	FRMG's MOT Task Force Leader	Verify coordination effort occurred with trail managers during the design phase addresses restoration.	Visual Monthly, as needed, during construction activities	Compliance Inspection	Monthly Report	TBD	TBD
53	South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction	If new trail construction or full trail reconstruction is required, coordinate with Denver Parks and Recreation during the design and construction phase to ensure that all trail construction meets current standards.	Department: Will include representatives from the City in the design review process and construction as agreed to in the IGA. Developer: Existing trail systems, temporary trails, sidewalks, and pedestrian routes shall be maintained at all times. The Developer shall meet all requirements of the Americans with Disabilities (ADA) Act for all Construction Work that impacts existing trails and pedestrian facilities or that will be used for temporary detour routes; Temporary trail detours shall meet requirements for trail detours as outlined in the CCD Construction Detour Standards for Bikeways and Multi-Use Trails (Schedule 10, Section 2.11.19, Trail and Pedestrian Impacts) Developer: Any reconstructed trail segment shall be rebuilt to match the existing facility. (Schedule 17, Section 15.1.3)	Department FRMG's Design Team	Invite CCD representatives to the design meetings, Verify that meetings with Denver Parks and Recreation occurred, as needed. Include applicable requirements in project specifications and/or within plan sheets and notes IDR reviews at 60% and 90%	Visual Weekly	NA	Memoranda	NA	NA

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

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54	0.95 acre of impact to Swansea Elementary School	Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue (Schedule 17, Section 15.1.1)	Developer: Shall construct these project elements in accordance with the Project Agreement including the I-70 Cover Plans and the I-70 Cover and Swansea Elementary School Outdoor Areas Design Narrative. (Schedule 10B)	FRMG's Landscape Design Team	IDR reviews at 60% and 90%	NA	NA	NA	TBD	TBD
55	Part of Globeville Landing Park will be closed during construction	Return trails to pre-construction or comparable state following construction	Developer: Any reconstructed trail segment shall be rebuilt at minimum to match the existing facility. (Schedule 17, Section 15.1.3)	FRMG's Construction Manager	Verify that a coordination meeting occurred with trail managers during the design phase addresses notice, detour routes, detour signage, construction period access, accessibility, impact avoidance, and restoration, including surface transitions. Use photo log to verify pre-construction and post-construction conditions. IDR reviews at 60% and 90%	Visual Daily, as needed, during construction activities	Compliance Inspection	Monthly Report	TBD	TBD
56	Globeville Landing Park and South Platte River Greenway temporary impacts may occur during construction	Once final design has occurred and prior to impacts occurring to Globeville Landing Park and the South Platte River Greenway, a Proposal Description/Environmental Screening Form for the temporary non-conforming uses must be completed, submitted, and approved by Colorado Parks and Wildlife (CPW) and the National Park Service (NPS)	Department: Will complete the form, submit to CPW/NPS, and conduct any other coordination necessary on this impact from the ROD. Developer: Shall have responsibilities described in Schedule 17, Section 8, Required Environmental Approvals, if impacts exceed those described in the Reference Design.	Department with FRMG's Environmental Manager	Monitor CDOT's process and design changes to anticipate and respond with completion of the form, if necessary	NA	NA	Form	TBD	TBD

AIR QUALITY

Mitigation Measures

57	Construction fugitive dust could cause temporary impacts	Monitor for PM10, which will allow for the real-time modification or implementation of various dust control measures during construction	Developer: Shall conduct continuous PM-10 monitoring during the Construction Period. (Schedule 17, Section 10.1.3.a.iii and vi)	FRMG's Air Quality Specialist	Establish pre-construction baseline conditions with existing monitoring data	Visual Fugitive Dust and Emissions Monitoring (Opacity Readings) Daily Compare baseline data with onsite monitoring data to provide immediate application of dust control measures CQP-0310-12 IQC Inspection Checklist - Air Quality	NA	Monitoring Records Daily Monthly Report	Baseline monitoring is underway TBD	TBD
58	Construction fugitive dust could cause temporary impacts	Cover, wet, compact, or use chemical stabilization binding agent to control dust and excavated materials at construction sites	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
59	Construction fugitive dust could cause temporary impacts	Use wind barriers and wind screens to prevent spreading dust from the site	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
60	Construction fugitive dust could cause temporary impacts	Have a wheel wash station and/or crushed stone apron at egress/ingress areas to prevent dirt being tracked onto public streets	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
61	Construction fugitive dust could cause temporary impacts	Use vacuum-powered street sweepers to remove dirt tracked onto streets	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD

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62	Construction fugitive dust could cause temporary impacts	Cover all dump trucks leaving sites to prevent dirt from spilling onto streets	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
63	Construction fugitive dust could cause temporary impacts	Minimize disturbed areas, particularly in winter	Developer: Shall comply with the idling restrictions and opacity requirements of the City and County of Denver's Code of Ordinances, including Chapter 4 Air Pollution Control, Article IV Mobile Sources.	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
64	MSAT emissions could increase temporarily during construction	Prohibit unnecessary idling of construction equipment	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
65	MSAT emissions could increase temporarily during construction	Locate construction diesel engines as far away as possible from residential areas	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
66	MSAT emissions could increase temporarily during construction	Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
67	MSAT emissions could increase temporarily during construction	Require heavy construction equipment to use the cleanest available engines or be retrofitted with diesel particulate control technology	Developer: (Schedule 17, Section 10.1.5 Diesel Nonroad Construction Equipment)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
68	MSAT emissions could increase temporarily during construction	Use alternatives to diesel engines and/or diesel fuels, such as biodiesel, liquefied natural gas, or compressed natural gas, fuel cells, and electric engines, if applicable.	Developer: Shall undertake Reasonable Efforts to use alternatives to diesel engines and/or diesel fuels. (Schedule 17, Section 10.1.3.a.ix. Alternative Fuels)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
69	MSAT emissions could increase temporarily during construction	Install engine pre-heater devices to eliminate unnecessary idling for wintertime construction	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
70	MSAT emissions could increase temporarily during construction	Prohibit tampering with equipment to increase horsepower or to defeat an emission control device's effectiveness	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
71	MSAT emissions could increase temporarily during construction	Require construction vehicle engines to be properly tuned and maintained	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
72	MSAT emissions could increase temporarily during construction	Use construction vehicles and equipment with the minimum practical engine size for the intended job	Developer: Shall include this BMP as part of the Air Quality Monitoring, Maintenance, and Mitigation Plan. (Schedule 17, Section 10.1.3.a.viii)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
73	Construction fugitive dust could cause temporary impacts	Continue the "sweepbox" program on the highway to achieve the current level of fugitive dust reduction; and enhance street sweeping after snow events to reduce the particulate matter accumulation during operations	Developer: Post storm sweeping shall be performed as required by the Denver Regional Council of Governments (Schedule 11 Section 11.4, Appendix A-1 Item 17.1, and Appendix A-2 Item 17.1)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	Monitor Performance of the Sweepbox Program (Monthly)	Monthly Report	TBD	TBD
74	MSAT emissions could increase temporarily during construction	Optimize signal timing at intersections and along arterial streets near the freeway to reduce vehicle delay and tailpipe emissions	Developer: Shall provide intersection analysis that includes traffic signal timing optimization and signal coordination. (Schedule 10, Section 2.10.1)	FRMG's Air Quality Specialist	Include these requirements in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017										
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					Construction Period: Design Stage Means and Methods Inspection Checklist – Environmental Pre-Construction)	Construction Period: Construction Stage Means and Methods (Inspection / Monitoring Method and Frequency) (Inspection Checklist – Environmental Screening and Monitoring)	Operating Period Means and Methods (If Different from Construction Period)	Reporting Format	Compliance Status (Updated Regularly after NTP1 and NTP2)	Impact or Mitigation Altered (For ReEval Tracking)
75	MSAT emissions could increase temporarily during construction	Implement congestion pricing and commuter incentive programs that reduce peak-period highway congestion and emissions	Department: Will implement dynamic pricing for the managed lanes based on congestion levels.	FRMG Traffic Task Force Leader	NA	NA	Verify pricing set for the managed lanes	Monthly Report	TBD	TBD
76	MSAT emissions could increase temporarily during construction	Encourage TDM options, such as high-occupancy vehicle lanes and agreements with major employers to promote and implement flexible work programs	Developer: Shall develop and implement a TDM program to reduce travel demand and improve traffic operating conditions during the Construction Period. (Schedule 10, Section 2.2.5.g)	FRMG's Traffic Task Force Leader	Meet with CCD traffic engineering representatives to establish roadway access and performance requirements as construction phasing details are developed. Verify approval of identified plans.	Visual Daily	NA	Monthly Report	TBD	TBD
Other Commitments										
1	NA	Air Quality Monitoring, Maintenance and Mitigation Plan (AQ3MP) Refer to Schedule 17, Section 10.1.3, 10.1.4 10.1.5 and 10.16)	NA	FRMG Air Quality Task Leader	Prepare Plan based on similar Plans written for recent and relevant projects and project-specific details	Visual Daily	NA			
A	NA	Air Pollution Emission Notice, CDPHE APCD	NA	FRMG Air Quality Task Leader	Prepare applications based on similar applications prepared for recent and relevant projects and project-specific details	Visual Daily	NA	Monthly Report	Input Format: Sample Text Pre-Construction Phase Status: Example Content Only:	Input Format: Sample Text Change in Setting (Affected Environment) No change to as compared to
B	NA	Stationary Source Air Quality Permit, CDPHE APCD	NA	FRMG Air Quality Task Leader	Prepare applications based on similar applications prepared for recent and	Visual	NA	Monthly Report	TBD	TBD
C	NA	Fugitive Dust Permit, CDPHE APCD	NA	FRMG Air Quality Task Leader	Prepare applications based on similar applications prepared for recent and	Visual	NA	Monthly Report	TBD	TBD
D	NA	Demolition Permits, CDPHE and Other	NA	FRMG Air Quality Task Leader	Prepare applications based on similar applications prepared for recent and relevant projects and project-specific details	Visual Daily	NA	Monthly Report	TBD	TBD
ENERGY										
Mitigation Measures										
77	5,808 billion Btu consumed during construction	Limit idling of construction equipment	Developer: Shall comply with the idling restrictions and opacity requirements of the City and County of Denver's Code of Ordinances, including Chapter 4 Air Pollution Control, Article IV Mobile Sources.	FRMG's Environmental Manager	Include this requirement in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Weekly	NA	Quarterly Report	TBD	
78	5,808 billion Btu consumed during construction	Encourage employee carpooling and vanpooling for construction workers	Developer: Shall use Reasonable Efforts to implement this mitigation.	FRMG's Environmental Manager	Include this requirement in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Weekly	NA	Quarterly Report	TBD	
79	5,808 billion Btu consumed during construction	Encourage use of closest material sources	Developer: Shall use Reasonable Efforts to optimize hauling efficiency within the parameters of contract requirements and local ordinances.	FRMG's Environmental Manager	Include this requirement in project specification and/or within plan notes IDR reviews at 60% and 90%	Visual Weekly	NA	Quarterly Report	TBD	
80	5,808 billion Btu consumed during construction	Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses	Developer: Shall use Reasonable Efforts to optimize hauling efficiency within the parameters of contract requirements and local ordinances.	FRMG's Environmental Manager	Include this requirement in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Weekly	NA	Quarterly Report	TBD	Subject to NEPA Reevaluation
81	5,808 billion Btu consumed during construction	Encourage use of cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies)	Developer: Shall undertake Reasonable Efforts to use alternatives to diesel engines and/or diesel fuels (Schedule 17, Section 10.1.3.a.ix)	FRMG's Environmental Manager	Include this requirement in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Weekly	NA	Quarterly Report	TBD	Yes/No: Explanation
82	5,808 billion Btu consumed during construction	Encourage use of alternative fuels and asphalt binders	Developer: Shall undertake Reasonable Efforts to use alternatives to diesel engines and/or diesel fuels. (Schedule 17, Section 10.1.3a.ix)	FRMG's Environmental Manager	Include this requirement in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Weekly	NA	Quarterly Report	TBD	TBD
83	5,808 billion Btu consumed during construction	Implement traffic management schemes that minimize delays and idling	Developer: Shall provide intersection analysis that includes traffic signal timing optimization and signal coordination. (Schedule 10, Section 2.1.10)	FRMG's Traffic Task Force Leader	Include this requirement in project specifications and/or within plan notes IDR reviews at 60% and 90%	Visual Weekly	NA	Quarterly Report	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

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84	70.0 billion Btu consumed per day	Implement energy conservation measures where appropriate, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation in accordance with CDOT's <i>Lighting Design Guide</i> (CDOT, 2006)	Developer: Shall adhere to CDOT's Lighting Design Guide for Department maintained lighting, and Xcel's and Local Agency Guidelines for Local Agency maintained lighting. (Schedule 10A)	FRMG's Environmental Manager	Include this requirements in utility plans IDR reviews at 60% and 90%	NA	NA	Quarterly Report	TBD	TBD
85	70.0 billion Btu consumed per day	Encourage energy-efficient options for the cover facilities	Developer: Shall adhere to cover design guidelines and requirements.	FRMG's Landscape Design Team	Include this requirement in utility plans IDR reviews at 60% and 90%	NA	NA	Quarterly Report	TBD	TBD

NOISE

Mitigation Measures

86	Construction noise will present short term effects to those dwelling units located along the corridor and along designated construction access routes	Implement BMPs to minimize noise during construction, as per FHWA's <i>Highway Construction Noise Handbook</i> (2006)	Developer: (Schedule 17, Section 11.6.2 Construction Noise Mitigation and Monitoring)	FRMG's Noise Task Leader	Complete Construction Noise Analysis and incorporate approved noise mitigation measures into the project plans IDR reviews at 60% and 90%	Monitoring As needed during the construction period where receptors are located that may be disturbed See Public Involvement Plan	NA	Technical Memoranda with Monitoring Records	TBD	TBD
87	Construction noise will present short term effects to those dwelling units located along the corridor and along designated construction access routes	Conduct a benefitted receptor survey prior to construction to determine if the recommended noise wall is desired; if the survey results show that the majority of benefitted receptors who respond to the survey desire the noise wall, the noise wall will be optimized and built	Developer: Shall conduct benefitted receptor survey. (Schedule 17, Section 11.3.3 New Noise Abatement)	FRMG's Noise Task Leader	Follow CDOT Benefitted Receptor Survey Process adapting recent C-470 approach See Public Involvement Plan Include noise wall designs in project plans with details in structures plans as required IDR reviews at 60% and 90%	NA	NA	Technical Report	TBD	TBD
88	Number of noise receptors that exceed NAC threshold: Globeville: 27 Elyria: 40 (11 increase substantially—by 10 dBA or more) Swansea: 37 Stapleton: 0 Peoria Street: 0 Montbello: 3 Aurora: 2	Location and height of feasible and reasonable walls: Elyria: 12 to 20 feet	Developer: New noise abatement is required in the Elyria area as identified in Exhibit 46 of the ROD. (Schedule 17, Section 11.3.1 New Noise Abatement)	FRMG's Noise Task Leader	Include noise wall designs in project plans with details in structures plans as required IDR reviews at 60% and 90%	Visual Monthly	NA	Technical Report	TBD	TBD

Other Commitments

NA	1	Construction Noise Mitigation and Monitoring Plan (CNMMP) (Refer to Schedule 17, Section 11.6)	NA	FRMG's Noise Task Leader	Include applicable conditions in project specification and plan notes IDR reviews at 60% and 90%	Visual Daily CQP-0310-38 IQC Construction Noise Monitoring	NA	Monthly Report	TBD	TBD
NA	A	Construction Noise Permit	NA	FRMG's Noise Task Leader	Include applicable conditions in project specification and plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
NA	B	Temporary Noise Variance	NA	FRMG's Noise Task Leader	Include applicable conditions in project specification and plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD
NA	C	Noise Technical Report (Refer to Schedule 17, Section 11.2, 11.3, 11.4 and 11.5)	NA	FRMG's Noise Task Leader	Include applicable conditions in project specification and plan notes IDR reviews at 60% and 90%	Visual Daily	NA	Monthly Report	TBD	TBD

BIOLOGICAL RESOURCES

Mitigation Measures

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

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89	369.2 acres of permanent, direct impact to wildlife habitat; 0.999 acres of permanent impacts and 0.892 acre of temporary impacts to riparian areas	Comply with Senate Bill 40, CDOT Impacted Black-Tailed Prairie Dog Policy, and CDOT Standard Specifications for protection of migratory birds	Developer: Shall comply with Senate Bill 40 (Schedule 17, Section 17); shall comply with BTPD Policy (Schedule 17, Section 22); and shall comply Project Special Provision 240 (Schedule 17)	FRMG's Wildlife Task Leader	Perform field surveys for trees and protected species prior to construction Develop Black Tailed Prairie Dog Management Plan based on recently approved plans and site specific details.	Field Surveys Weekly	NA	Technical Memoranda Monthly Report	TBD	TBD
90	369.2 acres of permanent, direct impact to wildlife habitat; 0.999 acres of permanent impacts and 0.892 acre of temporary impacts to riparian areas	Monitor disturbed sites during construction to identify and treat any noxious weed invasion	Developer: Shall conduct regular noxious weed surveys. (Schedule 17, Section 18 Integrated Noxious Weed Management Plan)	FRMG Biologist	Perform field surveys (March to October) to verify current extent of noxious weed prior to construction Develop Integrated Noxious Weed Management Plan based on recently approved plans and site specific details.	Visual Daily, as needed, during construction activities to verify procedures to prevent import/export noxious weeds are followed CQP-0310-70 IQC Noxious Weed Inspection Checklist	NA	Technical Memoranda Monthly Report	TBD	TBD
91	369.2 acres of permanent, direct impact to wildlife habitat; 0.999 acres of permanent impacts and 0.892 acre of temporary impacts to riparian areas	Reclaim disturbed areas in phases throughout construction with native grasses and forbs	Developer: Shall follow the stabilization requirements of Schedule 17, Project Special Provision 240 and the seeding requirements of Schedule 10 Section 14 Landscaping and Aesthetics.	FRMG's Landscape Design Team	Include requirements in project plans with details IDR reviews at 60% and 90%	Visual Weekly, as needed, during construction activities CQP-0310-13 IQC Inspection Checklist – Landscape Planting CQP-0310-42 IQC Environmental Sodding Inspection Checklist CQP-0310-43 IQC Environmental	Monitoring and replacement, as needed Annually	Monthly Report	TBD	TBD
92	0.999 acres of permanent impacts and 0.892 acre of temporary impacts to riparian areas	Replace riparian trees at a 1:1 ratio and riparian shrubs at a 1:1 square foot ratio	Developer : (Schedule 17, Section 16 Vegetation, and Schedule 17, Section 17 Senate Bill 40 Wildlife Certification)	FRMG's Biologist and Landscape Design Team	Include requirements in project plans with details IDR reviews at 60% and 90%	Visual Monthly, as needed, during construction activities	Monitoring and replacement, as needed Annually	Monthly Report	TBD	TBD
93	369.2 acres of permanent, direct impact to wildlife habitat	Conduct a Burrowing Owl survey following CPW protocols no more than 30 days prior to construction if construction in prairie dog colonies will occur between February 1 and August 31; if a nesting pair is discovered, no construction activity will occur within 150 feet of the nest between March 15 and October 31	Developer: (Schedule 17, Section 22.5 Burrowing Owl)	FRMG's Wildlife Task Leader	Seasonal field surveys for pre-construction verification prior to initiating construction	Seasonal field surveys Weekly where appropriate CQP-0310-28 IQC Western Burrowing Owl Survey Checklist	NA	Technical Memoranda Monthly Report	TBD	TBD
94	369.2 acres of permanent, direct impact to wildlife habitat	Eagle nest surveys will be conducted during the appropriate seasons prior to construction beginning near the winter range and known nest sites, then annually between January 1 and April 31 for the remainder of construction, in the event that a Bald and Golden Eagle Protection Act permit is needed	Developer: Schedule 17, Project Special Provision 240.01 (b)3.	FRMG's Biologist	Seasonal field surveys for pre-construction verification prior to initiating construction Include requirements in project plans Incorporate seasonal requirements into construction scheduling IDR reviews at 60% and 90%	Field Surveys to Verify Weekly, where appropriate	NA	Technical Memoranda Monthly Report	TBD	TBD
95	369.2 acres of permanent, direct impact to wildlife habitat	Remove or trim vegetation outside of the April 1 to August 31 migratory bird-breeding season	Developer: Project Special Provision 240 (Schedule 17, Section 22.2) encourages Developer to remove or trim vegetation between September 1 and March 30.	FRMG's Biologist	Include requirements in project plans Incorporate seasonal requirements into construction scheduling IDR reviews at 60% and 90%	Visual Weekly	NA	Monthly Report	TBD	TBD
96	369.2 acres of permanent, direct impact to wildlife habitat	Survey areas to be cleared and grubbed, as well as areas within 50 feet of these areas, between April 1 and August 31 for active migratory bird nests within seven days of the work being performed	Developer: If vegetation must be removed or trimmed from April 1 to August 30, the surveys and procedures of Project Special Provision 240 (Schedule 17) shall be followed.	FRMG's Biologist	Include requirements in project plans Incorporate seasonal requirements into construction scheduling IDR reviews at 60% and 90%	Field Surveys to Verify Weekly	NA	Technical Memoranda Monthly Report	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

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97	369.2 acres of permanent, direct impact to wildlife habitat	Remove existing nests from structures after August 31 and prior to April 1	Developer: (Schedule 17, Project Special Provision 240 Protection of Migratory Birds)	FRMG's Biologist	Include requirements in project plans Incorporate seasonal requirements into construction scheduling IDR reviews at 60% and 90%	Specialists will remove nests from structures (bridges) using approved techniques to prevent reinhabitation during the required timeframe and ahead of planned construction	NA	Technical Memoranda, Photography Monthly Report	TBD	TBD
98	369.2 acres of permanent, direct impact to wildlife habitat	Monitor structures at least once every three days for any nesting activity between April 1 and August 31	Developer: Schedule 17, Project Special Provision 240.	FRMG's Biologist	Include requirements in project plans Incorporate seasonal requirements into construction scheduling IDR reviews at 60% and 90%	Visual Monitor every three days, as needed during construction in nesting areas	NA	Technical Memoranda, Photography Monthly Report	TBD	TBD
99	369.2 acres of permanent, direct impact to wildlife habitat	Prepare and implement an Integrated Noxious Weeds Management Plan	Developer: (Schedule 17, Section 18 Integrated Noxious Weed Management Plan)	FRMG's Biologist	Develop Integrated Noxious Weed Management Plan based on recently approved plans and site specific details.	Visual Weekly	Monitoring and treatment, as needed Annually	Technical Memoranda, Photography Monthly Report	TBD	TBD
100	0.999 acres of permanent impacts and 0.892 acre of temporary impacts to riparian areas	Perform botanical surveys for Ute ladies'-tresses orchid and Colorado butterfly plant	Developer: (Schedule 17, Section 22.3 Colorado Butterfly Plant and Section 22.4 Ute-Ladies'-tresses Orchid)	FRMG's Biologist	Perform surveys with prequalified biologists in the field season prior to construction	NA	NA	Technical Memoranda Monthly Report	TBD	TBD
Other Commitments										
1	NA	Integrated Noxious Weed Management Plan (INWMP) (Refer to Schedule 17, Section 17)	NA	FRMG's Biologist	Develop Integrated Noxious Weed Management Plan based on recently approved plans and site specific details.	Visual Daily, as needed, during construction activities to verify procedures to prevent import/export noxious weeds are followed CQP-0310-70 IQC Noxious Weed Inspection Checklist	NA	Technical Memoranda Monthly Report	TBD	TBD
2	NA	Black Tailed Prairie Dog (BTPD) Management Plan	NA	FRMG's Wildlife Task Leader	Develop Black Tailed Prairie Dog Management Plan based on recently approved plans and site specific details.	Field Surveys Weekly	NA	Technical Memoranda Monthly Report	TBD	TBD
A	NA	Black Tailed Prairie Dog Removal Permit, CPW	NA	FRMG's Wildlife Task Leader	Develop permit based on based on recently approved plans and site specific details.	Field Surveys Weekly	NA	Technical Memoranda Monthly Report	TBD	TBD
B	NA	SB 40 Certification/Approval, CPW	NA	FRMG's Biologist	Develop Black Tailed Prairie Dog Management Plan based on recently approved plans and site specific details.	Field Surveys Weekly	NA	Technical Memoranda Monthly Report	TBD	TBD
C	NA	Nest Take Permit, USFWS	NA	FRMG's Wildlife Task Leader	Avoid need for nest take permit process through coordinated pre-season vegetation management efforts and corresponding construction scheduling	Field Surveys Weekly	NA	Technical Memoranda Monthly Report	TBD	TBD
FLOODPLAINS AND DRAINAGE/HYDROLOGY										
Mitigation Measures										
101	Impact to potential ponding areas due to the increased width of the highway, which may increase runoff from I-70	Create detention ponds and implement storm drainage for onsite drainage system improvements	Developer: Detention and Flood Control Ponds are required by CDOT's MS4 Permit and are specified in multiple locations in Schedule 10, Section 8 Drainage.	FRMG's Drainage Task Force Lead	IDR reviews at 60% and 90%	Visual Monthly	Performance monitoring, periodically and during storm events until functionality is demonstrated.	Monthly Report	TBD	TBD

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102	The potential ponding areas between Brighton Boulevard and Dahlia Street will be substantially impacted due to lowered profile of the highway	Build a south offsite drainage system to reduce the risk of flooding within the lowered section of I-70, as well as the portion of the watershed between I-70 and the South Platte River	Developer: (Schedule 10, Section 8.4.9 Area Specific Drainage Requirements)	FRMG's Drainage Task Force Lead	IDR reviews at 60% and 90%	Visual Monthly	Performance monitoring, periodically and during storm events until functionality is demonstrated.	Monthly Report	TBD	TBD
103	Potential impacts to South Platte River	Design the outfalls to the South Platte River to have no adverse impact to the floodplain	Developer: The effect of tailwater in the receiving drainageway shall be evaluated. (Schedule 10 Section 8.4.4 Drainage)	FRMG's Drainage Task Force Lead	IDR reviews at 60% and 90%	Visual Monthly	Performance monitoring, periodically and during storm events until functionality is demonstrated.	Monthly Report	TBD	TBD
104	Potential conflict with adjacent drainage projects by Denver	Coordinate with adjacent projects to ensure there are no conflicts between projects	Developer: Shall coordinate all drainage related issues with affected Governmental Authorities. (Schedule 10 Section 8.3 Administrative Requirements)	FRMG's Drainage Task Force Lead and Construction Manager	IDR reviews at 60% and 90%	Visual Monthly	Performance monitoring, periodically and during storm events until functionality is demonstrated.	Monthly Report	TBD	TBD
Other Commitments										
NA	NA	See Water Quality	NA	NA	NA	NA	NA	NA	NA	NA
WETLANDS, OPEN WATERS AND OTHER WATERS OF THE U.S.										
Mitigation Measures										
105	5.507 acres of permanent and 0.081 acre of temporary wetland impacts 0.219 acre of permanent and 0.556 acre of temporary impacts to other waters of the U.S. and open waters	Mitigate unavoidable, permanent impacts at a 1:1 ratio in a wetland mitigation bank in the South Platte River watershed	Developer: Shall mitigate for permanent wetland impacts at a 1:1 ratio. (Schedule 17, Section 21 Wetlands/Waters of the U.S. and Section 404 Permit)	FRMG Wetlands Task Leader	Prepare Section 404 permit applications, Secure permits Confirm mitigation banking process and payment protocol	Visual Daily in wetland areas	NA	Technical Memorandum Permit Application	TBD	TBD
106	5.507 acres of permanent and 0.081 acre of temporary wetland impacts 0.219 acre of permanent and 0.556 acre of temporary impacts to other waters of the U.S. and open waters	Obtain and follow requirements of Section 404 permitting and Senate Bill 40 certification	Developer: Shall meet all requirements. (Schedule 17, Section 17 Senate Bill 40 Wildlife Certification and Section 21 Wetlands/Waters of the U.S. and Section 404 Permit)	FRMG Wetlands Task Leader and FRMG Biologist	Prepare Section 404 permit applications, Secure permits Confirm mitigation banking process and payment protocol Survey trees in SB 40 Areas	Visual Daily in SB 40 Areas	NA	SB 40 Certification Request	TBD	TBD
107	5.507 acres of permanent and 0.081 acre of temporary wetland impacts 0.219 acre of permanent and 0.556 acre of temporary impacts to other waters of the U.S. and open waters	Install temporary erosion control and sediment control BMPs before ground-disturbing activities; permanently stabilize completed areas within seven days	Developer: (Schedule 17, Section 20 Water Quality Control and Water Resources and Section 21 Wetlands / Waters of the U.S. and Section 404 Permit)	FRMG Water Resources Team	Stormwater Management Plan (SWMP) approval	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	See Water Quality	TBD	TBD
108	5.507 acres of permanent and 0.081 acre of temporary wetland impacts 0.219 acre of permanent and 0.556 acre of temporary impacts to other waters of the U.S. and open waters	Restore wetlands temporarily affected during construction to pre-construction conditions	Developer: Temporary fills must be removed in their entirety... The areas affected by temporary fills must be revegetated (NW Permit 14, Schedule 17, Section 21.1.2)	FRMG Wetlands Task Leader and FRMG Biologist	Include requirements in project plans IDR reviews at 60% and 90%	Visual Daily in wetland areas	NA	Monthly Reports	TBD	TBD
Other Commitments										
A	NA	Clean Water Act Section 404 Permit, USACE	NA	FRMG Wetlands Task Leader	Include requirements in project plans IDR reviews at 60% and 90%	Visual Daily in wetland areas	NA	Monthly Reports	TBD	TBD

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WATER QUALITY

Mitigation Measures

109	Stormwater runoff can create erosion and degradation of water quality during and after construction	Implement the following BMPs for erosion and sediment control, dust control, stormwater control, and expansive soils during and after construction: Silt fences, erosion control blankets Sediment traps, sediment basins Soil stockpile management Temporary diversion structures Spill prevention and control measures Regrading Seeding and revegetating soils and slopes Mulch protection for new plantings Stormwater control channels	Developer: (Schedule 17, Section 20, Schedule 10, Section 8, Drainage, and CDOT Standard Specifications)	FRMG Water Resources Team	Stormwater Management Plan (SWMP) approval	Visual Daily, as needed, during construction activities Monthly Summaries CQP-0310-20 IQC Inspection Checklist – Storm Water Management	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD
110	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Prevent over-treating by commencing liquid de-icer application at the beginning of snowfall and no longer pre-treat roads	Developer: Shall follow CDOT Guidance which advises against using liquids or solids on bare roads prior to precipitation. (CDOT Standard Operating Guide (SOG) for Winter Maintenance and Operations, August 2010.)	FRMG's Construction Manager	NA	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD
111	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Reduce the application rate of sand and salt mixtures from historic rates by compliance with CDPHE, Air Quality Control Commission's Regulation 16.	Developer: Shall also conform to the requirements of the Colorado Department of Public Health and Environment, Air Quality Control Commission's Regulation 16 and DRGOG sweeping requirements. (Schedule 17, Section 10.1.1 and Schedule 11, Section 11.4)	FRMG's Construction Manager and O&M Manager	NA	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD
112	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Apply liquid de-icer products at the lowest application rate that it will remain effective by adherence to CDOT's Standard Operating Guide for Winter Maintenance and Operations.	Developer: Shall follow CDOT Guidance which advises against exceeding 80 gallons per lane mile. (CDOT Standard Operating Guide (SOG) for Winter Maintenance and Operations, August 2010)	FRMG's Construction Manager and O&M Manager	NA	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD
113	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Completely remove sand/salt within the "core" sweeping area within four days of snow events, as per DRCOG and CDOT regulations; only 35 percent removal outside the "core" areas is required; for the past two years, it has been CDOT practice to remove all remaining sand/salt from the study area even though it is not in the "core" sweeping area—and CDOT will continue to do so	Developer: Post storm sweeping shall be performed as required by the Denver Regional Council of Governments. (Schedule 11 Section 11.4, Appendix A-1 Item 17.1, and Appendix A-2 Item 17.1)	FRMG's Construction Manager and O&M Manager	NA	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD
114	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Perform fleet upgrades that include on-board computers to track the amount of mixture being applied, as well as rates of application of de-icing materials; this technology prevents over-treating; the majority of the CDOT Region 1 fleet is currently equipped with these computers	Developer: Shall equip all winter operations spreading equipment with on board electronic spreader control system designed to control the application of highway de-icing chemicals. (Schedule 11, Section 11.6)	FRMG's Construction Manager and O&M Manager	NA	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD
115	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Utilize only de-icing and anti-icing products which are on the Pacific Northwest Snow Fighters Approved Product List. Use product application rates which conform to the manufacturer's recommendations and air and water quality regulations.	Developer: All de-icing and anti-icing chemical materials introduced into the Environment by Developer shall meet or exceed Pacific Northwest Snow Fighters (PNS) criteria, and materials used shall be materials identified on the PNS approved products list. (Schedule 11, Section 11.8)	FRMG's Construction Manager and O&M Manager	NA	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD
116	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Stockpile solid mixtures at the I-70 and Havana Street CDOT maintenance facility; the mixtures are kept under domes to protect them from precipitation, which prevents water high in salts from running off into receiving waters	Developer: All stockpiled material shall be managed in accordance with applicable permits including the requirements for Facility Runoff Control Measures referenced in the MS4 Permit. (Schedule 11, Section 2.2.4)	FRMG's Construction Manager and O&M Manager	NA	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017				FRMG Means and Methods				FRMG Compliance Tracking Input		
#	Impact from ROD	Mitigation Commitment	Status/Resolution	Responsible Party for Implementation (Environmental Manager Verifies Compliance)	Construction Period: Design Stage Means and Methods Inspection Checklist – Environmental Pre-Construction)	Construction Period: Construction Stage Means and Methods (Inspection / Monitoring Method and Frequency) (Inspection Checklist – Environmental Screening and Monitoring)	Operating Period Means and Methods (If Different from Construction Period)	Reporting Format	Compliance Status (Updated Regularly after NTP1 and NTP2)	Impact or Mitigation Altered (For ReEval Tracking)
117	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Perform quality assurance audits on de-icing mixtures several times per year to ensure elevated levels of harmful anti-caking compounds are not found in the mixtures	Developer: De-icer sampling shall be performed in accordance with (CDOT Standard Operating Guide (SOG) for Winter Maintenance and Operations, August 2010.)	FRMG's Construction Manager	NA	Visual Daily, as needed, during construction activities Monthly Summaries	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Daily, Weekly, Monthly Refer to SWMP Compliance Requirements	TBD	TBD
118	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Train snowplow drivers annually, stressing the importance of meeting or exceeding water quality and air quality permit requirements	Developer: Winter operations staff training shall include environmental compliance requirements. (Schedule 11, Section 11.9 Winter Operations Environmental Training)	FRMG's Construction Manager and O&M Manager	NA	Training Program	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Training Records	TBD	TBD
119	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Use temperature gauges built into trucks and roadway surfaces to assist with making decisions related to de-icing application rates and mixes	Developer: A Road Weather Information System (RWIS) and environmental friction sensors shall be installed and utilized. (Schedule 10, Section 3.8.17) Developer shall equip winter operations equipment with digital infrared temperature indicating system. (Schedule 11, Section 11.6.6)	FRMG's Construction Manager and O&M Manager	NA	Winter Season Verification	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Monthly	TBD	TBD
120	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Use vacuum sweepers, not side-cast sweepers, as part of ongoing fleet upgrades; trash within the right of way is picked up prior to each sweeping	Developer: Sweeping with a kick broom (side-cast sweeper) is prohibited. (Schedule 17 Project Special Provision 208.04 (f)) Developer shall pick up trash prior to sweeping. Schedule 11 Appendix A-1 17.2 and Appendix A-2 17.2)	FRMG's Construction Manager and O&M Manager	NA	Winter Season Verification	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Monthly	TBD	TBD
121	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Rely on cameras/ITS systems to determine problem areas during each storm event	Developer: Shall use all available resources to assess weather conditions and make decisions and direct actions that maintain the travel ways as safe as possible during and after the occurrence of any Precipitation Event. (Schedule 11, Section 11 Snow and Ice Services.)	FRMG's Construction Manager and O&M Manager	NA	Winter Season Verification	O&M Manual Requirement, Winter Season implementation, monitoring and reporting	Reports Monthly	TBD	TBD
122	Increase in runoff TSS loads of six percent to the South Platte River Increase in runoff TSS loads of 18 percent to Sand Creek	Provide permanent water quality control features (i.e., extended detention pond) as part of the project to treat stormwater runoff from the highway	Developer: Shall comply with CDOT's MS4 Permit which includes requirement for Permanent Water Quality Control. (Schedule 10, Section 8.3.3 and multiple additional locations.)	FRMG Water Resources Team	IDR reviews at 60% and 90%	Visual Monthly	Water treatment performance monitoring.	Reports Daily, Weekly, Monthly Refer to MS4 Compliance Requirements	TBD	TBD
123	Increase in runoff TSS loads of six percent to the South Platte River Increase in runoff TSS loads of 18 percent to Sand Creek	Consider environmentally friendly techniques to provide water quality treatment	Developer: Shall design permanent water quality features for stormwater runoff to UDFCD Urban Storm Drainage Criteria Manual. (Schedule 10, Section 8.3.3i)	FRMG Water Resources Team	IDR reviews at 60% and 90%	NA	Consider treatment improvements if new or improved techniques become feasible	Reports Monthly	TBD	TBD
124	Increase in runoff TSS loads of six percent to the South Platte River Increase in runoff TSS loads of 18 percent to Sand Creek	Treat runoff entering the South Platte River and Sand Creek in conformance with CDOT's MS4 Permit and New Development and Redevelopment Program	Developer: (Schedule 10, Section 8, Drainage, and Schedule 17, Environmental Requirements.)	FRMG Water Resources Team	IDR reviews at 60% and 90%	Visual Daily, as needed, during construction activities Sampling/Logging CQP-0310-23 IQC Inspection Checklist – Discharge Monitoring Report	Water treatment performance monitoring.	Monthly Report Monthly Log	TBD	TBD
Other Commitments										
A	NA	Clean Water Act Section 402 Construction Dewatering Permit (or Individual Construction Dewatering Permit if contaminated groundwater is expected to be encountered), CDPHE WQCD	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities CQP-0310-23 IQC Inspection Checklist – Discharge Monitoring Report	NA	Monthly Report Monthly Log	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017										
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B	NA	Construction Activities Stormwater Discharge Permit ("CASDP"), CCD Waste Water Management	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities CQP-0310-23 IQC Inspection Checklist – Discharge Monitoring Report	NA	Monthly Report Monthly Log	TBD	TBD
C	NA	Colorado Discharge Permit System ("CDPS") Stormwater Construction Permit ("SCP"), CDPHE WQCD	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities CQP-0310-23 IQC Inspection Checklist – Discharge Monitoring Report	NA	Monthly Report Monthly Log	TBD	TBD
D	NA	Municipal Separate Storm Sewer System (MS4) Discharge Permit (CDOT MS4 discharge requirements), CDPHE WQCD	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities CQP-0310-24 IQC Inspection Checklist – Water Quality	Performance Monitoring	Report	TBD	TBD
E	NA	Municipal Separate Storm Sewer System (MS4) Discharge Permit (outside CDOT ROW), All Applicable Government Authorities	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities	Performance Monitoring	Report	TBD	TBD
F	NA	Subterranean Groundwater Permit, CDPHE WQCD	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities	Performance Monitoring	Monthly Report Monthly Log	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

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G	NA	Construction Dewatering Permit, CDPHE WQCD Subterranean Groundwater Permit, CDPHE WQCD Construction Dewatering Permit, CDPHE WQCD	NA	FRMG Water Resources Team	AECOM's Water Resources Team and Environmental Team will provide the background information necessary for the permit to the Contractor, including the Project's SWMP. The Contractor will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address the dewatering process, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities CQP-0310-23 IQC Inspection Checklist – Discharge Monitoring Report	Performance Monitoring	Monthly Report Monthly Log	TBD	TBD
H	NA	Substitute Water Supply Plan, CDWR	NA	FRMG Water Resources Team	FRMG will prepare the application, address water rights issues and secure the permit.	NA	NA	Report	TBD	TBD
I	NA	Notice of Intent to Construct Dewatering Wells, CDWR	NA	FRMG Water Resources Team	FRMG will prepare the application, address water rights issues and secure the permit.	Visual Daily, as needed, during construction activities	NA	Monthly Report Monthly Log	TBD	TBD
J	NA	Well Construction and Test Reports, CDWR	NA	FRMG Water Resources Team	FRMG will prepare the application, address water rights issues and secure the permit.	Visual Daily, as needed, during construction activities	NA	Monthly Report Monthly Log	TBD	TBD
K	NA	Dewatering Systems Well Report, CDWR	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities CQP-0310-23 IQC Inspection Checklist – Discharge Monitoring Report	Performance Monitoring	Monthly Report Monthly Log	TBD	TBD
L	NA	Stormwater Quality Discharge Permit for Construction Activities, City of Aurora	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit. Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily, as needed, during construction activities CQP-0310-23 IQC Inspection Checklist – Discharge Monitoring Report	NA	Monthly Report Monthly Log	TBD	TBD
M	NA	Sewer Use and Drainage Permit (SUDP), CCD	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit.	Visual Monthly	Performance Monitoring	Monthly Report Monthly Log	TBD	TBD
N	NA	Well Abandonment Report (GWS-09), State of Colorado, Office of State Engineer	NA	FRMG Water Resources Team	FRMG will prepare the application and secure the permit.	Visual Monthly	NA	Monthly Report Monthly Log	TBD	TBD
NA	NA	See Hazardous Materials	NA	NA	NA	NA	NA	NA	NA	NA

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017				FRMG Means and Methods				FRMG Compliance Tracking Input		
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GEOLOGY AND SOILS

Mitigation Measures

125	Excavation is anticipated to extend below the depth of groundwater from approximately the UPRR to Columbine Street	Prevent groundwater infiltration into the lowered section of the highway; install underdrain pipes below the pavement to drain any additional groundwater that still enters the lowered section	Developer: Shall design, construct, and operate a system that prevents groundwater infiltration into the lowered section. (Schedule 10, Section 8, Drainage.)	FRMG Water Resources Team	IDR reviews at 60% and 90%	Visual Inspection of Underdrain Pipes	Performance Monitoring	Project Plans Monthly Report	TBD	TBD
126	Temporary impacts to groundwater during excavation	Dewater during the construction process	Developer: The Developer shall be responsible for obtaining and will be the designated entity under all of the water quality permits related to construction activities. If required, the Developer shall obtain a Substitute Water Supply Plan from the Colorado Division of Water Resources for all temporary or permanent dewatering activities (Schedule 17, Section 20)	FRMG Water Resources Team	See Water Quality Permits	See Water Quality Permits	See Water Quality Permits	See Water Quality Permits	TBD	TBD

HAZARDOUS MATERIALS

Mitigation Measures

127	34 hazardous materials sites affected; 750 acres of land disturbed	Before right-of-way acquisition, conduct a Phase I Environmental Site Assessment (Phase I) or initial site assessment for those properties identified for acquisition; based on these assessments, additional subsurface investigation may be required depending on the recognized environmental conditions identified and potential risk to the project	Department: Has completed Phase I Environmental Site Assessments and has completed a Limited Subsurface Investigation Report, which is included in Schedule 29. Developer: Shall complete any required Phase 1s beyond those that the Department has agreed to do and have been identified in Schedule 18 (Right-of-Way).	FRMG's Hazardous Materials Task Manager	Prepare Phase I Report following applicable standards and protocol, and Phase II investigations, including sampling and reporting	Monitoring and Sampling As specified in the Phase II Report(s)	NA	Technical Reports, including Monitoring and Sampling Results	Pre-Construction Phase Status: Phase I ESA and Limited Subsurface Investigation Report: Complete: CDOT, Schedule 29 Additional Phase 1s: Pending Construction Phase Status: Pending Post-Construction/ Operation Status: Pending	TBD
128	34 hazardous materials sites affected; 750 acres of land disturbed	Avoid contaminated sites wherever practical; where unavoidable, initiate further site investigation and coordination with affected property owners	Developer: The Developer shall minimize impacts to hazardous materials sites. When unavoidable, the Developer shall follow the requirements specified in Schedule 17, Section 23.	FRMG's Hazardous Materials Task Manager	IDR reviews at 60% and 90%	Visual Daily Monitoring and Sampling As specified in the Phase II Report(s) CQP-0310-33 IQC Contaminated Soils Disposition Report CQP-0310-34 IQC Contaminated Ground Water Disposition Report CQP-0310-37 IQC General Soil Disposition Report	NA	Technical Reports, including Monitoring and Sampling Results	TBD	TBD
129	34 hazardous materials sites affected; 750 acres of land disturbed	Follow <i>CDOT Standard Specifications for Road and Bridge Construction</i> , Section 250, Environmental, Health and Safety Management	Developer: The Developer is responsible for completing all work activities in accordance with the 250 Specification (Schedule 17, Section 23.1.2)	FRMG's Hazardous Materials Task Manager	Approval of Project-Specific Health and Safety Plan: Standard and Customized Practices	Safety Observations Daily See Project-Specific Health and Safety Plan: Standard and Customized Practices	See Project-Specific Health and Safety Plan: Standard and Customized Practices	See Project-Specific Health and Safety Plan: Standard and Customized Practices	TBD	TBD
130	Potential impact to Vasquez Boulevard/I-70 Superfund Site	Coordinate with and obtain approval from the U.S. Environmental Protection Agency (EPA) and CDPHE, as necessary, when construction occurs in the Vasquez Boulevard/I-70 Superfund site	Developer: Shall follow the approved Beneficial Use and Materials Management Plan approved by CDPHE. (Schedule 17, Section 23.8)	FRMG's Hazardous Materials Task Manager	Meet with EPA and CDPHE to develop compliance strategies and requirements	Visual Daily	NA	As specified in the Benefitted Use and Materials Management Plan	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

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131	Extensive excavation through a known landfill that contains contaminants	Follow Tri-County Health Department <i>Health and Safety Practices during Construction on or Near Former Landfills</i>	Developer: The Developer is responsible for coordinating with all Governmental Authorities and obtaining the required approvals (Schedule 17, Section 23.5)	FRMG's Hazardous Materials Task Manager and Health and Safety Officer	Approval of Project-Specific Health and Safety Plan: Standard and Customized Practices	Safety Observations Daily See Project-Specific Health and Safety Plan: Standard and Customized Practices	See Project-Specific Health and Safety Plan: Standard and Customized Practices	See Project-Specific Health and Safety Plan: Standard and Customized Practices	TBD	TBD
132	33 hazardous materials sites affected, 719 acres of land disturbed	Conduct appropriate surveys for asbestos, lead based paint, and universal wastes prior to demolition of any building structures and bridges or elevated structures; if these materials are encountered, remove them in accordance with applicable regulations and guidelines; if ACM is encountered, including buried utilities, follow CDOT Specification 250.07, Asbestos-Containing Material Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure; additionally, depending on the type of ACM, clean up this material in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations	Department: In accordance with Appendix A of Schedule 18, the Department is completing building surveys for Department assigned parcels. Developer: The Developer is responsible for completing building surveys for Developer assigned parcels in accordance with Schedule 18 Sections 2.2 and 2.3 and Schedule 17, Section 23.13 along with completing surveys for other elements (e.g., bridges) that will be impacted by construction activities in accordance with Schedule 17, Section 23.13. In areas with asbestos-contaminated soils, the Developer is responsible for following the requirements defined in Section 23.14.	FRMG's Hazardous Materials Task Manager	Include the requirements in Appendix A of Schedule 18 and other requirements in project plans and specifications IDR reviews at 60% and 90% Perform surveys	Visual Daily Clean up ACM and/or LBP according to applicable procedures, requirements and safety protocol CQP-0310-30 IQC Asbestos Containing Soils Inspection Checklist CQP-0310-31 IQC Asbestos Abatement Inspection Checklist CQP-0310-35 IQC Environmental Unexpected Asbestos Discovery Report CQP-0310-36 IQC Asbestos Building Manifest Report	NA	Technical Reports, including Monitoring and Sampling Results	TBD	TBD
133	33 hazardous materials sites affected, 719 acres of land disturbed	Update contaminated sites search databases to reflect most recent records	Department: As part of the Phase I Environmental Site Assessments that the Department is completing, updated database reports are being obtained. Developer: Shall be responsible for any reporting or notification with respect to RHMs required by Governmental Authorities (Schedule 17, Section 23.20.1.)	FRMG's Hazardous Materials Task Manager	Use updated database information from CDOT's Phase I work and additional Phase I work performed by FRMG Provide required notice in coordination with CDOT and other team members	NA	NA	Technical Report Notices, as needed	TBD	TBD
134	33 hazardous materials sites affected, 719 acres of land disturbed	Prepare and implement a project-specific Health and Safety Plan and Materials Management Plan to address potential hazardous materials that are encountered during construction; these plans will consist of specific measures to protect worker and public health and safety, as well as programs to manage contaminated materials during construction	Developer: The Developer is responsible for the preparation and implementation of a project-specific Health and Safety Plan (Schedule 17, Section 23.110) and a Materials Management Plan (Schedule 17, Section 23.8).	FRMG's Hazardous Materials Task Manager and Health and Safety Officer	Approval of Project-Specific Health and Safety Plan: Standard and Customized Practices Approval of Beneficial Use and Materials Management Plan	Visual Daily	Visual Daily	Recognized Hazardous Materials Reports Sampling, Monitoring and Performance Records	TBD	TBD
135	Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	In the event that unknown contaminated media is encountered during construction, stop working until the contamination is properly evaluated and measures are developed to protect worker health and safety in accordance with the project-specific Health and Safety Plan and Materials Management Plan	Developer: The Developer is responsible for completing work in accordance with Schedule 17, Section 23 and for developing and implementing a Materials Management Plan (Schedule 17, Section 23.8) and a Health and Safety Plan (Schedule 17, Section 23.110).	FRMG's Hazardous Materials Task Manager and Health and Safety Officer	Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	Visual Daily	Recognized Hazardous Materials Reports Sampling Monitoring and Performance Records	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017				FRMG Means and Methods				FRMG Compliance Tracking Input		
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136	Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination	Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil; during the construction phase, require the FRMG to file and abide by a dust management plan to minimize the effects of dust on surrounding communities; additionally, conduct air monitoring to determine whether dust control efforts are successful in preventing violations of air quality standards	Developer: The Developer is responsible for developing management plans and utilizing best management practices for fugitive dust control (Schedule 17, Section 10) and stormwater erosion (Schedule 17, Section 20).	FRMG's Air Quality Task Manager and Hazardous Materials Task Manager	Approval of Air Quality and Water Quality Permits and associated Discipline Specific Management Plans	Visual Daily	NA	Monitoring Results	TBD	TBD
137	Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination	Obtain a CDPHE CDPS Construction Dewatering Permit, Remediation Activities Discharging to Surface Water or Construction Activities Discharging to Ground Water, as required, utilizing readily available data; the selected Developer will follow the permit requirements	Developer: The Developer is responsible for the permitting, treatment, management and disposal related to water quality in accordance with Schedule 17, Section 23.4 and for approvals related to consumptive use in accordance with Schedule 17, Sections 20.1.9 and 20.1.10.	FRMG's Water Resources Team and Hazardous Materials Task Leader	See Water Quality	See Water Quality	See Water Quality	See Water Quality	TBD	TBD
138	Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination	If this alternative requires permanent dewatering, obtain and follow the necessary CDPS Dewatering Permits; under the temporary construction and permanent feature dewatering permits, treat and discharge source water onsite in accordance with the permit or characterize and remove source water offsite to a permitted disposal facility	Developer: The Developer is responsible for the permitting, treatment, management and disposal related to water quality and Consumptive Use in accordance with Schedule 17, Section 20.1.9, 20.1.10, and 23.4.	FRMG's Water Resources Team and Hazardous Materials Task Leader	See Water Quality	See Water Quality	See Water Quality	See Water Quality	TBD	TBD
139	Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	Properly abandon and close monitoring wells or septic systems disturbed during construction activities in accordance with applicable regulations and guidelines; if existing monitoring wells are impacted during construction, the project will replace them, as necessary	Developer: The Developer is responsible for abandoning or relocating monitoring wells in accordance with Schedule 17, Section 23.20.2 and for abandoning and closing septic systems in accordance with Schedule 18, Sections 2.2 and 2.3.	FRMG's Water Resources Team and Hazardous Materials Task Leader	See Water Quality	See Water Quality	See Water Quality	See Water Quality	TBD	TBD
Other Commitments										
1	NA	Beneficial Reuse and Materials Management Plan	NA	FRMG's Hazardous Materials Task Manager	Prepare the plan according to the applicable requirements using previously approved plans as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD
2	NA	Sampling and Analysis Plan (Included in Materials Management Plan)	NA	FRMG's Hazardous Materials Task Manager	Prepare the plan according to the applicable requirements using previously approved plans as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD
3	NA	Spill Prevention Control Countermeasures (SPCC) Plan	NA	FRMG's Hazardous Materials Task Manager	Prepare the plan according to the applicable requirements using previously approved plans as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily CQP-0310-26 IQC Inspection Checklist – Spill Response Report	NA	Reports	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

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5	NA	Structure Survey Assessment Plan (SSAP)	NA	FRMG's Hazardous Materials Task Manager	Prepare the plan according to the applicable requirements using previously approved plans as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD
5	NA	Structure Survey Assessment Reports (SSAR), Asbestos Project Design meeting the requirements of CDPHE, Air Quality Control Commission (AQCC) Regulation No. 8, Part B, Section III.C. (to be included in SSARs)	NA	FRMG's Hazardous Materials Task Manager	Prepare the reports according to the applicable requirements using previously approved reports as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD
6	NA	Long-Term Clean Up Plan	NA	FRMG's Hazardous Materials Task Manager	Prepare the plan according to the applicable requirements using previously approved plans as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD
7	NA	Residential Properties Sampling Plan	NA	FRMG's Hazardous Materials Task Manager	Prepare the plan according to the applicable requirements using previously approved plans as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD
8	NA	Remedial Plan	NA	FRMG's Hazardous Materials Task Manager	Prepare the plan according to the applicable requirements using previously approved plans as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017										
#	Impact from ROD	Mitigation Commitment	Status/Resolution	Responsible Party for Implementation (Environmental Manager Verifies Compliance)	FRMG Means and Methods				FRMG Compliance Tracking Input	
					Construction Period: Design Stage Means and Methods Inspection Checklist – Environmental Pre-Construction)	Construction Period: Construction Stage Means and Methods (Inspection / Monitoring Method and Frequency) (Inspection Checklist – Environmental Screening and Monitoring)	Operating Period Means and Methods (If Different from Construction Period)	Reporting Format	Compliance Status (Updated Regularly after NTP1 and NTP2)	Impact or Mitigation Altered (For ReEval Tracking)
9	NA	Colorado Air Pollution Control Asbestos Abatement or Demolition Permits	NA	FRMG's Hazardous Materials Task Manager	Prepare the permits according to the applicable requirements using previously approved permits as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD
10	NA	Dewater or Remedial Management Plan (RAMP)	NA	FRMG's Hazardous Materials Task Manager	Prepare the plan according to the applicable requirements using previously approved plans as models while customizing the content Include requirements in project plans and specifications IDR reviews at 60% and 90% Incorporate into Pre-Construction Training Program	Visual Daily	NA	Reports	TBD	TBD
11	NA	Health and Safety Plan (HASP)	NA	FRMG's Hazardous Materials Task Manager and Health and Safety Officer	Approval of Project-Specific Health and Safety Plan: Standard and Customized Practices Approval of Beneficial Use and Materials Management Plan	Visual Daily	Visual Daily	Recognized Hazardous Materials Reports Sampling, Monitoring and Performance Records	TBD	TBD
A	NA	Remediation Activities Discharging to Surface Waters Permit, CDPHE WQCD	NA	FRMG's Hazardous Materials Task Manager	Prepare the application and secure the permit according to the applicable requirements using previously approved applications as models while customizing the content Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily	NA	Reports	TBD	TBD
B	NA	Remediation Activities Discharging to Groundwater, CDPHE WQCD	NA	FRMG's Hazardous Materials Task Manager	Prepare the application and secure the permit according to the applicable requirements using previously approved applications as models while customizing the content Approved designs for construction and post-construction water treatment facilities will address water quality treatment requirements and dewatering processes, including the need to treat water encountered within the depressed section of the roadway.	Visual Daily	NA	Reports	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017				FRMG Means and Methods				FRMG Compliance Tracking Input		
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C	NA	Notification as Resource Conservation and Recovery Act (RCRA) Generator (when the Developer is the Generator as determined pursuant to Section 23.6 of this Schedule 17; if the Department is the Generator as determined pursuant to Section 23.6 of this Schedule 17, the Department will submit this notification), CDPHE, Hazardous Materials and Waste Management Division	NA	FRMG's Hazardous Materials Task Manager	Prepare the notice according to the applicable requirements using previously approved notices as models while customizing the content	NA	NA	Notice	TBD	TBD

UTILITIES

Mitigation Measures										
140	All utility types will be affected to some extent Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width Offsite stormwater drainage system south of I 70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency	Minimize service disruptions by connecting to active utilities, and scheduling to coincide with periods of lower demand	Developer: Shall use Reasonable Efforts to anticipate and avoid Utilities, and to otherwise minimize and/or mitigate the consequences of Utility Work. (Schedule 10 Section 4, Utilities)	FRMG's Utilities Task Leader	Include requirements in project plans and specifications IDR reviews at 60% and 90%	Verification Monthly	NA	Contact Reports Technical Memoranda	TBD	TBD
141	All utility types will be affected to some extent Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width Offsite stormwater drainage system south of I 70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency	Encase or provide protective cover over any impacted underground utilities	Developer: Except as otherwise provided in the applicable URA or Utility Work Order, all Utility Work furnished or performed by the Developer shall comply with the relevant Utility Owner's Utility Relocation standards. The Developer shall obtain all such written specifications, standards of practice, and construction methods and other information and materials constituting the Utility Relocation standards from the Utility Owners. (Schedule 10, Section 4.2.13, Utilities)	FRMG's Utilities Task Leader	Include requirements in project plans and specifications IDR reviews at 60% and 90%	Verification Monthly	NA	Contact Reports Technical Memoranda	TBD	TBD
142	All utility types will be affected to some extent Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width Offsite stormwater drainage system south of I 70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency	Coordinate with utility owners and operators to identify construction requirements and financial responsibilities for relocations	Developer: Shall coordinate and cooperate with the Department and the Utility Owners to ensure that all Utility Relocations and all Utility Work is performed in accordance with the applicable URA and Utility Work Order. (Schedule 10 Section 4, Utilities)	FRMG's Utilities Task Leader	Include requirements in project plans and specifications IDR reviews at 60% and 90%	Verification Monthly	NA	Contact Reports Technical Memoranda	TBD	TBD

APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017				FRMG Means and Methods				FRMG Compliance Tracking Input		
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143	All utility types will be affected to some extent Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width Offsite stormwater drainage system south of I 70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency	Identify and improve any utility concerns that can be addressed as part of project implementation	Developer: Shall be responsible for coordinating with Utility Owners in relation to the performance of all Utility Work. (Schedule 10 Section 4, Utilities)	FRMG's Utilities Task Leader	Include requirements in project plans and specifications IDR reviews at 60% and 90%	Verification Monthly	NA	Contact Reports Technical Memoranda	TBD	TBD
144	All utility types will be affected to some extent Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width Offsite stormwater drainage system south of I 70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency	Integrate above-ground utilities that are impacted by the project into the design, hide them from sight within the design, and/or design them to be aesthetically pleasing to the greatest extent practical	Developer: Shall coordinate with Utility Owners and CDD to underground portions of the distribution system. (Utility Matrix and Preliminary Utility Plans, Schedule 29)	FRMG's Utilities Task Leader	Include requirements in project plans and specifications IDR reviews at 60% and 90%	Verification Monthly	NA	Contact Reports Technical Memoranda	TBD	TBD
145	All utility types will be affected to some extent Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width Offsite stormwater drainage system south of I 70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency	Move above-ground utilities underground to the greatest extent practical	Developer: Shall coordinate with Utility Owners and CDD to underground portions of the distribution system. (Utility Matrix and Preliminary Utility Plans, Schedule 29)	FRMG's Utilities Task Leader	Include requirements in project plans and specifications IDR reviews at 60% and 90%	Verification Monthly	NA	Contact Reports Technical Memoranda	TBD	TBD
SECTION 4(f) - RECREATION RESOURCES										
Mitigation Measures										

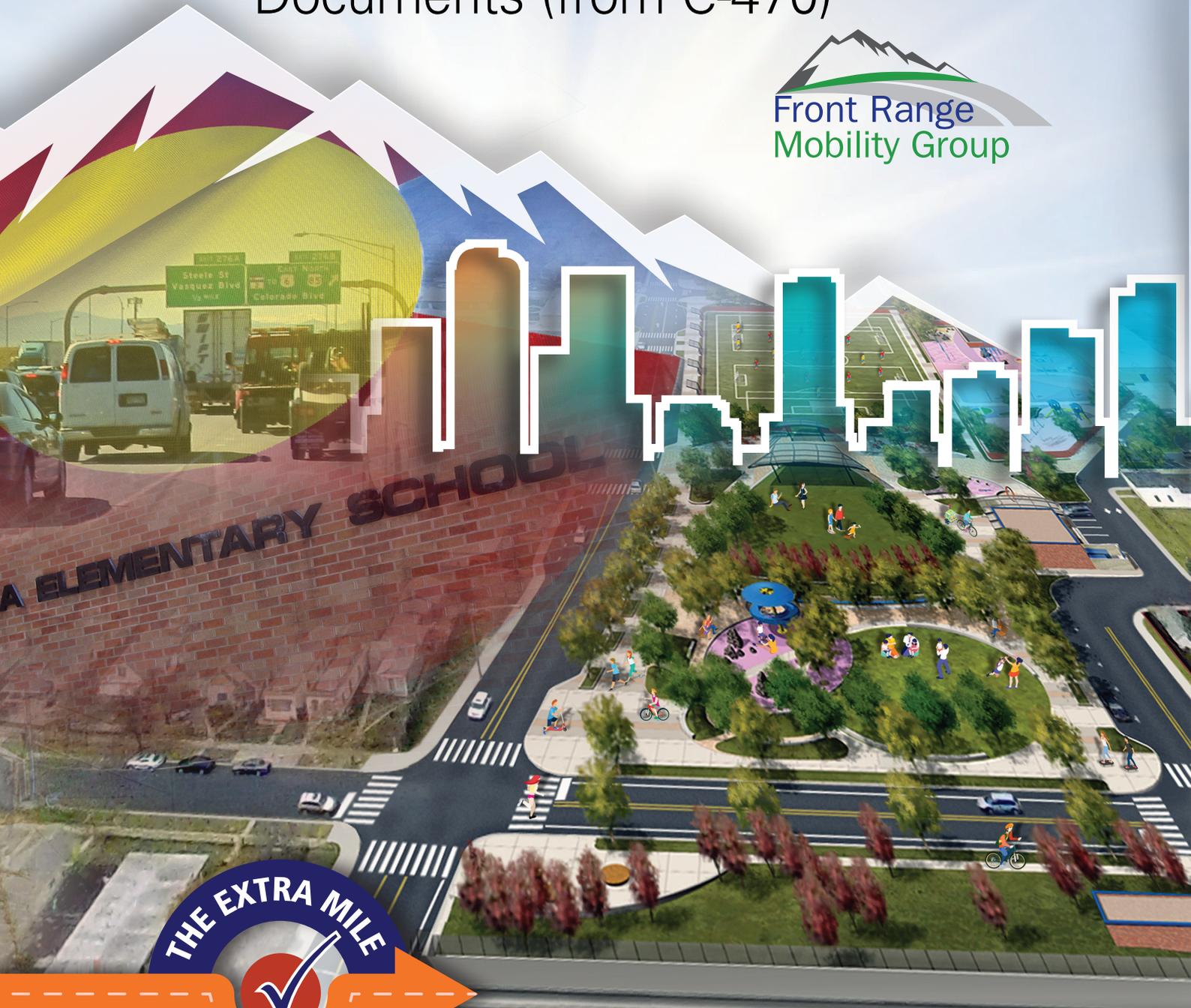
APPENDIX 1 FRMG ENVIRONMENTAL COMPLIANCE TRACKING MATRIX: June 1, 2017

Compliance Means and Methods for the Construction and Operating Periods of the Project

Central 70 Mitigation Measures Status: March 6, 2017				FRMG Means and Methods				FRMG Compliance Tracking Input		
#	Impact from ROD	Mitigation Commitment	Status/Resolution	Responsible Party for Implementation (Environmental Manager Verifies Compliance)	Construction Period: Design Stage Means and Methods	Construction Period: Construction Stage Means and Methods (Inspection / Monitoring Method and Frequency)	Operating Period Means and Methods (If Different from Construction Period)	Reporting Format	Compliance Status (Updated Regularly after NTP1 and NTP2)	Impact or Mitigation Altered (For ReEval Tracking)
146	Use of Swansea Elementary School Public Playground	Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue	Developer: Shade design and construct in accordance with the RFP including the I-70 Cover Plans and the I-70 Cover and Swansea Elementary School Outdoor Areas Design Narrative. (Schedule 10B)	FRMG's Landscape Design Team	The FRMG design process includes an integrated set of plans and details that will address reducing and mitigating construction phase effects on the school and fully characterize how new parcels and the cover relate to an overall site reconfiguration that addresses school facility changes (layout, classrooms, and playgrounds) and vehicle, bicycle and pedestrian access, circulation, and community connections. IDR reviews at 60% and 90%	Visual Monthly	NA	NA	TBD	TBD
147	Use of Globeville Landing Park	Return to pre-construction state following construction	Department will perform mitigation for all Globeville Landing impacts identified in the ROD for the Preferred Alternative. Developer: Shall have responsibilities described in Schedule 17, Section 8, Required Environmental Approvals, if impacts exceed those described in the Reference Design.	FRMG's Landscape Design Team	The FRMG design process includes an integrated set of plans and details that will address reducing and mitigating construction phase effects on the school and fully characterize how new parcels and the cover relate to an overall site reconfiguration that addresses school facility changes (layout, classrooms, and playgrounds) and vehicle, bicycle and pedestrian access, circulation, and community connections. IDR reviews at 60% and 90%	Visual Monthly	NA	NA	TBD	TBD
148	Use of 22 historic resources, which includes 9 <i>de minimis</i> impact determinations	Implement other mitigation measures, as identified, in consultation with SHPO and consulting parties as described in the PA	Department will comply with the terms of the Programmatic Agreement with the SHPO. Developer: Shall preform all requirements of the RFP including those in Schedule 17 Section 12 Historic Requirements.	Department with FRMG's Cultural Resources Team	NA	Visual Daily, as needed, during construction activities Oversee construction activity at stop work order site, Document resource, Develop protections, Add to PA requirements	NA	Monthly Report	TBD	TBD
HUMAN HEALTH CONDITIONS										
NA	NA	No Mitigation Measures, Technical Discipline Plans or Permits	NA	NA	NA	NA	NA	NA	NA	NA

Attachment 2

Selected Examples of Environmental Compliance Documents (from C-470)



CONNECTING COMMUNITIES

	Central 70 Project Draft Environmental Compliance Work Plan	
Document Owner:	Revision – 0	
Approved by:	Revision Date:	Review by:
Approved by:	Release Date: TBD	

ATTACHMENT 2

EXAMPLES OF ENVIRONMENTAL COMPLIANCE DOCUMENTS PRODUCED BY FRMG’S ENVIRONMENTAL MANAGEMENT TEAM FOR THE C-470 PROJECT

Item Number and Description

1. Environmental Compliance and Mitigation Training Program
2. ECWP Monthly Addendum (template)
3. Monthly Field Review Site Form
4. Site Specific Construction Mitigation Plan Checklist
5. Monthly Statement of Recognized Hazardous Materials Management
6. Black Tailed Prairie Dog Field Oversight Tracking Log
7. Migratory Bird Treaty Act and Sensitive Species Form
8. Wetland and Other Waters Tracking Matrix
9. Master Environmental Compliance Tracking Spreadsheet (example pages)
10. Review Comment Summary / Resolution Form for Environmental Interdisciplinary Review and Document Comments
11. CDOT Reevaluation Form 1399
12. Ready for Construction, Standard Environmental Notes and Environmental Exhibits (example)
13. Discipline Specific Management Plans, Examples:
 - Black Tailed Prairie Dog Management Plan
 - Construction Noise and Vibration Plan



C-470 TOLLED EXPRESS LANES DB PROJECT

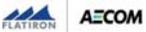
Training:
Managing Environmental Issues During Construction

Purpose of Training

- A number of environmental issues exist within the construction footprint.
- Specific processes exist for managing environmental resources.
- This training provides information on how to recognize potential environmental issues and the steps to identify and communicate issues.



Source: [usdot.gov](#)

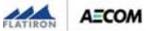


Environmental Resources

- Water Quality
- Air Quality
- Cultural (Paleontology and Archaeology)
- Hazardous Materials
- Noise
- Wildlife and Protected Species
- Waters and Wetlands
- Toxic Wastes
- Parks and Recreational Facilities

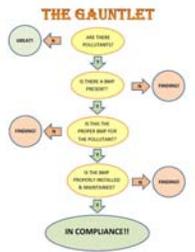


Source: [caltrans.thruway.dot.gov](#)

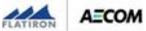


Water Quality

- Stormwater runoff in a construction site affect water quality through erosion and sedimentation.
- Stormwater controls, or Best Management Practices (BMPs), must be in place and working properly at all times, as required by the project permit, local, state, and federal laws and regulations.



Source: [www.COORR.com](#)



EXAMPLE

Stormwater BMPs

- Temporary construction BMPs - seed, mulch, embankment protectors, grade techniques, inlet protection, silt fences, and vehicle tracking prevention.
- Permanent BMPs – extended detention basins, grass buffers, and grass swales.



Source: www.ccodot.gov

Source: www.ccodot.gov

Source: www.ccodot.gov

FLATIRON AECOM

What you can do – Water Quality

- Be aware of any BMPs located within your site and monitor for damage after storm events.
- Notify your supervisor if you notice:
 - Temporary or permanent BMPs that are not working properly due to sedimentation, erosion, or damage from a storm event.
 - Mud and debris tracked onto the roadway from construction vehicles



Source: www.ccodot.gov

FLATIRON AECOM

Air Quality

- Construction activities can generate air pollution as a result of dust and emissions from vehicles.
- Poor air quality can affect worker health and individuals at nearby schools, residential areas, parks and recreational facilities.
- Control practices can minimize construction-related emissions.



Source: www.flatiron.com

Source: www.flatiron.com

FLATIRON AECOM

Typical Air Quality Control Practices

- wheel wash station (top left)
- wind screen (bottom left)
- Vehicle tracking pad to minimize tracking dirt onto public streets (bottom center)
- dust suppression truck (bottom right)



Source: www.flatiron.com

Source: www.ccodot.gov

Source: www.flatiron.com

Source: www.flatiron.com

FLATIRON AECOM

EXAMPLE

What you can do – Air Quality

- Be aware of any control practices that are in place at your site
- Notify your supervisor if:
 - Control practices are damaged or not working properly
 - There are visible dust clouds or mud tracks coming from the construction site



Source: www.vdot.gov

FLATIRON | AECOM

Cultural Resources

- Cultural resources include: historic properties, Native American artifacts, sacred sites, and cemeteries. The project may encounter the following cultural resources:
 - Archeological Resources: arrowheads or pottery chips; human remains; burial sites
 - Paleontological Resources: fossil animals and plants



Jasper artifacts uncovered at 11,500-year old Brock Run Paleo-Indian site as part of Virginia DOT's 1998 cultural resources survey. (photo courtesy of VDOT)

FLATIRON | AECOM



Cultural Resources (left) and Paleontological Resources (right)




Source: www.researchbiology.com

Source: www.cpa.gov

Source: www.aalabor.org

FLATIRON | AECOM

What you can do – Cultural Resources

- If project activities encounter cultural resources:
 - Stop work in the area where the resources were discovered.
 - Immediately notify the project supervisor.
 - A resource-specific professional will be notified to monitor construction activities. Wait for additional information or specific protocols.



Source: www.environmentaltransformation.org

FLATIRON | AECOM

EXAMPLE

Hazardous Materials

- The project may encounter hazardous materials in the form of:
 - Contaminated soil or groundwater
 - Releases from equipment, stored materials, or roadside spills
 - Building materials and construction debris, which may consist of asbestos containing materials (ACMs)
 - Unexpected containers, drums, and underground storage tanks (USTs)
- Exposure to hazardous materials can be harmful to worker health and safety.
- Releases can impact public health and the environment.
- Hazardous materials are generally regulated and require special handling and/or disposal.



Potential Hazardous Materials

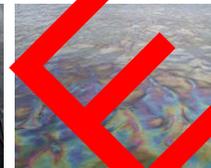
- Building debris (top right)
- Transit tile, a suspect asbestos containing material (bottom left)
- Oil sheen (bottom center)
- Underground storage tank (bottom right).



Source: www.raburandfill.com



Source: www.cj.gov



Source: www.mhbt.com



Source: www.ajm.com



What you can do – Hazardous Materials

- Notify your supervisor if you:
 - Notice anything that “looks bad or smells bad” (i.e. sheen on the surface, odor, staining, discoloring)
 - Encounter any buried construction and demolition debris, building materials, containers (e.g., underground storage tanks, drums)
 - Notice a release from construction equipment, stored materials, or a roadside spill
- Wait for additional information on specific protocols and provisions for personal protective equipment.
- **Note: Human safety is foremost. Address hazardous material issues only after conditions are safe for workers and the public.**



Noise

- Noise can also be a nuisance to nearby schools, residential areas, parks and recreational facilities.
- Control measures can help reduce impacts from noise.



Source: www.centralsouthbay.org



Source: www.noisematters.com



Source: www.healthandtime.com



What you can do – Noise

- Be aware of any control practices in place at your site (e.g., noise barriers)
- Maintain appropriate work hours; limit pile driving from 9 pm to 7 am
- Wear appropriate personal protective equipment for noise (e.g., hearing protection)
- Notify your supervisor with any concerns or questions



Source: www.thwa.dor.gov




Source: www.manafactory.com



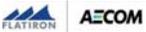
Wildlife and Protected Species

- Wildlife may be present during project activities, including species of concern and species which are protected under state and Federal laws or regulations.
- General Wildlife
 - Coyote, Fox, Deer
 - Rodents
 - Snakes
- Protected Wildlife or Species of Concern
 - Prairie Dog
 - Western Burrowing Owl
 - Raptors
 - Migratory Birds





All photos courtesy of US Fish and Wildlife Service



What you can do – Wildlife

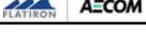
- Be aware of any fenced areas protecting sensitive habitats
- Vehicle operation should be limited to designated areas
- Do not approach live or dead animals
- Do not destroy open prairie dog mounds or burrows
- Stop work and notify your supervisor if you see:
 - Sensitive habitat fencing that has been removed or damaged
 - Dead animals
 - Bird nests within the construction area
 - Bird activity in the construction area



Source: www.exhibition.org



Source: owl.perch.blogspot.com

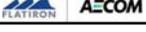


Waters and Wetlands

- Impacts to rivers, streams, creeks, ponds, lakes, and wetlands require special consideration under local agency, state, and Federal regulations.
- Prior to construction, orange temporary fencing and sediment-control measures will be placed to protect wetlands that are outside the planned area of disturbance.



Source: www.offfoto.org



EXAMPLE

What you can do – Waters and Wetlands

- Be aware of any control measures within your site.
- Do not remove or modify environmental fencing.
- Stop work and notify your supervisor if you see:
 - Unplanned discharges or fill being placed into a wetland or water feature
 - Removed or damaged wetland fencing
 - Staged equipment, stored materials, chemical use (e.g., soil stabilizers, dust inhibitors), or refueling stations within 50 feet of wetlands or other water features.



Source: Pingph

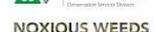


Source: Pingph



Noxious Weeds

- Noxious weeds are plants that grow aggressively, multiply quickly, and can have a negative effect on natural landscapes.
- Management of noxious weeds is required under local, State, and Federal regulations.
- Construction sites can worsen the spread of noxious weeds through the excavation and transport of soil.
- Inspect construction vehicles before and after use to ensure they are free of soil or debris capable of transporting weeds.



Parks and Recreational Facilities

- Parks and recreational facilities, including bike trails, are located throughout the project area.
- Impacts to these facilities must be avoided to the greatest extent possible.



Source: aadp.gov



What you can do - Parks and Recreational Facilities

- Be aware of any environmental fencing protecting these facilities
- To minimize unavoidable impacts, use the following guidelines:
 - Place adequate trail detours (e.g., advanced notice and signage) before construction.
 - Do not stage construction equipment on trails



Source: www.dmvcolorado.org



EXAMPLE

Environmental Compliance Summary

- Notify your supervisor if you are unsure or have questions on a specific resource.
- Be aware of any control practices in your site, and monitor to ensure they are properly functioning.
- Be a considerate neighbor – most compliance issues are raised by the public, who are concerned about public safety and the environment.

PLEASE
STOP WORK IF:

- UNSURE
- UNSAFE
- CONCERNED

Source: www.mcafeefocus.com



EXAMPLE



**C470 TOLLED EXPRESS LANES SEGMENT 1
DESIGN BUILD PROJECT
ECWP Monthly Addendum**

Memorandum

To: [Name], Environmental Point-of-Contact and [Name] CDC/EM
From: [Name], Contractor EM, AECOM
CC: [Name]
Project: C-470 Tolled Express Lanes Segment 1 Design Build Project, CDOT Project No:
NHPP 4701-124 SA #18999
Date: [Date]
Subject: **ECWP Monthly Addendum for [Month] 2017, Reporting Period: [Month] 1
through 31, 2017**

This submittal includes the monthly ECWP Addendum for January 2017, as specified in Book 2 – Technical Requirements, Section 5 – Environmental Requirements and the Project Environmental Compliance Work Plan (ECWP). The purpose of this monthly submittal is to identify proposed changes to the ECWP, as needed, and describe the progress, activities, and milestones related to the specific elements of environmental mitigation for which the Contractor is responsible.

Monthly Narrative

The following table includes a description of activities, environmental exceedances and non-compliance issues, and action items that occurred during the monthly reporting period as required in Book 2 – Technical Requirements, Section 5 – Environmental Requirements and specified in the ECWP. Updates related to specific environmental mitigation measures and permits are provided in the Master Compliance Tracking Spreadsheet. Where environmental mitigation or commitments require that additional documentation be developed to demonstrate compliance, such documentation has been cited and attached.

Monthly Narrative and Reporting Form

Work Description - Description of ongoing construction activities and current status of compliance with Environmental Requirements.

Design:

[Updates]

Master Compliance Tracking Spreadsheet (**Attached**).

Construction:

[Updates]

Personnel – Description of activities performed by environmental professionals not previously identified in Section 1.3 of the ECWP. Resumes of the individuals performing the work are included as an attachment to this form if not already provided in the Approved ECWP or earlier ECWP Monthly Addenda.

[Updates]

Environmental Issues - Exceedances of permit conditions, environmental requirements, or other compliance criteria and other environmental incidents during construction, including a summary of the number and severity of the incidents).

[Updates]

Field Review Site Form (**Attached**)

Compliance Actions – Summary of corrective action strategies implemented during the reporting period and plans for submittals which have undergone environmental review. The ECM prepares the Field Review Form immediately following the field visit and sends to CDOT for their informal review to ensure all field observations are documented. Following that informal review, the ECM sends the Field Review Form to Flatiron for resolution. The Field Review Form is submitted as completed with the ECWP Monthly Addenda will all resolutions noted.

[Updates]

Field Review Site Form (**Attached**).

Hold Point Approvals – Summary of hold points and approvals in accordance with Book 2 Section 3.6.2.5.

[Updates]

Site Specific Construction Mitigation Plan (SSCMP) for field site reviews is **attached**.

Project Changes – Documentation that the EC Team reviewed environmental changes (e.g., RFI, FDC).

Environmental Interdisciplinary Review (IDR) of Design Plans for all segments ongoing. Review of Pre-RFC and RFC plans for the following packages were completed in [Month] 2017:

[Plan set title] RFC Package	Segment [No.]
[Plan set title] Pre-RFC Package	Segment [No.]

The IDR Screener did not identify increases in environmental impacts or mitigation requirements compared to the impacts and mitigation identified in the Revised EA (2015).

Summary of Stakeholder, Agency, Public or Other Relevant Communications

Stakeholder, External Agency, or Public Communications: None for this reporting period.

Paleontological Resources: Pre-construction notifications for site surveys to Nicole Peavey, CDOT Paleontologist on the following dates:

[Updates]

BTPD Passive Relocation Oversight: See **attached** tracking spreadsheet for summary of prairie dog oversight activities and dates performed by CDOT-Qualified Biologist in [Month] 2017.

[Updates]

Environmental Compliance Mitigation Training Program (ECMTP) Documentation:

Environmental Compliance Mitigation Training was completed on the following dates (if CDOT requires a copy of training class rosters, these can be provided. Rosters kept in C-470 Project files.):

- [date]
- [date]

Lessons Learned

Mud tracking has been an issue in the winter months. This issue and best management practices have been discussed with Flatiron. Flatiron has a dedicated project sweeper to cleanup tracking.

ATTACHMENTS

Attachment 1 – Monthly Field Review Site Form

Attachment 2 – Site-Specific Construction Mitigation Plan (SSCMP) Checklists

Attachment 3 – Monthly Statement of Regulated Hazardous Materials Management

Attachment 4 – Black-Tailed Prairie Dog Passive Relocation Oversight Tracking Spreadsheet

Attachment 5 – New Team Member Resumes

Attachment 6 – Master Compliance Tracking Spreadsheet

EXAMPLE



Date of Field Review:	
Participants:	
Locations Visited:	

Environmental Resource Field Review Matrix:

Environmental Resource	Item of Concern			Approximate Station #	Location Description	Notes	Site Photos
	Yes	No	N/A				
Air Quality							
Cultural and Historical Resources							
Hazardous Materials							
Noise and Vibration							
Wildlife and Protected Species							
Waters and Wetlands							
Vegetation							
Noxious Weeds							
Parks and Recreational Facilities							
Visual Resources and Aesthetics							
Water Quality (including stormwater management)							
Transportation (including traffic)							
Stakeholder Coordination							

EXAMPLE

Action Items:

Area of Concern	Required Action	Responsible Team Member	Action Identified / Completed	Photos



SITE SPECIFIC CONSTRUCTION MITIGATION PLAN CHECKLIST

This checklist is to be completed by the Construction Manager and Environmental Manager during a pre-construction field review, prior to initiating construction activities as noted in the ECWP.

GENERAL INFORMATION

Project Area/Phase:		Station Number(s):
Date of Environmental Scoping Meeting:	Applicable Design Packages:	
Attendees:		
Estimated Start Work Date:	Estimated Duration:	
Excavation/Fill Square Footage: Yes: _____ No: _____	Date of Photographs Personnel:	
<p>Work Location and Description: <i>Include specific details on the scope of work to be completed, square footage of areas that will be disturbed by any clearing, grading, excavating, stockpiling, and/or filling; and location of support facilities/activities that would be involved.</i></p> <ul style="list-style-type: none"> • Work will include the following activities: • General construction methodology includes: 		

ENVIRONMENTAL RESOURCES, POTENTIAL IMPACTS, AND PRE-CONSTRUCTION ACTION ITEMS

Environmental Resource	Present? (Yes/No)	Notes	Pre-Construction Action Items
Air Quality			
Cultural and Historical Resources			
Hazardous Materials			
Noise and Vibration			
Wildlife and Protected Species			
Waters and Wetlands			
Vegetation			

C470 TOLLED EXPRESS LANES SEGMENT 1
DESIGN BUILD PROJECT
SITE SPECIFIC CONSTRUCTION MITIGATION PLAN CHECKLIST

Environmental Resource	Present? (Yes/No)	Notes	Pre-Construction Action Items
Noxious Weeds			
Parks and Recreational Facilities			
Visual and Aesthetic			
Water Quality (including stormwater management)			
Stakeholder Agreements/Intergovernmental Agreement (IGA) Review			
Public Information (PI)			
Transportation (including traffic)			
Other			

EXAMPLE



MONTHLY STATEMENT OF REGULATED HAZARDOUS MATERIALS MANAGEMENT

Reporting Period: [Date] 1 through 31, 2017
Prepared by: Environmental Compliance Manager
Submitted to: CDOT Environmental Manager

Date Submitted: [Date], 2017
Subject: Monthly Statement of Regulated Hazardous Material Management, C-470 Tolled Express Lanes DB Project

Reporting regarding Regulated Hazardous Materials is required by the contract documents. The purpose of this Regulated Hazardous Materials Monthly Report is to summarize the activities completed by the Contractor as they relate to regulated hazardous materials (RHMs) and the Materials Management Plan (MMP) during the course of project construction. Regulated Hazardous Materials are defined as materials that are regulated by an agency and, therefore, do not meet project reuse standards as identified in the MMP. These may include but are not limited to: asbestos, lead based paint, petroleum impacted soils above the Division of Occupational Public Safety standards, impacted soils above EPA Risk Screen Levels (RSLs) and groundwater or surface water above the Colorado Department Public Health and Environment (CDPHE) water quality standards.

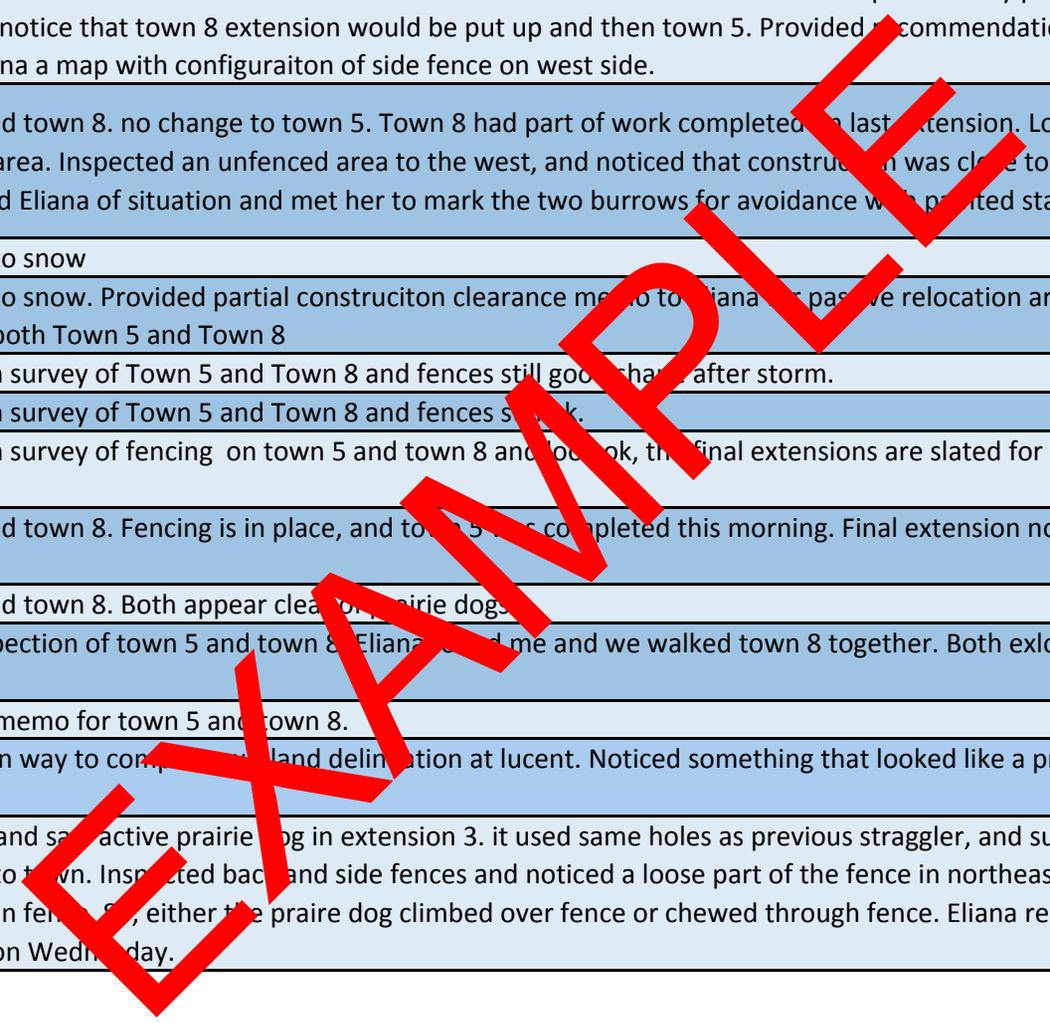
Furthermore, the intent of this report is to answer: What, what, when, where, why and how? For each occurrence of RHMs during the reporting period, a location-specific summary table has been completed, and is attached to this Monthly Report.

For this reporting period, no discrete RHM occurrences were encountered, and addressed under provisions of the MMP. Therefore, no summary tables were completed.

If there are any questions or comments regarding this Monthly Report, please contact Environmental Compliance Manager at [Contact Number].

C-470 BTPD Field Oversight Tracking Log

Date	Work performed
1/1/2017	No monitoring due to no work on site
1/2/2017	Inspected town 5 to make sure prairie dog indeed left. Burrow remained blocked, meaning it left on Friday.
1/3/2017	Inspected town 5 and the extension remained clear. Put back silt fence in obstruction area to prevent any prairie dogs from returning. Received notice that town 8 extension would be put up and then town 5. Provided commendation on side fencing for town 5. Sent Eliana a map with configuraiton of side fence on west side.
1/4/2017	Inspected town 5 and town 8. no change to town 5. Town 8 had part of work completed on last extension. Looks like no prairie dogs remain in this area. Inspected an unfenced area to the west, and noticed that construction was close to an active and an inactive burrow. Told Eliana of situation and met her to mark the two burrows for avoidance with painted stakes.
1/5/2017	No monitoring due to snow
1/6/2017	No monitoring due to snow. Provided partial construcion clearance memo to Eliana for passive relocation areas south of Centennial Trail on both Town 5 and Town 8
1/7/2017	Did quick pedestrian survey of Town 5 and Town 8 and fences still good shape after storm.
1/8/2017	Did quick pedestrian survey of Town 5 and Town 8 and fences still good.
1/9/2017	Did quick pedestrian survey of fencing on town 5 and town 8 and look, the final extensions are slated for completion this week.
1/10/2017	Inspected town 5 and town 8. Fencing is in place, and town 5 was completed this morning. Final extension not completed on Town 8
1/11/2017	Inspected town 5 and town 8. Both appear clear of prairie dogs.
1/12/2017	Completed final inspection of town 5 and town 8. Eliana joined me and we walked town 8 together. Both exlcusion areas fully cleared.
1/16/2017	Provided clearance memo for town 5 and town 8.
1/20/2017	drove past town 5 on way to complete land delimitation at lucent. Noticed something that looked like a prairie dog in extension 3.
1/23/2017	Resurveyed town 5 and saw active prairie dog in extension 3. it used same holes as previous straggler, and suspect same prairie dog moved back onto town. Inspected back and side fences and noticed a loose part of the fence in northeast corner. Eliana reported two holes in fence on 8, either the prairie dog climbed over fence or chewed through fence. Eliana reported that they would repair fence on Wednesday.



**C470 TOLLED EXPRESS LANES SEGMENT 1
DESIGN BUILD PROJECT
MBTA and Sensitive Species Tracking Matrix
Month 2016**

Survey Date	Activity	Location	Notes	Personnel
Example: 7/15/16	MBTA/Structures survey	Bridge ID	No nesting swallows noted	Name

Notes:
MBTA = Migratory Bird Treaty Act

EXAMPLE



C470 TOLLED EXPRESS LANES SEGMENT 1
DESIGN BUILD PROJECT
Wetlands and Other Waters Tracking Matrix
Month 2016

Wetland ID	Station	Water Feature	Jurisdictional (Y/N)	404 Permitted Impact (acres)	Monthly Impacts (acres)	Cumulative Impacts (acres)	Difference (acres)
Example: WL-3		XXX River					
TOTAL							

Notes

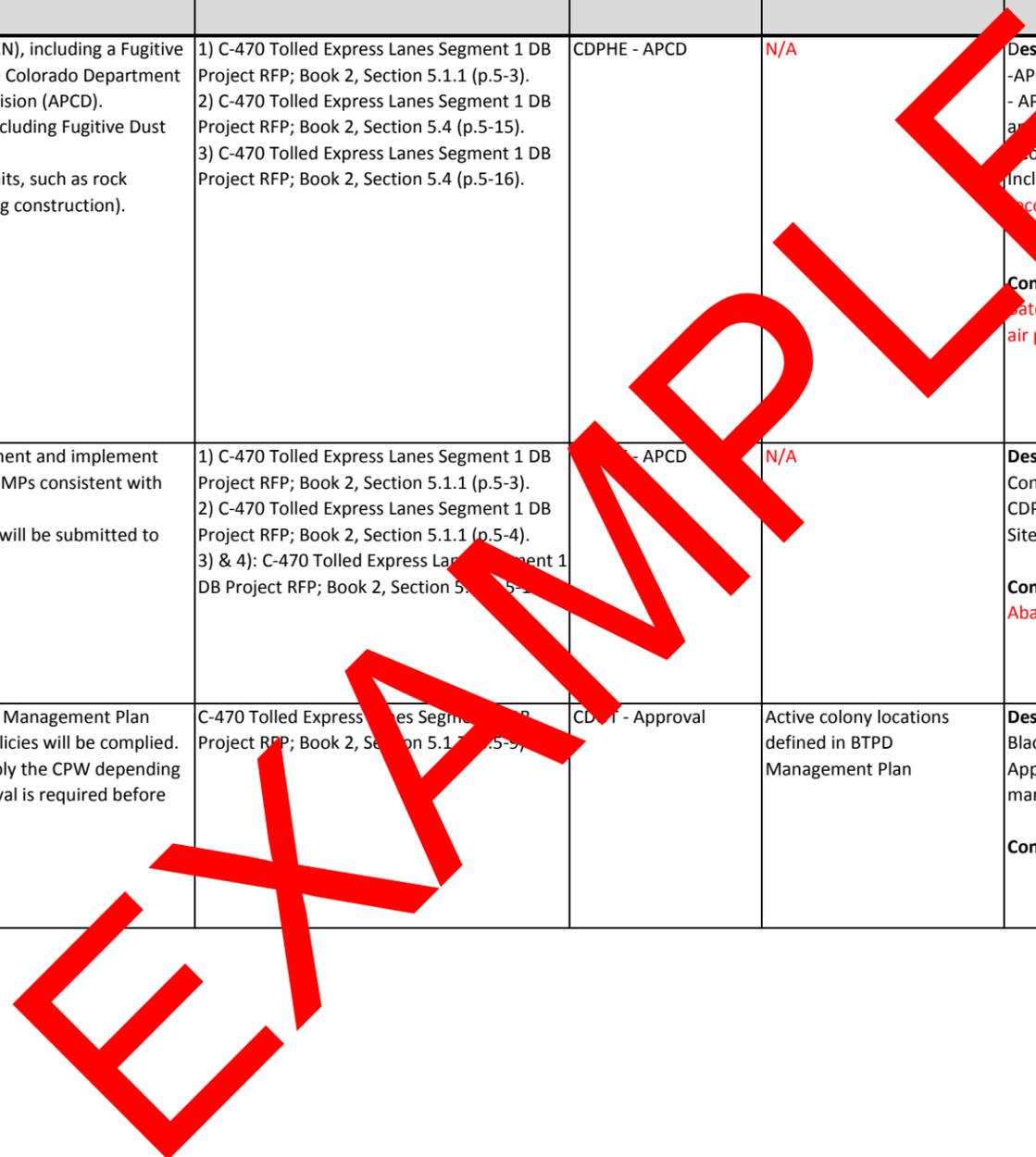
EXAMPLE

**C-470 Tolled Express Lanes Segment 1 Design/Build Project
Master Compliance Tracking Spreadsheet**

January 2017 Monthly Update

Baseline entries in black font; Updates in Red Font

Mitigation / Commitment Category	Mitigation Commitment #	Environmental Mitigation/Commitment Description	Source Document (including page #)	Agency Coordination Required Agency Name	Location of Mitigation in Plan Sets/ Environmental Exhibits/Project Plans (For Site Specific Measures Only)	Mitigation Compliance Status Design and Construction	Mitigation Compliance - Primary Responsible Party
Air Quality - Permitting	AQ-1 (See Tab 2)	1) The Contractor shall obtain an Air Pollution Emission Notice (APEN), including a Fugitive Dust Control Plan and construction and demolition permit from the Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (APCD). 2) Air Pollution Emission Notice (APEN) and Construction Permit (including Fugitive Dust Control Plan). 3) Stationary Source Air Quality Permit (Emissions from portable units, such as rock crushers, generators, asphalt plants, and cement plants, used during construction).	1) C-470 Tolled Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.1.1 (p.5-3). 2) C-470 Tolled Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.4 (p.5-15). 3) C-470 Tolled Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.4 (p.5-16).	CDPHE - APCD	N/A	Design Phase Status: COMPLETE -APEN Construction Permit: Final Approval by CDPHE, issued 8/23/16. Permit No. 16JE0837L. - APEN includes: Particulate Emissions Control Plan, Control Measures, and General Terms and Conditions. - Construction Air Quality Plan (CAQP), Revision 2, dated September 29, 2016, Approved. Includes Fugitive Dust Emission Activities and On-Site and Off-Site Controls. See Aconex record for submittal of Floodplain Permit to CDOT for their record. Construction Phase Status: Site Specific Construction Mitigation Plan for University Concrete Batch Plant (Segment 3) submitted to CDOT 1/16/17 through Aconex; with stationary source air permit 09PO0486 (air permit dated 12/27/16).	Flatiron
Air Quality - Permitting	AQ-2 (See Tab 2)	1) The Contractor will develop an Air Quality Plan, which will document and implement procedures for controlling air quality and dust which shall include BMPs consistent with the Fugitive Dust Control Plan. 2) The Construction Air Quality Plan and Fugitive Dust Control Plan will be submitted to CDOT for approval prior to issuance of NTP 2. 3) Asbestos Abatement Permit (Bridge Demolition). 4) Demolition Permit (Bridge/Structure Demolition).	1) C-470 Tolled Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.1.1 (p.5-3). 2) C-470 Tolled Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.1.1 (p.5-4). 3) & 4): C-470 Tolled Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.1.1 (p.5-5).	CDPHE - APCD	N/A	Design Phase Status: COMPLETE Construction Air Quality Plan (CAQP), Revision 2, dated September 29, 2016, Approved by CDPHE. The CAQP addresses item #2 (Fugitive Dust Emission Activities and On-Site and Off-Site Controls) . Construction Phase Status: All Segments: The CAQP addresses items #3 and #4 (Asbestos Abatement and Demolition controls).	Flatiron
Black-Tailed Prairie Dogs	BTPD-1	Prior to Release for Construction, the Contractor shall submit BTPD Management Plan specifying expected impacts and the manner by which the BTPD policies will be complied. The BTPD plan will be Reviewed and Approved by CDOT, and possibly the CPW depending on the level of impact, and any other agencies as necessary. Approval is required before impacts to BTPD habitat or species can occur.	C-470 Tolled Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.1.1 (p.5-9).	CDOT - Approval	Active colony locations defined in BTPD Management Plan	Design Phase Status: COMPLETE Black-tailed Prairie Dog (BTPD) Management Plan (dated 8/26/16) approved by CDOT. Applicable laws, policies, regulations and CDOT Policies have been followed to identify and management conflicts. Construction Phase Status: N/A	AECOM



**C-470 Tolled Express Lanes Segment 1 Design/Build Project
Master Compliance Tracking Spreadsheet**

January 2017 Monthly Update

Baseline entries in black font; Updates in Red Font

Mitigation / Commitment Category	Mitigation Commitment #	Environmental Mitigation/Commitment Description	Source Document (including page #)	Agency Coordination Required Agency Name	Location of Mitigation in Plan Sets/ Environmental Exhibits/Project Plans (For Site Specific Measures Only)	Mitigation Compliance Status Design and Construction	Mitigation Compliance - Primary Responsible Party
Black-Tailed Prairie Dogs	BTPD-2	If prairie dogs are relocated or removed during the burrowing owl nesting season (March 15 through October 31) the affected habitat shall be surveyed by a qualified biologist for the presence of burrowing owls in accordance with CPW survey protocols. Surveys shall be timed such that the final burrowing owl survey is completed within one week of disturbance to BTPD colonies and submitted to CDOT for Acceptance. Exterminating prairie dogs and donating them to the Rocky Mountain Raptor Program is an option.	C-470 Tolled Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.1.7 (p.5-9)	CDOT - Acceptance	Active colony locations defined in BTPD Management Plan	<p>Design Phase Status: N/A</p> <p>Construction Phase Status: ONGOING</p> <p>EA team continually monitoring construction schedule to identify construction activities conducted during burrowing owl nesting season. Surveys are in accordance with CDOT-Approved BTPD Management Plan (dated 8/26/2016). See BTPD Field Tracking Log attached to each EA Monthly Addenda for specific survey details including dates of preconstruction surveys, passive relocation field oversight activities, and BTPD town construction clearance.</p> <p>Segment 3: ONGOING. Towns 5 & 8 construction clearance memo Rev 1 dated 1/25/17. Town 9 pre-clearance for passive reloc memo dated 12/2/16.</p> <p>Segment 1: PENDING. Towns 2, 3, 4 = passive relocation activities not started. Town 1 previously identified in EA = no impacts from construction.</p> <p>Segment 2: N/A. No Towns identified; or previously identified towns from EA are not active.</p> <p>Segment 4: ONGOING. Town 10 pre-clearance for passive reloc memo dated 2/6/17.</p> <p>Segment 5: N/A. No Towns identified; or previously identified towns from EA are not active.</p>	AECOM/ Pinyon

EXAMPLE

**C-470 Tolloed Express Lanes Segment 1 Design/Build Project
Master Compliance Tracking Spreadsheet TAB 2: PERMIT REQUIREMENTS**

Permit Reference Number	Permit Action Number	Permit/Approval	Cooperating Agency	Status	Required Actions	Source	Permit Number from Authorizing Agency / Date Authorized
1	1	Municipal Separate Storm Sewer System (MS4) Discharge Permit (CDOT MS4 discharge requirements)	CDPHE - Water Quality Control Division	COMPLETE: CDOT Phase I MS4 Permit effective July 1, 2016	The Contractor shall be responsible for complying with the terms and conditions of the (existing) CDOT MS4 Permit that pertains to the Project. The MS4 Permit is available on the web page at http://www.coloradodot.info/programs/environmental/water-quality/documents (issued July 28, 2015)	C-470 Tolloed Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.4 (p.5-16)	Construction Task: Ongoing
	2			See Item 1.1	The Contractor shall construct permanent water quality BMPs for the Project as necessary to comply with the requirements of the CDOT MS4 Permit. Permanent water quality BMPs for the Project shall include, but are not limited to, such components as sediment basins and properly sited vaults, water quality ponds, grass roadside ditches and grass buffer strips.		Construction Task: Ongoing
	3			See Item 1.1	The Contractor shall immediately notify CDOT of any suspected illicit or improper connections or discharges into any storm sewer system discovered during construction of the Project. CDOT will be responsible for investigation of the suspected illicit connection and implementing corrective action. The Contractor shall maintain, reconstruct, or otherwise allow discharge of improperly disposed materials into the storm sewer system within the limits of the Project.		Construction Task: Ongoing
	4			See Item 1.1	The Contractor shall adhere to the conditions of all sections of the permit in effect at the time of construction, except for those sections related to the NDRD program, described in the following paragraphs.		Construction Task: Ongoing
	5			See Item 1.1	See Book 2, Section 12 for detailed MS4 requirements.		Construction Task: Ongoing
2	1	CDPHE Colorado Discharge Permit System (CDPS) storm water permit associated with construction activity	CDPHE - Water Quality Control Division	<p>COMPLETE: SPCC Plan dated July 20, 2016. CDOT Approved 8/4/16.</p> <p>PENDING: SWMP submitted to CDOT on 10/21/16 for Approval</p>	CDOT has the authorization to discharge under the Colorado Discharge Permit System. Implementation of the permit requirements (i.e., SWMP, SWMP Site Map, and SPCC Plan) shall be a first construction item. Construction cannot begin until these items have been accepted by CDOT. CDOT will review the Contractor's stormwater management activities throughout the duration of the Project for verification of compliance with the CDPS-SCP and CDOT's construction section of its MS4 Permit. The CDPS-SCP shall be in the Contractor's name. The Contractor shall comply with CDOT Standard Specifications, Sections 101, 107 and 208.	C-470 Tolloed Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.4 (p.5-19)	Construction Task: Pending

**C-470 Tolloed Express Lanes Segment 1 Design/Build Project
Master Compliance Tracking Spreadsheet TAB 2: PERMIT REQUIREMENTS**

Permit Reference Number	Permit Action Number	Permit/Approval	Cooperating Agency	Status	Required Actions	Source	Permit Number from Authorizing Agency / Date Authorized
2	2	CDPHE Colorado Discharge Permit System (CDPS) storm water permit associated with construction activity	CDPHE - Water Quality Control Division	See Item 2.1	Non-compliance issues and necessary Best Management Practices (BMP) deficiencies will be noted during the Monthly Inspections by CDOT and the Regional Erosion Control Advisory Team (RECAT) inspections (or the equivalent under a new MS4 permit).	C-470 Tolloed Express Lanes Segment 1 DB Project RFP; Book 2, Section 5.4 (p.5-19)	Construction Task: Ongoing
	3			See Item 2.1	CDOT may request an inspection at any time or issue 105 memo for non-compliance by the Contractor.		Construction Task: Ongoing
	4			See Item 2.1	The Contractor's Transportation Erosion Control Supervisor (TES) will maintain a daily stormwater log.		Construction Task: Ongoing
	5			See Item 2.1	The Contractor shall prevent the discharge of any sediment or pollutants into any storm drains or receiving waters during the life of the CDPS-SCP.		Construction Task: Ongoing
	6			See Item 2.1	The Contractor shall be responsible for all stormwater permit requirements until the Project has achieved final stabilization (see Book 2, Section 17, Landscaping) and the CDPS-SCP permit can be closed. This includes the maintenance of all BMPs, maintenance of all seeded/landscaped areas, and removal of BMPs once final stabilization has been achieved and documented. The Contractor shall notify the Region WPCM at least two weeks prior to closure, at which time the WPCM will decide whether to require an inspection of the entire Project.		Construction Task: Ongoing

EXAMPLE

COLORADO DEPARTMENT OF TRANSPORTATION REEVALUATION FORM	Original NEPA Approval Date:	Reevaluation Date:	Project Code:
Project Name and Location:			
NEPA Document Title:			
Region/Program/Residency:			
Project Description:			
Project Phasing Plan and Portions Completed (if warranted):			
Portion of Project Currently Being Advanced:			
Date(s) of Prior Reevaluations:			

I. Document Type

- Categorical Exclusion (CE)
- Environmental Assessment (EA)
- Finding of No Significant Impacts (FONSI)
- Draft Environmental Impact Statement (DEIS)
- Final Environmental Impact Statement (FEIS)
- Supplemental Environmental Impact Statement (SEIS)
- Record of Decision (ROD)
- Other (such as: local funding, etc.) _____

II. Reason for Reevaluation

- Project is proceeding to the next major approval action [23 CFR 771.129(c)]
- Project changes such as laws, rules, guidelines, design, environmental setting, impacts or mitigation (describe:)
- Greater than three years have elapsed since FHWA's approval of the DEIS [23 CFR 771.129(a)] or FHWA's last major approval action for the FEIS [23 CFR 771.129(b)]
- Other: _____

III. Conclusion and Recommendation

- The above environmental document has been reevaluated as required by 23 CFR 771.129 and it was determined that no substantial changes have occurred in the social, economic, or environmental impacts of the proposed action that would substantially impact the quality of the human, socio-economic, or natural environment. Therefore, the original environmental document or CE designation remains valid for the proposed action. It is recommended that the project identified herein be advanced to the next phase of project development. A summary of the review is documented in Section IV.
- The above environmental document has been reevaluated as required by 23 CFR 771.129 and it was determined that the environmental document or CE designation is no longer valid or more information is required. Additional required documentation is identified in Section VII.

Regional Planning Environmental Manager or Designee

Date

Federal Highway Administration Division Administrator or Designee

Date

IV. Evaluation

- Level 1: Less than three years since last major step to advance the action (e.g. approval of NEPA document, authority to undertake final design, authority to acquire significant portion of ROW, approval of PS&E) and there are no changes in project scope, environmental conditions, environmental impacts or regulations and guidelines - OR - The document being re-evaluated is a programmatic Categorical Exclusion regardless of time since the last major step to advance the action (as long as the project would still be covered by a programmatic Categorical Exclusion). All decisions in the prior NEPA document are valid. No FHWA concurrence is required. Note to file and to distribution below.
- Level 2: Less than three years since last major step to advance action and there are only minor changes in the project scope and/or updates or explanation needed for one or more resource areas. FHWA concurrence is required.
- Level 3: More than three years since last major step to advance action and there are only minor changes in the project scope and/or updates or explanation needed for one or more resource areas. FHWA concurrence is required.
- Level 4: Major changes in project scope or environmental commitments, or for EISs when greater than three years have elapsed since the last major project action. Updates or new studies may be required. A Level 4 Reevaluation may require a separate document. FHWA concurrence is required.

ENVIRONMENT SETTING, AFFECTED ENVIRONMENT, AND ENVIRONMENTAL IMPACT ASSESSMENT:

Document changes to social, socio economic, or natural environment for environmental setting or circumstances.
Document changes in impact status. Place check-mark or description where relevant. Note: this list may be expanded or adjusted to match the headings in the original environmental document reviewed.

Setting/Resource/Circumstance	Change in Affected Environment or Setting		Change in Environmental Impact		Date Reviewed	Highlight Section VI Additional Studies Required or Section IX Attachments
	Yes	No	Yes	No		
Air Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Geologic Resources and Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Water Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Floodplains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Wetlands/Waters of U.S.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Distribution: Edition # 2 (06-09-2011)

CDOT Form # 1399

RPEM (original); copies to Project Manager, Region Right of Way (if ROW required), Environmental Programs Branch, Central Files, and Federal Highway Administration

Vegetation and Noxious Weeds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fish and Wildlife	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Threatened/Endangered Species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Historic Resource (includes bridges)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Archaeological Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Paleontological Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Land Use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Social Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Economic Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Environmental Justice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Residential/Business Right-of-Way Impacts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Transportation Resources (roadway, rail, bus, bike, pedestrian, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilities and Railroads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Section 4(f)/6(f)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Farmlands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Noise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Visual Resources/Aesthetics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hazardous Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cumulative Impacts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

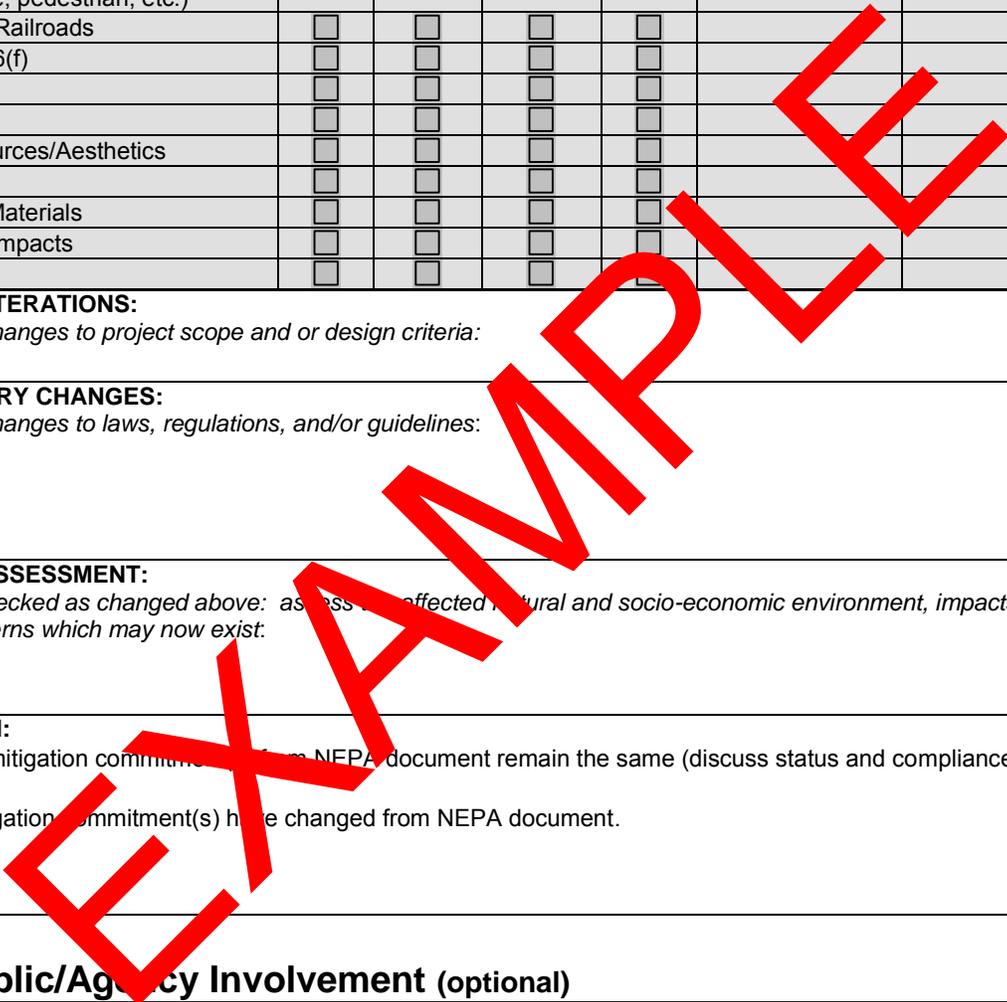
DESIGN ALTERATIONS:
 Document changes to project scope and or design criteria:

REGULATORY CHANGES:
 Document changes to laws, regulations, and/or guidelines:

IMPACTS ASSESSMENT:
 For items checked as changed above: assess how affected natural and socio-economic environment, impacts and new issues/concerns which may now exist:

MITIGATION:

- All mitigation commitments from NEPA document remain the same (discuss status and compliance):
- Mitigation commitment(s) have changed from NEPA document.



V. Public/Agency Involvement (optional)

If any, document public meetings, notices, & websites, and/or document agency coordination. For each provide dates, and coordination, where applicable:

VI. Additional Studies Required for Proposed Action

VII. Additional Requirements for Proposed Action

- An SEIS is required, because the changes to the proposed action will result in significant impacts not evaluated in the EIS.
- An SEIS is required, because new information or circumstances will result in significant environmental impacts not evaluated in the EIS.
- A revised ROD is required, because an alternative is recommended that was fully evaluated in an approved FEIS but was not identified as the preferred alternative.
- Appropriate environmental study or an EA is required, because the significance of new impacts is uncertain.
- A revised FONSI is required, because an alternative is recommended that was fully evaluated in an approved EA but was not identified as the preferred alternative.
- Other _____
- None

VIII. Permits Updated (optional)

*This section is only required when the next stage of a project is going to construction.
List permits:*

IX. Attachments Listed

List permits, studies, background data, etc.

EXAMPLE

EROSION AND SEDIMENT CONTROL

- ALL EROSION/SEDIMENT CONTROL AND STORMWATER RESPONSIBILITIES STATED IN THE STORMWATER MANAGEMENT PLAN AND CDOT SPECIFICATIONS WILL BE ADHERED TO. ANY AMENDMENTS REQUIRE THE ENGINEER'S APPROVAL.
- A TRANSPORTATION EROSION CONTROL SUPERVISOR (TECS) IS REQUIRED ON THIS PROJECT, AND HE/SHE WILL BE RESPONSIBLE FOR AN INSPECTION AT LEAST EVERY 7 DAYS AND/OR AFTER EVERY RAIN OR SNOW EVENT. THE TECS WILL BE RESPONSIBLE FOR COORDINATING THE PLACEMENT OF ALL BMPS DURING EACH PHASE OF CONSTRUCTION.
- BEST MANAGEMENT PRACTICES (BMPS) WILL BE IMPLEMENTED BEFORE, DURING, AND FOLLOWING CONSTRUCTION TO PREVENT DEBRIS OR CONSTRUCTION MATERIALS FROM ENTERING INTO EXISTING WATERWAY AND WETLAND AREAS. STRUCTURAL AND/OR NON-STRUCTURAL EROSION AND SEDIMENT CONTROL DEVICES WILL BE USED TO PREVENT THE MOVEMENT OF DRILLING FLUIDS, MUDS, CONCRETE, PETROLEUM PRODUCTS, AND SEDIMENT FROM EXPOSED AREAS INTO SURROUNDING DRAINAGES AND WETLAND AREAS TO PROTECT AQUATIC RESOURCES WITHIN AND ADJACENT TO THE PROJECT AREA.
- SEDIMENT CONTROL MEASURES WILL BE INSTALLED WHERE NEEDED TO PREVENT SEDIMENT FILLING WETLANDS. FERTILIZERS OR HYDRO-MULCHING WILL NOT BE ALLOWED WITHIN 50 FEET OF A WETLAND. ALL DISTURBED AREAS WILL BE REVEGETATED WITH NATIVE GRASS AND FORB SPECIES. SEED, MULCH, AND MULCH TACKIFIER WILL BE APPLIED IN PHASES THROUGHOUT CONSTRUCTION. WHERE PERMANENT SEEDING OPERATIONS ARE NOT FEASIBLE BECAUSE OF SEASONAL CONSTRAINTS (E.G., SUMMER AND WINTER MONTHS), DISTURBED AREAS WILL HAVE MULCH AND MULCH TACKIFIER APPLIED TO PREVENT EROSION. EROSION BALES, EROSION LOGS, SILT FENCE, OR OTHER SEDIMENT CONTROL DEVICES WILL BE USED AS SEDIMENT BARRIERS AND FILTERS ADJACENT TO WETLANDS, SURFACE WATERWAYS, AND AT INLETS WHERE APPROPRIATE. CONSTRUCTION STAGING AREAS WILL BE LOCATED AT A DISTANCE OF GREATER THAN 50 FEET FROM ADJACENT STREAM/RIPARIAN AREAS TO AVOID DISTURBANCE TO EXISTING VEGETATION, AVOID POINT SOURCE DISCHARGES, AND TO PREVENT SPILLS FROM ENTERING THE AQUATIC ECOSYSTEM (INCLUDING CONCRETE WASHOUT). TEMPORARY IMPACTS TO WATERS OF THE U.S. AND ADJACENT HABITAT WILL BE RECLAIMED WITH NATIVE PLANTS AND SHRUBS.
- THE CONTRACTOR WILL BE RESPONSIBLE FOR MAINTAINING EROSION CONTROL DOCUMENTATION, IDENTIFYING EROSION CONTROL FOR TEMPORARY CONSTRUCTION NEEDS AND FOR PERMANENT STORMWATER MANAGEMENT NEEDS, INSTALLATION OF BMPS. INSPECTION AND MAINTENANCE OF ALL BMPS, AND MAINTENANCE OF ALL SEEDED AREAS.
- THE CONTRACTOR WILL REMOVE ALL MUD, PLANTS AND DEBRIS FROM THE EQUIPMENT (TRACKS, TURRETS, BUCKETS DRAGS, TEETH, ETC.) AND STEAM PRESSURE WASH EQUIPMENT THAT HAS BEEN PREVIOUSLY USED IN ANOTHER STREAM, RIVER, LAKE, RESERVOIR, POND OR WETLAND TO MEET THE "CERTIFIED CLEAN" STANDARD AND KILL ANY UNDESIRABLE NUISANCE SPECIES.
- ANY OUT OF RIGHT OF WAY STAGING AREAS MUST BE PRE-APPROVED BY THE ENGINEER; PROOF OF WRITTEN PERMISSION FROM THE PROPERTY OWNER OF ANY PRIVATE PROPERTY USED FOR PARKING OR STAGING MUST BE PROVIDED TO THE ENGINEER PRIOR TO USE.
- CONSTRUCTION STAGING AND MATERIALS STOCKPILING WILL BE LOCATED GREATER THAN 50 FEET FROM THE EDGE OF WETLANDS TO AVOID DISTURBANCE OF VEGETATION AND TO PREVENT POLLUTANT DISCHARGES INTO SENSITIVE HABITATS. FERTILIZERS AND/OR HYDRO-MULCHING WILL NOT BE ALLOWED WITHIN 50 FEET OF WETLANDS. SPECIFIC LOCATIONS WILL BE DETERMINED DURING CONSTRUCTION WITH THE ENVIRONMENTAL MANAGER.
- THERE WILL BE NO STOCKPILING OR SIDECASTING OF WASTE MATERIALS, INCLUDING BUT NOT LIMITED TO PAINT CHIPS, ASPHALT, OR CONCRETE ADJACENT TO ANY DRAINAGES, INCLUDING DRY DRAINAGES. PAINT MATERIAL REMOVED IN THE COURSE OF RESTRIPING WILL BE PROPERLY CONTAINED AND DISPOSED TO PREVENT SUCH MATERIALS FROM ENTERING WATERS OF THE STATE.

DEWATERING

- NO GROUNDWATER WILL BE ALLOWED TO RUN OFF TO ANY STORM SEWER, DITCH, OR WATERS OF THE STATE WITHOUT THE APPROPRIATE PERMIT FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT. DISCHARGE INTO STORM SEWERS WILL NOT BE PERMITTED UNLESS WRITTEN PERMISSION IS OBTAINED FROM THE OWNER OR CONTROLLING AUTHORITY AND A COPY OF THIS APPROVAL SUBMITTED TO THE ENGINEER.
- DEWATERING AT THE FOLLOWING LOCATIONS MAY REQUIRE A REMEDIATION PERMIT DUE TO THE POTENTIAL FOR ENCOUNTERING CONTAMINATED GROUNDWATER: BROADWAY BRIDGE, COLORADO BRIDGE AREA, AND QUEBEC BRIDGE AND I-25 INTERCHANGE.

WETLANDS, SENATE BILL 40 (SB40), AND BLACK-TAILED PRAIRIE DOG HABITAT

- THE CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING EXISTING WETLANDS DURING CONSTRUCTION. PRIOR TO CONSTRUCTION, THE CONTRACTOR AND CDOT BIOLOGIST WILL STAKE OUT WETLAND LOCATIONS TO BE PROTECTED BY TEMPORARY ORANGE FENCE. ALL WETLANDS ARE "NO WORK ZONES" UNTIL A CWA SECTION 404 PERMIT HAS BEEN ISSUED FOR WORK IN THE WETLANDS AND OTHER WATERS; OR JURISDICTIONAL DETERMINATION HAS BEEN ISSUED BY THE USACE. THE CONTRACTOR IS SUBJECT TO THE PERMIT CONDITIONS. WETLAND AND SB40 AREAS NOT IMPACTED BY THE PROJECT WILL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY TEMPORARY FENCING.
- TEMPORARY IMPACTS TO WETLANDS AND OTHER WATERS OF THE U.S. WILL BE MITIGATED. IN DESIGNATED TEMPORARY WORK AREAS WITHIN WETLANDS AND RIPARIAN AREAS, SHRUBS (PRIMARILY WILLOWS) WILL BE CUT TO THE GROUND LEVEL (NOT GRUBBED), AND THEN COVERED WITH A GEO-TEXTILE FABRIC AND AN ADDITIONAL LAYER OF CLEAN FILL. AREAS (INCLUDING WETLANDS) WILL THEN BE COVERED WITH A MINIMUM OF 2 FEET OF CLEAN FILL. AS SOON AS POSSIBLE, TEMPORARY FILL WILL BE REMOVED TO AN UPLAND LOCATION TO PROTECT RIPARIAN SHRUB ROOTSTOCK AND WETLAND SEED BANKS. IF POSSIBLE, TEMPORARY FILL OF WETLANDS WILL OCCUR DURING PERIODS WHEN PLANTS ARE DORMANT OR TOWARD THE END OF THE GROWING SEASON.
- THE CONTRACTOR WILL CONDUCT BURROWING OWL SURVEYS WITHIN BLACK-TAILED PRAIRIE DOG (BTPD) COLONIES BETWEEN MARCH 15 AND OCTOBER 31 WHERE IMPACTS TO BTPD COLONIES ARE PLANNED. THE CONTRACTOR WILL COMPLY WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL LAWS AND THE CDOT IMPACT STATEMENT FOR BLACK-TAILED PRAIRIE DOG POLICY, REVISION OF SECTION 240 PRAIRIE DOG MANAGEMENT AND THE CPW REGULATIONS.
- WORK ACTIVITIES INCLUDING THE MOVEMENT AND PLACEMENT OF MATERIALS AND EQUIPMENT WILL NOT DISTURB WETLANDS, OR - BLACK-TAILED PRAIRIES DOG COLONIES EXCEPT IN COMPLIANCE WITH THE APPROVED BLACK-TAILED PRAIRIE DOG MANAGEMENT PLAN AND UPON CLEARANCE FOR BURROWING OWLS ALL IMPACTS MUST BE CLEARED BY THE ENVIRONMENTAL MANAGER AND BIOLOGIST PRIOR TO CONSTRUCTION.
- ALL SB 40 ARE "NO WORK ZONES" UNTIL COLORADO PARKS AND WILDLIFE (CPW) CERTIFICATION IS OBTAINED FOR WORK IN SB 40 JURISDICTIONAL AREAS. THE PROJECT WILL COMPLY WITH A SB 40 CERTIFICATION FROM THE CPW. THE CONTRACTOR WILL PROTECT ALL RIPARIAN AREAS THAT ARE NOT TO BE IMPACTED WITH TEMPORARY FENCING PRIOR TO BEGINNING CONSTRUCTION ACTIVITIES ADJACENT TO THE RIPARIAN AREAS.
- THE CONTRACTOR WILL COMPLY WITH THE MIGRATORY BIRD TREATY ACT (MBTA) AT ALL TIMES, INCLUDING CONDUCTING PRE-CONSTRUCTION SURVEYS FOR NESTING BIRDS. REFER TO PROJECT SPECIAL PROVISION 240 - MIGRATORY BIRDS FOR MORE DETAILS.

- TO PREVENT NEW NEST ESTABLISHMENT, THE CONTRACTOR WILL IMPLEMENT TECHNIQUES SUCH AS NETTING UNDER BRIDGES AND CULVERTS DURING THE NON-BREEDING SEASON, REMOVAL OF NEW NESTS UNDER CONSTRUCTION, REMOVING TREES AND SHRUBS DURING THE NON-NESTING SEASON, OR TIMING CONSTRUCTION ACTIVITY TO AVOID ACTIVE NESTS DURING THE NESTING SEASON.
- THE REMOVAL OF NESTS ALONG THE PROJECT CORRIDOR, THE USE OF NETTING, AND THE PLACEMENT OF FENCE (PLASTIC) WILL BE AS DIRECTED BY THE CDOT APPROVED QUALIFIED WILDLIFE BIOLOGIST.

HAZARDOUS MATERIALS

- WORKERS WILL BE ALERT DURING EXCAVATIONS FOR ANY VISUAL OR OLFACTORY SIGNS OF CONTAMINATION. IF SOIL AND/OR GROUNDWATER CONTAMINATION IS ENCOUNTERED, WORK WILL STOP IMMEDIATELY AND THE PROCEDURES OUTLINED IN WILL THE APPROVED PROJECT-SPECIFIC MATERIALS MANAGEMENT PLAN WILL BE FOLLOWED.
- THE APPROVED PROJECT-SPECIFIC HEALTH AND SAFETY PLAN (HASP) WILL BE FOLLOWED.
- PRIOR TO DEMOLITION ACTIVITIES ON ANY RIGHT OF WAY OF ANY STRUCTURES, OR REMOVAL OF UTILITY LINES, THE CONTRACTOR WILL DETERMINE THE PRESENCE OR ABSENCE OF LEAD OR ASBESTOS CONTAINING MATERIALS. IF LEAD OR ASBESTOS IS PRESENT, THE CONTRACTOR WILL CONDUCT ABATEMENT IN ACCORDANCE WITH THE CDOT ASBESTOS-CONTAMINATED SOIL MANAGEMENT STANDARD OPERATING PROCEDURE (REVISED 2011), THE REVISED SECTION 250 SPECIFICATION AND RELEVANT OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), AND OTHER STATE AND FEDERAL REQUIREMENTS.
- THE CONTRACTOR WILL AVOID SANDING, GRINDING, BURNING, OR OTHERWISE CAUSING THE RELEASE OF LEAD FROM PAINT ON STRUCTURES. IF THIS IS NOT POSSIBLE, THE LEAD MUST BE ABATED IN ACCORDANCE WITH CDOT STANDARD SPECIFICATION 250 AND PROJECT SPECIAL PROVISION 250.
- BURIED UTILITIES SUCH AS TELEPHONE LINES AND ELECTRIC UTILITIES MAY NEED TO BE RELOCATED OR REPLACED. SUSPECT UTILITY LINES WILL BE INSPECTED FOR ASBESTOS CONTAINING MATERIALS. APPROPRIATE FEDERAL REQUIREMENTS INCLUDING CDPHE AIR QUALITY CONTROL COMMISSION REGULATIONS PART B WILL BE FOLLOWED. IF SUBSURFACE UTILITIES ARE DETERMINED TO BE HOUSED INTRANSIT ASBESTOS PIPE, SPECIAL HANDLING AND POSSIBLY ASBESTOS ABATEMENT WOULD BE REQUIRED. RELOCATION OF SUCH PIPES NEEDS TO BE COMPLETED WITH THE PERTINENT UTILITY COMPANY. FOR MORE DETAILS, REFER TO THE APPROVED PROJECT-SPECIFIC BMP AND HASP.

AIR QUALITY

- THE CONTRACTOR WILL FOLLOW THE CONSTRUCTION AIR QUALITY PLAN AND FUGITIVE DUST CONTROL PLAN.
- THE CONTRACTOR SHALL PERFORM REGULAR MAINTENANCE ON CONSTRUCTION VEHICLES TO REDUCE EMISSIONS AND HAVE MUFFLERS MAINTAINED TO REDUCE NOISE. TO THE FURTHER FEASIBLE, CONSTRUCTION NOISE SHALL BE LIMITED TO DAYLIGHT HOURS.
- IN ACCORDANCE WITH COLORADO AIR QUALITY REGULATION NO. 1 (5CCR1001-3), THE CONTRACTOR SHALL USE ALL AVAILABLE PRACTICAL METHODS THAT ARE TECHNICALLY FEASIBLE AND ECONOMICALLY REASONABLE IN ORDER TO MINIMIZE FUGITIVE DUST EMISSIONS.
- THE CONTRACTOR WILL PREPARE AND IMPLEMENT A PLAN TO MINIMIZE THE IDLING OF CONSTRUCTION EQUIPMENT.

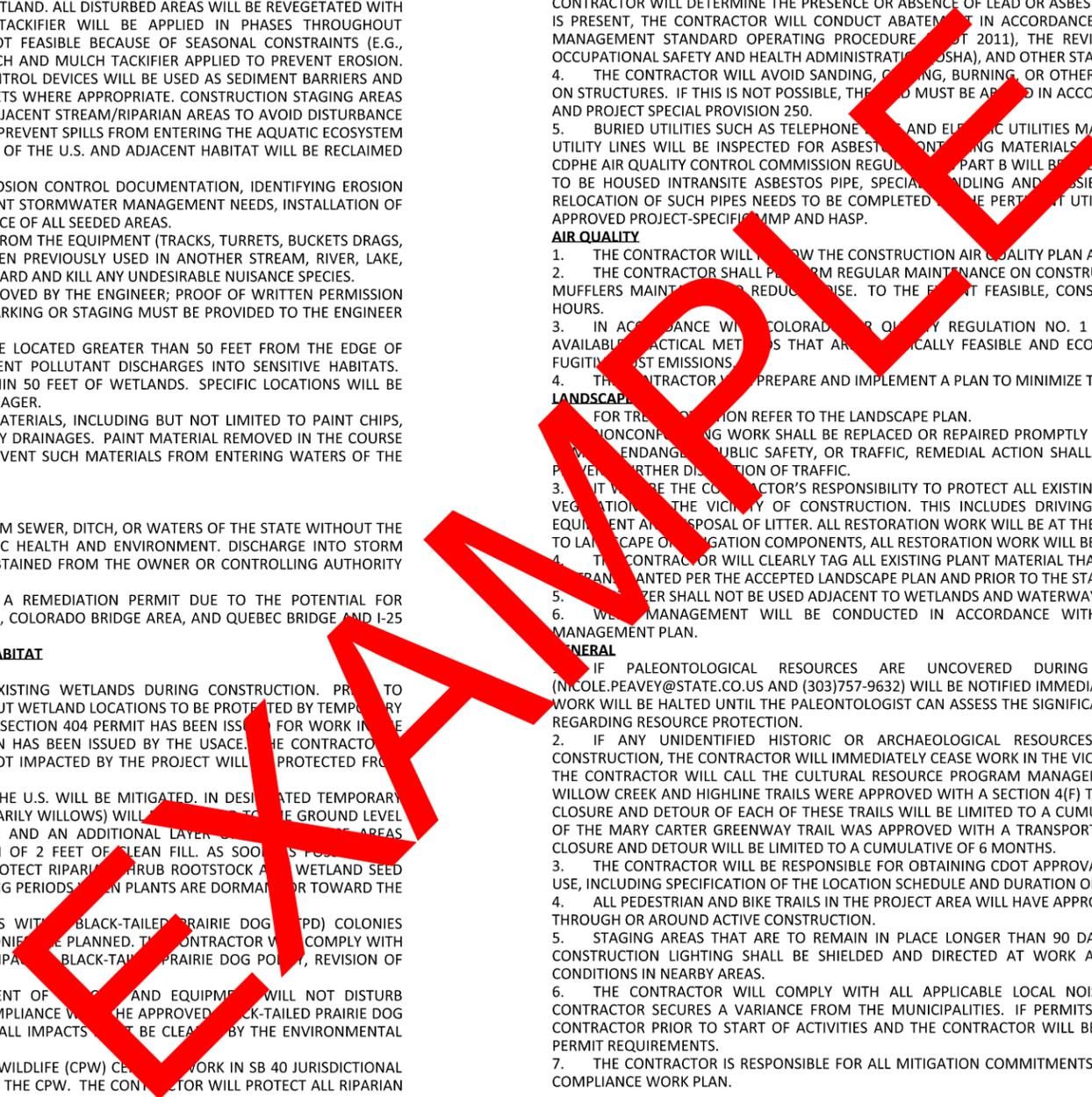
LANDSCAPE

- FOR TREE PROTECTION REFER TO THE LANDSCAPE PLAN.
- NONCONFORMING WORK SHALL BE REPLACED OR REPAIRED PROMPTLY BY THE CONTRACTOR AT ITS OWN EXPENSE. WHEN WORK ENDANGERS PUBLIC SAFETY, OR TRAFFIC, REMEDIAL ACTION SHALL BE TAKEN IMMEDIATELY TO ENSURE SAFETY AND PREVENT FURTHER DISRUPTION OF TRAFFIC.
- IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT ALL EXISTING WATER SERVICES, SPRINKLER CONNECTIONS AND VEGETATION IN THE VICINITY OF CONSTRUCTION. THIS INCLUDES DRIVING OR STAGING OF CONSTRUCTION VEHICLES AND EQUIPMENT AND DISPOSAL OF LITTER. ALL RESTORATION WORK WILL BE AT THE CONTRACTOR'S EXPENSE. IF ANY DAMAGE OCCURS TO LANDSCAPE OR IRRIGATION COMPONENTS, ALL RESTORATION WORK WILL BE AT THE CONTRACTOR'S EXPENSE.
- THE CONTRACTOR WILL CLEARLY TAG ALL EXISTING PLANT MATERIAL THAT WILL REMAIN UNDISTURBED, PRUNED, REMOVED OR TRANSPLANTED PER THE ACCEPTED LANDSCAPE PLAN AND PRIOR TO THE START OF ALL CONSTRUCTION ACTIVITIES.
- WEEDS SHALL NOT BE USED ADJACENT TO WETLANDS AND WATERWAYS.
- WEED MANAGEMENT WILL BE CONDUCTED IN ACCORDANCE WITH THE APPROVED INTEGRATED NOXIOUS WEED MANAGEMENT PLAN.

GENERAL

- IF PALEONTOLOGICAL RESOURCES ARE UNCOVERED DURING PROJECT CONSTRUCTION, NICOLE PEAVEY (NICOLE.PEAVEY@STATE.CO.US AND (303)757-9632) WILL BE NOTIFIED IMMEDIATELY AND CDOT SPECIFICATION 107.23 FOLLOWED. WORK WILL BE HALTED UNTIL THE PALEONTOLOGIST CAN ASSESS THE SIGNIFICANCE OF THE FIND AND MAKE RECOMMENDATIONS REGARDING RESOURCE PROTECTION.
- IF ANY UNIDENTIFIED HISTORIC OR ARCHAEOLOGICAL RESOURCES ARE ENCOUNTERED OR UNEARTHED DURING CONSTRUCTION, THE CONTRACTOR WILL IMMEDIATELY CEASE WORK IN THE VICINITY OF THE DISCOVERY AND FENCE OFF THE AREA. THE CONTRACTOR WILL CALL THE CULTURAL RESOURCE PROGRAM MANAGER AT 303-757-9631. THE CLOSURE AND DETOUR OF WILLOW CREEK AND HIGHLINE TRAILS WERE APPROVED WITH A SECTION 4(F) TEMPORARY OCCUPANCY EXCLUSION AND THUS THE CLOSURE AND DETOUR OF EACH OF THESE TRAILS WILL BE LIMITED TO A CUMULATIVE OF 6 MONTHS. THE CLOSURE AND DETOUR OF THE MARY CARTER GREENWAY TRAIL WAS APPROVED WITH A TRANSPORTATION ENHANCEMENT EXCLUSION AND THUS THE CLOSURE AND DETOUR WILL BE LIMITED TO A CUMULATIVE OF 6 MONTHS.
- THE CONTRACTOR WILL BE RESPONSIBLE FOR OBTAINING CDOT APPROVAL FOR ANY WORK THAT WILL DISRUPT C-470 TRAIL USE, INCLUDING SPECIFICATION OF THE LOCATION SCHEDULE AND DURATION OF ANY DETOURS.
- ALL PEDESTRIAN AND BIKE TRAILS IN THE PROJECT AREA WILL HAVE APPROPRIATE SIGNAGE POSTED TO PROVIDE SAFE ACCESS THROUGH OR AROUND ACTIVE CONSTRUCTION.
- STAGING AREAS THAT ARE TO REMAIN IN PLACE LONGER THAN 90 DAYS WILL BE FENCED AND SCREENED. TEMPORARY CONSTRUCTION LIGHTING SHALL BE SHIELDED AND DIRECTED AT WORK AREAS TO MINIMIZE GLARE AND AMBIENT LIGHT CONDITIONS IN NEARBY AREAS.
- THE CONTRACTOR WILL COMPLY WITH ALL APPLICABLE LOCAL NOISE ORDINANCES AND REGULATIONS, UNLESS THE CONTRACTOR SECURES A VARIANCE FROM THE MUNICIPALITIES. IF PERMITS ARE REQUIRED, THEY WILL BE ACQUIRED BY THE CONTRACTOR PRIOR TO START OF ACTIVITIES AND THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR COMPLIANCE WITH THE PERMIT REQUIREMENTS.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL MITIGATION COMMITMENTS AS OUTLINED IN THE APPROVED ENVIRONMENTAL COMPLIANCE WORK PLAN.

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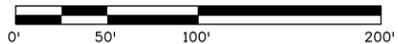
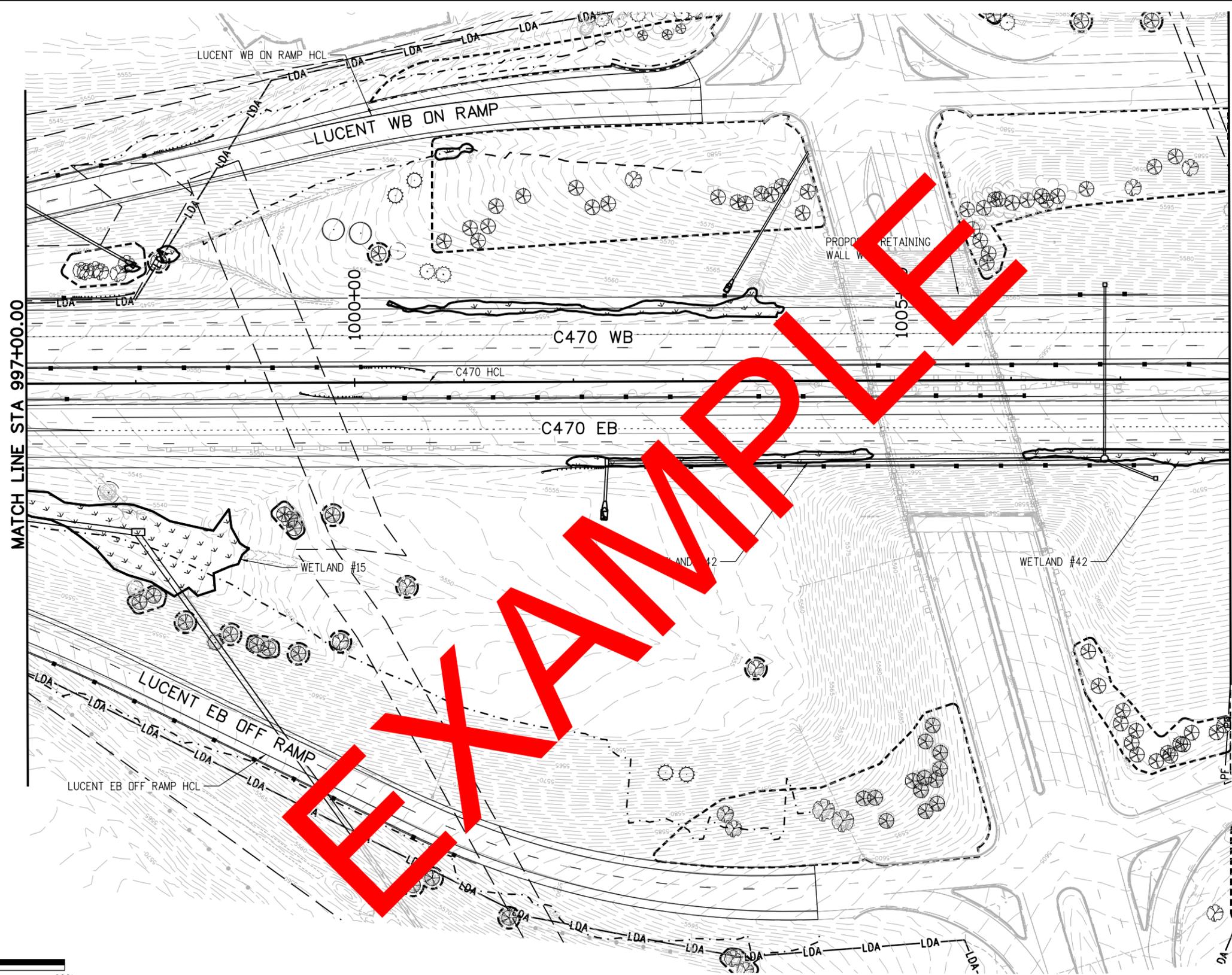


Print Date: 2/9/2017		Sheet Revisions				As Constructed		C470 MANAGED LANES ENVIRONMENTAL RESOURCES EXHIBIT		Project No./Code
File Name: 18999_EN-PLAN-N3100.dgn		Date:	Comments	Init.		No Revisions:	SEGMENT 3		NHPP 4701-124	
Horiz. Scale: 1:100 Vert. Scale:						Revised:	Designer: RSB	Structure Numbers	18999	
					Detailer: DWH					
					Subset: ENVIRONMENTAL	I.D.#: S3-E1	Sheet Number			



Know what's below.
Call before you dig.

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LEGEND:

- EXISTING ROW
- TOP OF CUT
- TOE OF FILL
- 100YR FLOOD PLAIN
- SWMP LIMIT OF DISTURBANCE
- TEMPORARY ORANGE FENCE
- WETLANDS
- BLACK TAILED PRAIRIE DOG HABITAT
- PARKS AND RECREATIONAL AREAS
- RESTRICTED DEWATERING SITES
- RAPTOR NESTS
- TREE SB40/ SHRUB SB40
- TREE TO PROTECT

NOTES:

1. REFER TO GENERAL NOTES PAGE FOR FURTHER ENVIRONMENTAL INFORMATION, CONSTRAINTS, AND MITIGATION
2. WETLANDS ARE NO WORK ZONES UNTIL A SECTION 404 PERMIT IS OBTAINED OR JD RECEIVED BY THE USACE.
3. SB 40 AREAS ARE NO WORK ZONES UNTIL THE CPW HAS PROVIDED SB40 CERTIFICATION.
4. ENVIRONMENTAL RESOURCES DISPLAYED ON THIS SHEET ARE PROTECTED. NO UNAUTHORIZED DISTURBANCES ARE ALLOWED. CONSTRUCTION ACTIVITIES SUCH AS EARTHMOVING, MATERIALS STORAGE, VEHICLE TRAVEL AND PARKING THAT PRESENT THE POTENTIAL TO IMPACT THESE RESOURCES ARE NOT PERMITTED UNLESS PREVIOUSLY ADDRESSED IN APPROVED EFFECTS ANALYSES AND AUTHORIZED BY CDOT.
5. SEE LANDSCAPE PLANS FOR TREE PROTECTION.

Print Date: 2/9/2017

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Horiz. Scale: 1:100

Vert. Scale:

TRANSPORTATION
AECOM Technical Services, Inc.
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Sheet Revisions

Date:	Comments	Init.

Colorado Department of Transportation



2000 S. Holly Street
Denver, Co 80222
Phone: 303-757-9295

Region 1

JKE

As Constructed

No Revisions:

Revised:

Void:

C470 MANAGED LANES
ENVIRONMENTAL RESOURCES EXHIBIT
SEGMENT 2

Designer:	RSB	Structure Numbers	
Detailer:	DWH	I.D.#:	
Subset: ENVIRONMENTAL		S2-E7	

Project No./Code

NHPP 4701-124

18999

Sheet Number



APPENDIX M
DRAFT ENVIRONMENTAL COMPLIANCE WORK PLAN



CENTRAL 70 PROJECT
PUBLIC DISCLOSURE
Administrative and Technical Proposal:



ATCs
CONNECTING COMMUNITIES

ATC 16



SWANSEA ELEMENTARY SCHOOL



CONNECTING COMMUNITIES



DATE: October 20, 2016

TO: Front Range Mobility Group

FROM: Anthony DeVito P.E. Central 70 Project Director
Nicholas Farber, Central 70 Project

SUBJECT: Central 70 - Detailed Alternative Technical Concept (ATC) Response
Front Range Mobility Group - ATC No. 16.1

Dear Mr. Friedrich:

Your Team's ATC Submission Form for Detailed ATC 16.1 was reviewed by the Procuring Authorities prior to the September One-on-One Meetings and an initial response was sent to you on September 23, 2016. As discussed during the September One-on-One Meeting, the Procuring Authorities committed to provide a final response to your Detailed ATC.

Detailed ATC 16.1 proposes to use a narrow, modified Type 7 barrier along designated bridge piers and overhead sign foundations in the median of I-70.

In accordance with the Instructions to Proposers ("ITP"), the Procuring Authorities will use reasonable efforts to provide a Proposer with the following written feedback on a ATC Submission within 15 Working Days following the later of (x) the date the relevant ATC Submission was submitted and (y) the One-on-One Meeting at which such submission is discussed. Below is the final response from the Procuring Authorities for your Detailed ATC:

- 1. unconditional approval;
- 2. conditional approval, subject to modifications and/or conditions;
 Re-submission required Re-submission not required
- 3. disapproval, with or without guidance that such ATC can be re-submitted under any circumstance;
- 4. notification that the incorporation of the proposed ATC in the Proposer's Proposal is already permitted under the terms of the RFP, and therefore does not qualify as an ATC (and will not be treated as such for purposes of Section 3.4 of Part C of the ITP).

Following our discussions at the September One-on-One Meeting, the Procuring Authorities have not changed their initial response to your above mentioned Detailed ATC Submission. The ATC is approved.

The approval of this Detailed ATC by the Procuring Authorities does not constitute an approval of specific drafting modifications to the RFP necessary to incorporate this ATC into the Project Agreement pursuant to Section 7.2.1.c of Part C of the ITP, which modifications shall be agreed by the Procuring Authorities and the Proposer (each acting reasonably) following issuance of a Notice of Award to such Proposer.



ANNEX 3: ALTERNATIVE TECHNICAL CONCEPT SUBMISSION FORM

Proposer Name: Front Range Mobility Group
Date: September 15, 2016

Central 70 Project RFP: ATC Submission No. 16.1¹

A. Background Information

1. Type of Submission

- Conceptual ATC
 Detailed ATC

2. Prior Submission(s)

- None (initial submission of ATC)
 Previously Submitted as Conceptual ATC
 Previously Submitted as Detailed ATC

3. Explanation of Reason for Resubmission

The Procuring Authorities requested that FRMG submit a Detailed ATC indicating the specific locations where this ATC concept will be used.

4. Request for Discussion at One-on-One Meeting

- Meeting Requested
 Meeting Not Requested²

¹ Proposers to complete in accordance with instruction (2) to the Annex.

² In accordance with Section 3.2.1 of Part C, the Procuring Authorities may nevertheless require a Proposer to present an ATC Submission at a One-on-One Meeting.

B. General ATC Submission Requirements

1. Overview Description

Narrative overview description of the proposed ATC.

“This information has been amended since the submission of the previous version of this ATC.”

FRMG proposes to use a narrow, modified Type 7 (Style CD) barrier along designated bridge piers and overhead sign foundations in the median of I-70. We propose to modify the concrete barrier Style CD with a narrower width barrier (i.e. change from the 15.5” bottom width and 8” top width to a 12” bottom width and a 4.5” top width). The proposed barrier is shown on Attachment A. Locations where FRMG proposes to use this ATC are shown on Attachment B,

2. Relevant RFP Requirements

List all material RFP requirements that are inconsistent with, and would require amendment to accommodate, the proposed ATC³.

“This information has not been amended since the submission of the previous version of this ATC.”

Schedule 10, Section 9.4.12.b Barrier and Guardrail indicates that median barrier shall be Type 7 concrete barrier with a concrete glare screen in accordance with CDOT Standard M-606-13.

3. Rationale

Explanation of how, where and why the ATC would be used on the Project, including how it aligns with the Project Goals.

“This information has been amended since the submission of the previous version of this ATC.”

The use of the proposed narrower modified Type 7 Barrier (Style CD) along piers and overhead sign foundations is equal to or better than the use of the Type 7 (Style CD) concrete barrier per the CDOT Standard M-606-13 for the following reasons:

1. This narrower barrier would allow the structures to be optimized and the required 8-foot shoulder to be provided without increasing the footprint of the proposed improvements. This supports the Project Goal to minimize impacts to the traveling public, businesses and nearby communities during and after construction.
2. Functionally, the narrower barrier adjacent to bridge piers and overhead sign foundations provides adequate strength for the barrier’s intended purpose.

4. Impacts

A preliminary analysis of potential environmental, social, economic, community, traffic, safety, operations and maintenance or third party impacts (positive and negative), including specific separate identification and analysis of any such impacts that are not reflected in the final EIS.

“This information has been amended since the submission of the previous version of this ATC.”

The use of the proposed narrower modified Type 7 Barrier (Style CD) along designated bridge piers and overhead sign foundations has no adverse environmental, social, economic, community, traffic, safety O&M or third party impacts for the Central 70 project. The positive impacts of this ATC are that it would reduce the footprint of the proposed improvements. The reduced footprint minimizes environmental and construction impacts and minimizes inconvenience to the public during construction. Also, the use of this ATC would reduce the amount of construction material to be installed.

³ Proposers are not required to propose RFP drafting amendments when completing Part B, but are required to do so when completing Section 5 of Part C.

5. Cost and Benefit Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely costs, and savings, that are likely to result from implementation of such ATC, including reference to assumptions on which such estimate is based.

“This information has not been amended since the submission of the previous version of this ATC.”

We anticipate a cost savings of \$2.5M in construction, and materials costs.

6. Schedule Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely design and construction time period impacts (positive and negative) of such ATC, including reference to assumptions on which such estimate is based.

“This information has been amended since the submission of the previous version of this ATC.”

We anticipate minor schedule reduction associated primarily with the movement of fewer materials to the site.

7. Conceptual Drawings

At Proposer’s discretion, unless otherwise requested by the Procuring Authorities, conceptual drawings.

“This information has been amended since the submission of the previous version of this ATC.”

Refer to Attachments A and B, which illustrate the modified Type 7 (Style CD) barrier and where FRMG proposes its use.

8. Past Use

Identification of other projects on which the ATC (or a substantially similar approach) has been implemented, regardless of the results, and the relevance of such experience.

“This information has not been amended since the submission of the previous version of this ATC.”

The proposed narrower Type 7 (Style CD) concrete barrier was used in the Narrows Segment (Broadway to Logan) on the CDOT Southeast Corridor Multi-Modal (TREX) project.

9. Additional Information

With respect to previously submitted ATC Submissions only, additional information as requested by the Procuring Authorities following review of such prior submissions.

“This information has been amended since the submission of the previous version of this ATC.”

As indicated above, FRMG proposes to use this ATC in the median of I-70 at the locations shown on Attachment B.

C. Detailed ATC Requirements

1. Risks

To the extent not otherwise addressed by the responses to Part B above, an analysis of any additional risks to the Procuring Authorities, CDOT, the State or third parties associated with implementation of the ATC, including discussion of how such risks are, or are proposed to be, allocated under the terms of the Project Agreement.

FRMG has analyzed this ATC from a risk perspective and believes that there are no risks associated with the approval of this ATC. In addition, the proposed narrower Type 7 (Style CD) concrete barrier was previously approved and used successfully on another CDOT project.

2. Handback

Description of any proposed changes in handback procedures and/or the Handback Requirements associated with the ATC, if any are expected.

There are no changes in handback procedures and/or Handback Requirements associated with the approval of this ATC.

3. Right-of-Way

A description, estimated cost and proposed procurement schedule of any Additional Right-of-Way expected to be required to implement the ATC, if any.

There is no Additional Right-of-Way expected to be required to implement this ATC.

4. List of Required Approvals

A list of required, or likely to be required, third party and Governmental Approvals, including any Design Exceptions (which should be summarized in the form of Attachment A (Design Exceptions)).

There are no third party and Governmental Approvals and/or Design Exceptions required to implement this ATC.

If this ATC is not approved, an additional Design Exception would be required for minor shoulder width reduction adjacent to piers and sign structures.

5. Proposed Drafting Revisions

(a) List all RFP requirements that are inconsistent with the proposed ATC and (b) attach in the form of a mark-up (for amendments to existing drafting) and/or a rider (with respect to newly proposed drafting) proposed revisions to address those inconsistencies.

Currently Schedule 10, Section 9.4.12.b states that "Median barrier is required along the entire length of the I-70 Mainline reconstruction and widening areas. Median barrier shall be Type 7 concrete barrier with a concrete glare screen in accordance with CDOT Standard M-606-13."

With approval of this ATC, Schedule 10, Section 9.4.12.b should be reworded to read, "Median barrier is required along the entire length of the I-70 Mainline reconstruction and widening areas. Median barrier shall be Type 7 concrete barrier with a concrete glare screen in accordance with CDOT Standard M-606-13 except where Type 7 (Style CD)(Modified) concrete barrier will be used at bridge piers and sign foundations in the median at the locations shown on Attachment B."



**Attachment A
 Design Exceptions**

<u>No.</u>	RFP Reference	Existing Condition and Applicable Standard (verbatim from standard)	Proposed Condition ⁴	Procuring Authorities' Response ⁵	FHWA Response ⁶
1.					
2.					

⁴ Proposers should include in this column or attach to the relevant ATC Submission Form the information referred to in Section 9.4.15.b.ii of Schedule 10 (*Design and Construction Requirements*) to the Project Agreement.

⁵ For Procuring Authorities' use only.

⁶ For FHWA use only.



Addendum No.3
Release of June 14, 2016

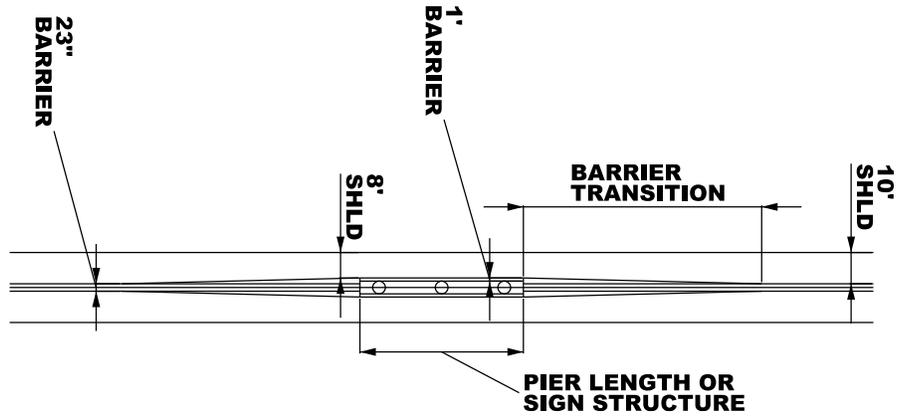
Central 70 Project: Instructions to Proposers
Part I: Exhibit 1

ATC SUBMISSION No. 16.1

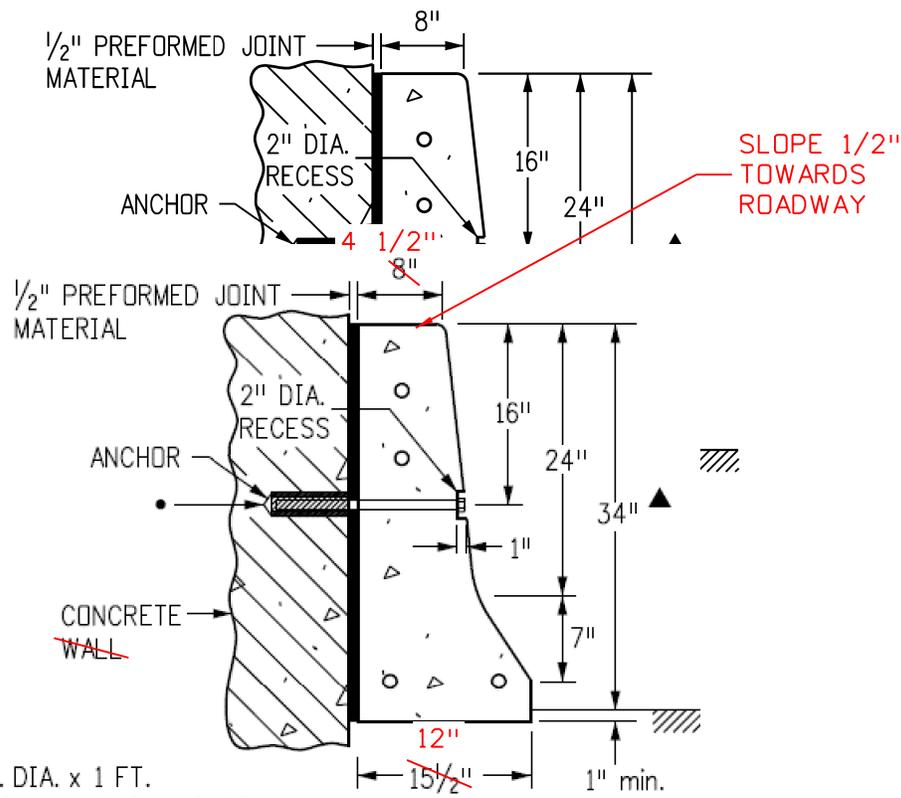
SUPPORT INFORMATION

CONFIDENTIAL

dbernard 7:38:07 AM pw:\projectwise.ch2m.com\DEN001\Documents\666933 - CDDT I-70 EAST\Work in Progress\CDDT I-70 EAST\EXH\Exh\Test-Estimators\ATC_16 Guardrail CD Modified.dgn



TYPE 7 (STYLE CD)(MODIFIED) BARRIER



1/2 IN. DIA. x 1 FT.
 LONG GALVANIZED ANCHOR
 BOLT AND WASHER,
 MECHANICALLY FASTENED
 AT 2 FT. - 6 IN. CENTERS.
 USE ONLY WHEN CALLED
 FOR ON PLANS.

~~STYLE CD~~
 BARRIER AGAINST WALL

GUARDRAIL TYPE 7 (STYLE CD)(MODIFIED) BARRIER

Narrow Barrier Against Pier and Guide Sign Foundation

	<p> Colorado Department of Transportation  2000 South Holly Street Denver, CO 80222 Phone: 303-757-9934 FAX: 303-757-9907 </p>	<p> ATTACHMENT A BARRIER DETAIL </p>
	<p> BL-02 KJS </p>	

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ATC SUBMITTAL

No	Object to Protect	Station	WB/ EB
1	Sign	2010+50	WB
2	Sign	2017+25	EB
3	UPRR Bridge	2020+00	
4	Sign	2021+50	WB
5	York St Bridge	2026+50	
6	Josephine St Bridge	2029+50	
7	Sign	2031+50	EB
8	Cover	2031+50	
9	Fillmore St Bridge	2044+00	
10	Sign	2045+00	WB
11	Sign	2052+00	EB
12	Steele/ Vasquez Bridge	2053+00	
13	Cook St Bridge	2059+50	
14	BNSF Bridge	2064+75	
15	Monroe St Bridge	2065+50	
16	Sign	2066+50	WB
17	Sign	2075+00	EB
18	Colorado Blvd Bridge	2078+00	
19	Sign	2094+25	WB
20	Sign	2099+00	EB
21	Sign	2113+00	EB
22	Sign	2122+50	WB
23	Sign	2124+50	EB
24	Sign	2140+50	WB
25	Sign	2149+50	EB
26	Sign	2155+25	WB
27	Sign	2172+00	WB
28	Sign	2179+50	EB
29	Sign	2190+50	WB
30	Sign	2198+50	EB
31	I-270 EB Connector	2202+00	
32	Sign	2206+50	WB
33	Sign	2224+50	EB and WB
34	Central Park Blvd Bridge	2242+00	
35	Sign	2245+25	WB
36	Sign	2254+50	EB
37	Sign	2266+75	WB
38	Sign	2275+75	EB
39	Sign	2300+50	EB
40	Sign	2302+75	WB
41	Sign	2315+75	EB



No	Object to Protect	Station	WB/ EB
42	Sign	2318+50	WB
43	Sign	2342+50	EB
44	Sign	2350+50	WB
45	Sign	2360+75	EB
46	Sign	2375+75	WB
47	Sign	2382+25	EB
48	Sign	2392+25	EB
49	Sign	2395+75	WB
50	Sign	2403+50	EB
51	Sign	2434+75	EB and WB
52	Sign	2447+00	EB



DATE: July 8, 2016

TO: Front Range Mobility Group

FROM: Anthony DeVito P.E. Central 70 Project Director
Nicholas Farber, Central 70 Project

SUBJECT: Central 70 - Conceptual Alternative Technical Concept (ATC) Response
Front Range Mobility Group - ATC No. 16.0

Dear Mr. Friedrich:

Your Team's ATC Submission Form for Conceptual ATC 16.0 has been reviewed by the Procuring Authorities. As discussed during the June One-on-One Meeting, the Procuring Authorities committed to provide a final response to your Conceptual ATC. The ATC proposes to use a narrow, modified style CD barrier along designated piers and walls.

In accordance with the Instructions to Proposers ("ITP"), the Procuring Authorities will use reasonable efforts to provide a Proposer with the following written feedback on a ATC Submission within 15 Working Days following the later of (x) the date the relevant ATC Submission was submitted and (y) the One-on-One Meeting at which such submission is discussed. Below is the final response from the Procuring Authorities for your Conceptual ATC:

- 1. unconditional approval and waiver of requirement for re-submission as a Detailed ATC;
- 2. unconditional approval for re-submission as a Detailed ATC;
- 3. conditional approval for re-submission as a Detailed ATC, subject to modifications and/or conditions;
- 4. disapproval, with or without guidance that such ATC can be re-submitted under any circumstance;
- 5. notification that the inclusion of the proposed ATC in the Proposer's Proposal is already permitted under the terms of the RFP, and therefore does not qualify as an ATC (and will not be treated as such for purposes of Section 3.4 of Part C of the ITP; or
- 6. subject to compliance with the confidentiality requirements set out in Section 3.4 of Part C of the ITP, the Procuring Authorities are considering amending (for the benefit of all Proposers) the terms of the RFP that are the subject-matter of the proposed ATC.

The Procuring Authorities have reviewed the Conceptual ATC Submission and have arrived at the above final evaluation as indicated with the check mark. The Procuring Authorities will only consider approval of this ATC in very limited locations. The Procuring Authorities request that graphics are included in the Detailed ATC submission indicating locations where the ATC concept will be used.



ANNEX 3: ALTERNATIVE TECHNICAL CONCEPT SUBMISSION FORM

Proposer Name: Front Range Mobility Group
Date: June 13, 2016

Central 70 Project RFP: ATC Submission No. 16.0¹

A. Background Information

1. Type of Submission

- Conceptual ATC
 Detailed ATC

2. Prior Submission(s)

- None (initial submission of ATC)
 Previously Submitted as Conceptual ATC
 Previously Submitted as Detailed ATC

3. Explanation of Reason for Resubmission

n/a

4. Request for Discussion at One-on-One Meeting

- Meeting Requested
 Meeting Not Requested²

¹ Proposers to complete in accordance with instruction (2) to the Annex.

² In accordance with Section 3.2.1 of Part C, the Procuring Authorities may nevertheless require a Proposer to present an ATC Submission at a One-on-One Meeting.

B. General ATC Submission Requirements

1. Overview Description

Narrative overview description of the proposed ATC.

We propose to use a narrow, modified style CD barrier along designated piers and walls. We propose to modify the concrete barrier style CD with a modified narrower width, i.e. change from the 15.5" bottom width and 8" top width to a 12" bottom width and a 4.5" top width.

2. Relevant RFP Requirements

List all material RFP requirements that are inconsistent with, and would require amendment to accommodate, the proposed ATC³.

- Schedule 10, Section 9.4.12.b Barrier and Guardrail indicates that median barrier shall be Type 7 concrete barrier with a concrete glare screen in accordance with CDOT Standard M-606-13.

3. Rationale

Explanation of how, where and why the ATC would be used on the Project, including how it aligns with the Project Goals.

The use of the proposed narrower modified Type 7 Barrier (Style CD) along walls and piers is equal or better than the use of the Type 7 concrete barrier (style CD) from the CDOT Standard M-606-13 for the following reasons:

1. This narrower barrier would allow the shoulder width to be maximized without increasing the footprint of the proposed improvements. This supports the Project Goal to minimize impacts to the traveling public, businesses and nearby communities during and after construction.
2. Functionally, it accomplishes the same thing without any additional risk since the piers/walls would provide even more additional support than what there would be with just the standard barrier.

Note: The conceptual plans and respective Microstation files show a pier column width of 4 feet and a 6 foot width from WB I-70 edge of inside shoulder to EB I-70 edge of inside shoulder. To accommodate a 4 foot width column while maintaining a Type 7 (Style CD) barrier per CDOT Standard M-606-13, a 7'-8.5" shoulder would be provided instead of an 8 foot shoulder (See Attachment A). We believe the intent of the conceptual drawings was to provide a 4 foot wide column while maintaining an 8 foot minimum shoulder width at that column. The ATC will accomplish this effect without increasing the overall footprint.

4. Impacts

A preliminary analysis of potential environmental, social, economic, community, traffic, safety, operations and maintenance or third party impacts (positive and negative), including specific separate identification and analysis of any such impacts that are not reflected in the final EIS.

The use of the proposed narrower modified Type 7 Barrier (Style CD) along the piers and the walls would reduce the footprint of the proposed improvements. This reduced footprint reduces environmental

³ Proposers are not required to propose RFP drafting amendments when completing Part B, but are required to do so when completing Section 5 of Part C.

impacts, minimizes construction impacts, and therefore minimizes inconvenience to the public during construction. Also, it would reduce the amount of materials needed to be installed and result in less construction impacts.

5. Cost and Benefit Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely costs, and savings, that are likely to result from implementation of such ATC, including reference to assumptions on which such estimate is based.

We anticipate an order of magnitude savings of under \$2.5M in construction, materials, and O&M costs.

6. Schedule Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely design and construction time period impacts (positive and negative) of such ATC, including reference to assumptions on which such estimate is based.

We anticipate minor schedule savings associated primarily with the movement of fewer materials to the site.

7. Conceptual Drawings

At Proposer's discretion, unless otherwise requested by the Procuring Authorities, conceptual drawings.

See attached

8. Past Use

Identification of other projects on which the ATC (or a substantially similar approach) has been implemented, regardless of the results, and the relevance of such experience.

The proposed narrower Type 7 (Style CD) concrete barrier was used in the Narrows Segment (Broadway to Logan) on the CDOT Southeast Corridor Multi-Modal (TRES) project.

9. Additional Information

With respect to previously submitted ATC Submissions only, additional information as requested by the Procuring Authorities following review of such prior submissions.

(n/a)

C. Detailed ATC Requirements

1. Risks

To the extent not otherwise addressed by the responses to Part B above, an analysis of any additional risks to the Procuring Authorities, CDOT, the State or third parties associated with implementation of the ATC, including discussion of how such risks are, or are proposed to be, allocated under the terms of the Project Agreement.

(n/a)

2. Handback

Description of any proposed changes in handback procedures and/or the Handback Requirements associated with the ATC, if any are expected.

(n/a)

3. Right-of-Way

A description, estimated cost and proposed procurement schedule of any Additional Right-of-Way expected to be required to implement the ATC, if any.

(n/a)

4. List of Required Approvals

A list of required, or likely to be required, third party and Governmental Approvals, including any Design Exceptions (which should be summarized in the form of Attachment A (Design Exceptions)).

(n/a)

5. Proposed Drafting Revisions

(a) List all RFP requirements that are inconsistent with the proposed ATC and (b) attach in the form of a mark-up (for amendments to existing drafting) and/or a rider (with respect to newly proposed drafting) proposed revisions to address those inconsistencies.

(n/a)

**Attachment A
Design Exceptions**

No.	RFP Reference	Existing Condition and Applicable Standard (verbatim from standard)	Proposed Condition⁴	Procuring Authorities' Response⁵	FHWA Response⁶
1.					
2.					

⁴ Proposers should include in this column or attach to the relevant ATC Submission Form the information referred to in Section 9.4.15.b.ii of Schedule 10 (Design and Construction Requirements) to the Project Agreement.

⁵ For Procuring Authorities' use only.

⁶ For FHWA use only.



Addendum No.2
Release of February 23, 2016

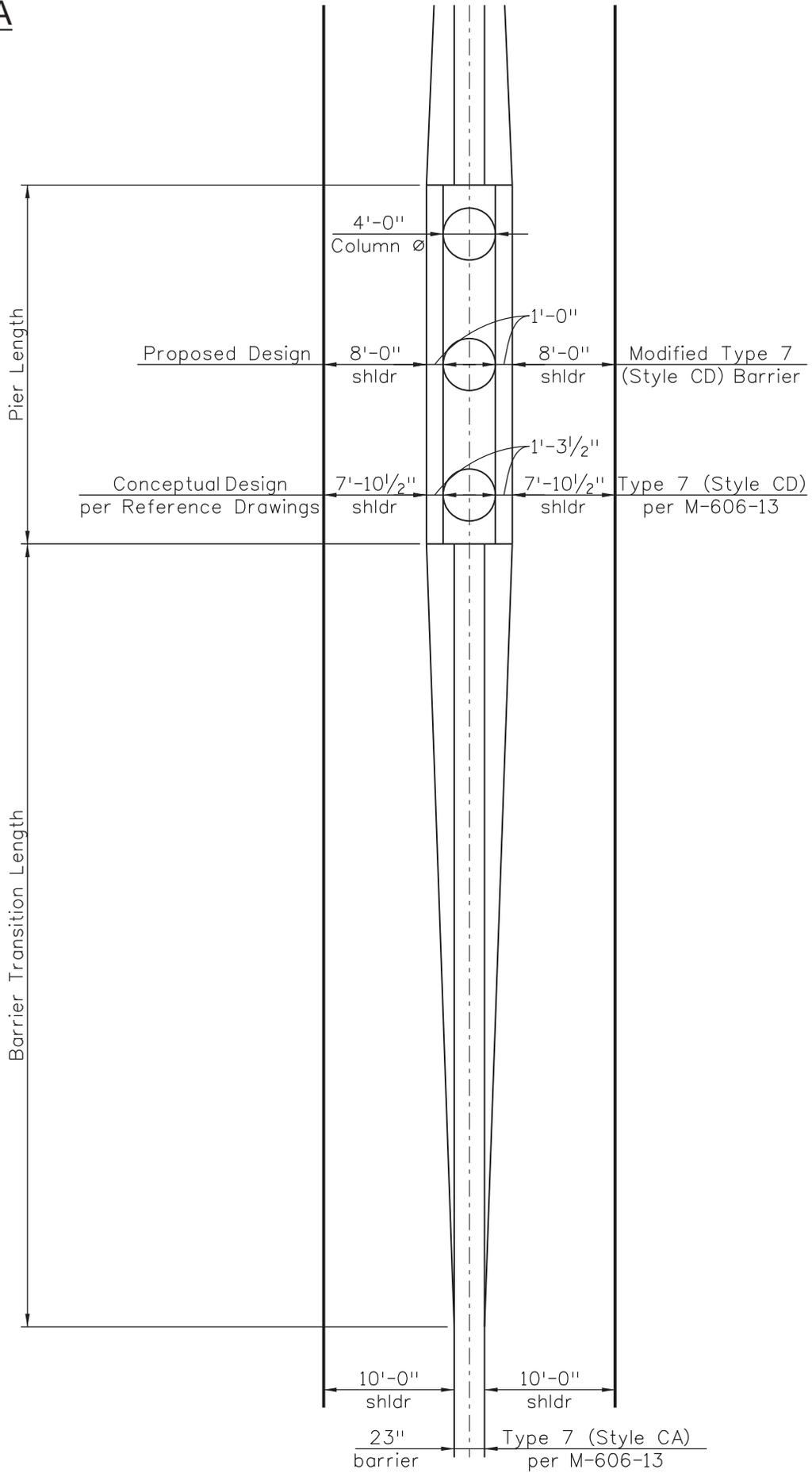
Central 70 Project: Instructions to Proposers
Part I: Exhibit 1

ATC SUBMISSION No. 16.0

CONCEPTUAL DRAWINGS

CONFIDENTIAL

Exhibit A



ATC 21



SWANSEA ELEMENTARY SCHOOL



CONNECTING COMMUNITIES



DATE: April 14, 2017
TO: Front Range Mobility Group
FROM: Anthony DeVito, P.E. Central 70 Project Director
Keith Stefanik, P.E. Central 70 Deputy Director of Project Delivery
SUBJECT: Central 70 - Detailed Alternative Technical Concept (ATC) Response
Front Range Mobility Group - ATC No. 21.2

Dear Mr. Friedrich:

Your Team's ATC Submission Form for Detailed ATC 21.2 was reviewed by the Procuring Authorities prior to the April One-on-One Meetings and an initial response was sent to you on April 7, 2017. As discussed during the April One-on-One Meeting, the Procuring Authorities committed to provide a final response to your Detailed ATC.

Detailed ATC 21.2 proposes to eliminate both the 72" storm sewer and bridge structure crossing of I-70 just east of York Street and the north drainage outfall system.

In accordance with the Instructions to Proposers ("ITP"), the Procuring Authorities will use reasonable efforts to provide a Proposer with the following written feedback on a ATC Submission within 15 Working Days following the later of (x) the date the relevant ATC Submission was submitted and (y) the One-on-One Meeting at which such submission is discussed. Below is the final response from the Procuring Authorities for your Detailed ATC:

- 1. unconditional approval;
- 2. conditional approval, subject to modifications and/or conditions;
 Re-submission required Re-submission not required
- 3. disapproval, with or without guidance that such ATC can be re-submitted under any circumstance;
- 4. notification that the incorporation of the proposed ATC in the Proposer's Proposal is already permitted under the terms of the RFP, and therefore does not qualify as an ATC (and will not be treated as such for purposes of Section 3.4 of Part C of the ITP).
- 5. subject to compliance with the confidentiality requirements set out in Section 3.4 of Part C of the ITP, the Procuring Authorities are considering amending (for the benefit of all Proposers) the terms of the RFP that are the subject-matter of the proposed ATC.

Following our discussions at the April One-on-One Meeting, the Procuring Authorities have not changed their initial response to your above mentioned Detailed ATC Submission. The ATC is approved with the following conditions:

Conditions of approval:

1. The Developer shall be responsible for performance of and all costs associated with any additional Utility Work required to implement this ATC.



2. Detention and water quality ponds shall have a minimum slope of 0.5% as required by the RFP.

The approval of this Detailed ATC by the Procuring Authorities does not constitute an approval of specific drafting modifications to the RFP necessary to incorporate this ATC into the Project Agreement pursuant to Section 7.2.1.c of Part C of the ITP, which modifications shall be agreed by the Procuring Authorities and the Proposer (each acting reasonably) following issuance of a Notice of Award to such Proposer.



ANNEX 3: ALTERNATIVE TECHNICAL CONCEPT SUBMISSION FORM

Proposer Name: Front Range Mobility Group
Date: March 27, 2017

Central 70 Project RFP: ATC Submission No. 21.2¹**A. Background Information****1. Type of Submission**

- Conceptual ATC
 Detailed ATC

2. Prior Submission(s)

- None (initial submission of ATC)
 Previously Submitted as Conceptual ATC
 Previously Submitted as Detailed ATC

3. Explanation of Reason for Resubmission

In a letter dated December 16, 2016, the Procuring Authorities requested that FRMG address the following items in a Re-submission of this Detailed ATC. FRMG's response to these items is included in Section B.9 of this ATC.

1. As discussed in the December One-on-One Meeting, the Procuring Authorities will be providing updated information regarding the RFP drainage requirements in a Commercial Update in January 2017. Please evaluate the impacts of the new drainage requirements on this ATC and resubmit with any revisions necessary.
2. Provide a no adverse impact analysis for the existing 72" pipe in York Street. The analysis shall compare the reference design to the ATC. As part of the analysis, provide the storm event that would fill the existing 72" pipe as well as the 5-year and 100-year flow conditions for both the reference design and if the ATC is implemented.
3. The Department is not Approving the use of equivalent areas for the Lowered Section. Please revise the ATC to provide permanent water quality for the Lowered Section prior to the connection to the 72" pipe in York Street.

4. Request for Discussion at One-on-One Meeting

- Meeting Requested
 Meeting Not Requested²

¹ Proposers to complete in accordance with instruction (2) to the Annex.

² In accordance with Section 3.2.1 of Part C, the Procuring Authorities may nevertheless require a Proposer to present an ATC Submission at a One-on-One Meeting.

B. General ATC Submission Requirements

1. Overview Description

Narrative overview description of the proposed ATC.

*“This information **has** been amended since the submission of the conceptual version of this ATC.”*

FRMG proposes this ATC to eliminate the 72” Storm Sewer and bridge structure MISC-E-17-IU crossing I-70 just east of York Street. In addition, this ATC includes the elimination of the North Drainage Outfall System, which includes the Onsite Detention Pond at Race Court. The ATC is being pursued based on Denver Wastewater’s indication at the meetings with proposers that it would entertain a change to the storm and sanitary crossings adjacent to York Street.

FRMG’s revised design includes upsizing the storm sewer paralleling the south side of I-70 south of 46th Avenue from a 7’x6’ concrete box culvert (CBC) to a 9’x6’ CBC from York Street to the UPRR, dual 78” reinforced concrete pipes (RCPs) under the UPRR, then back to a 9’x6’ CBC to the Brighton East Pond. This segment includes optimizing the two detention ponds at Brighton Boulevard. These ponds will have adequate capacity to address the increased flows that enter the system at York Street and from the deletion of the South ponds at Steele Street in the Final RFP, rather than crossing I-70 in the 72” pipe that is being eliminated. Attachment A-1 (sheet 1 to 3) shows the revised plan and profile for the proposed ATC 21 for the revised storm sewer system in 46th Avenue. Attachment B-1 shows a typical section through the 9’x6’ CBC relative to I-70 and 46th Ave.

North of I-70, FRMG proposes to use the available capacity in the existing 72” storm sewer in York Street to optimize drainage flows (Attachment C).

To eliminate the North Drainage Outfall System and the Onsite Pond at Race Court, FRMG proposes to locate the pump station that collects the I-70 lowered section drainage in the Northwest quadrant of I-70 and York Street. The discharge from the pump station will flow by gravity to the east through a proposed water quality pond and connect to the existing 72” RCP in York Street, which ultimately discharges to the South Platte River.

To address the contractual detention and water quality requirements identified in Schedule 10 Section 8 Table 8-5, FRMG proposes to:

- Eliminate the Onsite North Water Quality and Detention Pond at Race Court along with the elimination of the North Outfall. In the design provided by the Procuring Authorities in the Reference Documents, the York Street pond discharges at a rate of 278 cubic feet per second (cfs). FRMG’s proposed flow in the York Street 72” RCP north of I-70 would be 270 cfs. The drawings have been revised to show the flow comparisons, the flow conveyed within the storm sewer system, and the flow conveyed in the street due to surcharging.
- At the outlet of the proposed pump station FRMG has added a water quality pond to treat discharges from the Lowered Section prior to the connection to the existing storm sewer system.
- Increase the flood control volumes in the Brighton East and Brighton West ponds to accommodate the increased flows from York Street and the deletion of the south ponds at Steele Street.

Benefits of eliminating the North Drainage Outfall system include:

- Easing the impact to the local neighborhood with reduced construction activity. This eliminates the need to re-route the existing utilities to allow for large bore pits which would be required to install the North Drainage Outfall design as shown in the Reference Documents. Utility relocates

that would be eliminated include Denver Water Conduit 83 in 49th Avenue, as well as numerous other water, sanitary sewer, storm sewer, and gas lines.

- Eliminating road closures required for the bore pits
- Eliminating easements required to install the North Drainage Outfall System
- Eliminating the need to relocate the existing Delgany Interceptor upstream of the outfall at the South Platte River
- Eliminating the 404 permit to establish a new outfall to the South Platte River

2. Relevant RFP Requirements

List all material RFP requirements that are inconsistent with, and would require amendment to accommodate, the proposed ATC³.

"This information **has not** been amended since the submission of the conceptual version of this ATC."

- Schedule 10, Section 13.5.2 Table 13-2 identifies MISC-E-17-IU as a required new bridge structure included in the project that carries a 72" storm sewer.
- Schedule 10 Section 8 Table 8-5 shows the Onsite North Pond at Race Court as a required detention and water quality pond.
- The Reference Documents also show the North Outfall System and the associated Onsite Pond at Race Court.

3. Rationale

Explanation of how, where and why the ATC would be used on the Project, including how it aligns with the Project Goals.

"This information **has not** been amended since the submission of the conceptual version of this ATC."

The rationale for using this ATC on the Project includes:

- Providing a conveyance path for drainage to the South Platte River without the use of Structure MISC-E-17-IU across I-70.
- Eliminating the North Outfall System.
- Making use of available capacity in existing storm drainage systems to convey drainage from the lowered portion of I-70 and the area north of I-70 to the South Platte River.

This ATC supports the Project Goal of optimizing scope of the transportation and supporting infrastructure delivered through the project in order to promote corridor wide economic and community vitality.

4. Impacts

A preliminary analysis of potential environmental, social, economic, community, traffic, safety, operations and maintenance or third party impacts (positive and negative), including specific separate identification and analysis of any such impacts that are not reflected in the final EIS.

"This information **has** been amended since the submission of the conceptual version of this ATC."

This ATC includes elimination of Structure MISC-E-17-IU crossing I-70 as well as the North Drainage Outfall System and the Onsite Detention Pond at Race Court. It provides an alternate conveyance path

³ Proposers are not required to propose RFP drafting amendments when completing Part B, but are required to do so when completing Section 5 of Part C.

for the storm drainage flows that would have been carried across I-70 and to the North Outfall System. This ATC has several positive impacts which include:

- Allowing the profile of I-70 to be raised, reducing excavation and wall heights.
- Minimizing initial cost of the Project
- Reducing the construction schedule
- Removing an additional structure crossing I-70, thus eliminating long term maintenance associated with that structure
- Increasing safety due to the elimination of a center pier for the utility bridge crossing I-70.

Elimination of the Onsite Detention Pond at Race Court and the North Drainage Outfall System have the positive impact of optimizing the use of existing and proposed infrastructure in the project area and avoiding several costly and disruptive utility relocations. This in turn reduces construction traffic, noise, and safety concerns in the neighborhood.

FRMG has added a water quality pond at the outlet of the pump station to address the water quality requirements for the Lowered Section.

FRMG does not anticipate any negative impacts to the Project associated with the approval of this alternative solution.

5. Cost and Benefit Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely costs, and savings, that are likely to result from implementation of such ATC, including reference to assumptions on which such estimate is based.

*“This information **has** been amended since the submission of the conceptual version of this ATC.”*

The proposed ATC will realize the following cost benefits:

- Eliminating the costs associated with the construction of structure MISC-E-17-IU as well as long-term maintenance of the structure.
- Cost savings obtained by raising the I-70 profile from that shown in the Reference Documents.
- Eliminating the cost of the Onsite Detention Pond at Race Court and the North Drainage Outfall System by utilizing the pump station near Claude Court to convey flows through the added water quality pond then to the existing 72” storm sewer system in York Street
- Eliminating utility relocation costs that would be associated with the North Outfall construction including numerous water lines, sanitary sewers (including the Delgany interceptor), storm sewers, gas lines, and Denver Water’s Conduit 83 in 49th Avenue.

FRMG anticipates net savings of \$17.4M to the Base MPP over the term of the Project associated with the components of this ATC as follows:

Cost saving items

Elimination of Structure MISC-E-17-IU crossing I-70 – \$300,000

Reduction in Retaining Walls -- \$2,500,000

Reduction in Earthwork/Paving – \$3,100,000

Elimination of North Outfall – \$18,000,000

Additional Cost Items

Upsizing pump station --\$6,500,000

The operating cost of the pump station has not been included as this is a minor cost. The pump station is designed to use a small pump for flows up to the 10 year event. The large pumps will operate only during the 10 year event and higher.

6. Schedule Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely design and construction time period impacts (positive and negative) of such ATC, including reference to assumptions on which such estimate is based.

*“This information **has not** been amended since the submission of the conceptual version of this ATC.”*

This ATC does not affect the critical path, therefore there is not a schedule saving to the overall project.

7. Conceptual Drawings

At Proposer’s discretion, unless otherwise requested by the Procuring Authorities, conceptual drawings.

*“This information **has** been amended since the submission of the conceptual version of this ATC.”*

FRMG updated the detailed drawings showing the alignment (Attachment A-1) and cross section (Attachment B-1) of the proposed storm sewer system to eliminate Structure MISC-E-17-IU. In previous submissions of this ATC, these were Attachments A and B. Attachment C addresses the analysis of the elimination of the North Drainage Outfall, and the Onsite Detention Pond at Race Court.

8. Past Use

Identification of other projects on which the ATC (or a substantially similar approach) has been implemented, regardless of the results, and the relevance of such experience.

*“This information **has not** been amended since the submission of the conceptual version of this ATC.”*

The York Street Storm Sewer crossing over I-70 in the Reference Documents is driving the need for Structure MISC-E-17-IU. If FRMG can reroute the York Street storm sewer as requested in this ATC, Structure MISC-E-17-IU would not be required. A similar rerouting of the Mississippi Street outfall was carried out on CDOT’s T-REX project.

Optimizing the use of existing and proposed infrastructure is proposed in this ATC. Previous use of a pump station on a CDOT project includes the recently completed pump station for I-25 at Alameda Avenue to drain a lowered section of I-25.

9. Additional Information

With respect to previous submitted ATC Submissions only, additional information as requested by the Procuring Authorities following review of such prior submissions.

*“This information **has** been amended since the submission of the conceptual version of this ATC.”*

The following information was requested by the Procuring Authorities in the response to FRMG’s Detailed ATC. Responses follow the requested item.

1. **Requested Information:** As discussed in the December One-on-One Meeting, the Procuring

Authorities will be providing updated information regarding the RFP drainage requirements in a Commercial Update in January 2017. Please evaluate the impacts of the new drainage requirements on this ATC and resubmit with any revisions necessary.

Response

FRMG has amended the previous submittal of ATC 21 to address the Final RFP drainage requirements. South of I-70 a detailed plan and profile showing the location of the ATC 21 design from the 46th Avenue system addresses the elimination of the two ponds on the south side of Steele Street from the design (Attachment A-1). Minor upsizing of the 7'x6' CBC to a 9'x6' CBC is required west of York Street to convey the increased flows. A typical cross section for 46th Avenue is shown in Attachment B-1. The Brighton West and East Ponds have been increased in size to reduce the discharge to the allowable 463 cfs to the Reference Design in Brighton Boulevard.

- 2. Requested Information:** Provide a no adverse impact analysis for the existing 72" pipe in York Street. The analysis shall compare the reference design to the ATC. As part of the analysis, provide the storm event that would fill the existing 72" pipe as well as the 5-year and 100-year flow conditions for both the reference design and if the ATC is implemented.

Response

FRMG has addressed the no adverse impacts to the existing 72" pipe in York Street in the following ways. North of I-70 a detailed plan and profile showing the location of the lowered section pump station and the proposed outlet to the added water quality ponds then to the existing 72" storm sewer in York Street is shown on Attachment C. A summary flow table on Attachment C shows that the net balance of flow to the existing York Street storm sewer is reduced from the flows shown in the Reference Design.

Table 9-1 below shows a comparison between the Reference Design and the FRMG ATC 21 design.

The York Street North System surcharges at the 10-year event for the Reference Design with 13 cfs exiting the system. The FRMG ATC 21 design also surcharges for the 10 year event, which results in a surcharge of 5 cfs in York Street. In all cases the FRMG ATC 21 results in lower flows surcharging the York Street system, which reduces the impacts of the FRMG Design over the Reference Design.

- 3. Requested Information:** The Department is not Approving the use of equivalent areas for the Lowered Section. Please revise the ATC to provide permanent water quality for the Lowered Section prior to the connection to the 72" pipe in York Street.

Response

To address the requirements for permanent water quality for the lowered section, FRMG has added a water quality pond at the outlet of the pump station prior to the flows entering the York Street System.

Central 70 Project: Instructions to Proposers
Part G. Annex 3

Table 9-1

Street Outfall Flow arisons	5-yr (cfs)				10-yr (cfs)				100-yr (cfs)			
	Additional CFS	Total CFS	Pipe CFS	Surface CFS	Additional CFS	Total CFS	Pipe CFS	Surface CFS	Additional CFS	Total CFS	Pipe CFS	Surface CFS
North Local Flow (without additional contributions)		330	478	0		384	478	0		866	478	388
Refernce Drawings from Final RFP South Contribution (SWMM peak flow through pipe bridge, local basins only)	88	418	478	0	107	491	478	13	343	1209	478	731
With FRMG Pump Contribution	84	414	478	0	99	483	478	5	170	1036	478	558
Max pipe flow before system surcharge to surface	248	478										

¹ This flow is surface flow only and does not include flow already in the pipe. This flow is therefore quite conservative.

Central 70 Project: Instructions to Proposers
Part G. Annex 3

C. Detailed ATC Requirements

1. Risks

To the extent not otherwise addressed by the responses to Part B above, an analysis of any additional risks to the Procuring Authorities, CDOT, the State or third parties associated with implementation of the ATC, including discussion of how such risks are, or are proposed to be, allocated under the terms of the Project Agreement.

*“This information **has not** been amended since the submission of the conceptual version of this ATC.”*

No additional risk is incurred by elimination of bridge MISC-E-17-IU, the North Drainage Outfall System or the Onsite Detention Pond at Race Court.

Construction of the lowered section pump station on the north side of I-70 provides resiliency of the lowered section and would provide the drainage path for the lowered section to the existing York Street storm sewer.

2. Handback

Description of any proposed changes in handback procedures and/or the Handback Requirements associated with the ATC, if any are expected.

*“This information **has not** been amended since the submission of the conceptual version of this ATC.”*

There are no changes in handback procedures and/or Handback Requirements associated with the approval of this ATC.

3. Right-of-Way

A description, estimated cost and proposed procurement schedule of any Additional Right-of-Way expected to be required to implement the ATC, if any.

*“This information **has not** been amended since the submission of the conceptual version of this ATC.”*

There will be elimination of ROW and easements associated with removing the North Outfall System and the Onsite Detention Pond at Race Court.

4. List of Required Approvals

A list of required, or likely to be required, third party and Governmental Approvals, including any Design Exceptions (which should be summarized in the form of Attachment A (Design Exceptions)).

*“This information **has not** been amended since the submission of the conceptual version of this ATC.”*

No additional approvals are required for elimination of bridge MISC-E-17-IU.

Approvals from City and County of Denver Wastewater Division would be required for the rerouting of the drainage system along the north and south sides of I-70.

5. Proposed Drafting Revisions

(a) List all RFP requirements that are inconsistent with the proposed ATC and (b) attach in the form of a mark-up (for amendments to existing drafting) and/or a rider (with respect to newly proposed drafting)

proposed revisions to address those inconsistencies.

“This information **has not** been amended since the submission of the conceptual version of this ATC.”

Upon approval of this ATC, Schedule 10, Section 13.5.2 Table 13-2 would be modified as follows, with the requirement for Structure MISC E-17-IU being removed from the table.

Table 13-2 Actions for bridge structures

Existing Structure No.	New Structure No.	Structure Location and Description	Action
E-17-UY E-17-US	E-17-AEU E-17-AEV	I-70 westbound over Brighton Boulevard I-70 eastbound over Brighton Boulevard	Removal and reconstruction Removal and reconstruction
E-17-FX	N/A	I-70 Viaduct (Brighton Boulevard to Colorado Boulevard)	Removal
E-17-Z	N/A	UPRR Bridge under I-70	Removal
N/A	E-17-AEW E-17-AEX	UPRR over I-70 UPRR Service Road over I-70	New construction New construction
N/A	MISC-E-17-IT	Sanitary Sewer Bridge over I-70 (at York Street)	New construction
N/A	E-17-AEY	York Street over I-70	New construction
N/A	MISC-E-17-IU	Storm Sewer Bridge over I-70 (at York Street)	New construction
N/A	E-17-AEZ	Josephine Street over I-70	New construction
N/A	E-17-AEL	Cover (Columbine to Clayton)	New construction
N/A	E-17-AEN	Fillmore Street over I-70	New construction
N/A	E-17-AEO	Steele Street over I-70	New construction
N/A	E-17-AEP	Cook Street over I-70	New construction
N/A	E-17-AFA	BNSF Market Lead over I-70	New construction
N/A	E-17-AFC	Monroe Street over I-70	New construction
E-17-HU E-17-HT	E-17-AFD	Colorado Boulevard over I-70	Removal and reconstruction
E-17-HY E-17-HZ	E-17-AFF E-17-AFG	I-70 westbound over Dahlia Street I-70 eastbound over Dahlia Street	Removal and reconstruction Removal and reconstruction
E-17-HW E-17-HX	E-17-AFH E-17-AFI	I-70 westbound over Holly Street I-70 eastbound over Holly Street	Removal and reconstruction Removal and reconstruction
E-17-GC E-17-GD	E-17-AFJ E-17-AFK	I-70 westbound over Monaco Street I-70 eastbound over Monaco Street	Removal and reconstruction Removal and reconstruction
N/A	E-17-ADT	N Stapleton Drive over Denver Rock Island Railroad	Removal and reconstruction
E-17-EW E-17-DF	E-17-AFN E-17-AFO	I-70 westbound over Denver Rock Island Railroad I-70 eastbound over Denver Rock Island Railroad	Removal and reconstruction Removal and reconstruction
N/A	E-17-ADU	Quebec eastbound exit ramp over Denver Rock Island Railroad	New construction
E-17-GA E-17-GB	E-17-AFQ E-17-AFR	I-70 westbound over Quebec Street I-70 eastbound over Quebec Street	Removal and reconstruction Removal and reconstruction
E-17-AER	N/A	I-70 over Sand Creek	Existing bridge previously constructed
E-17-KR	E-17-AFS	Eastbound I-270 over I-70	Removal and reconstruction
E-17-VD	N/A	I-70 over Havana Street	Bridge constructed under Havana Design Build Project
E-17-VE	N/A	I-70 over UPRR spur track (near Havana Street)	Bridge constructed under Havana Design Build Project
E-17-IQ	E-17-AFT E-17-AFU	I-70 westbound over Peoria Street I-70 eastbound over Peoria Street	Removal and reconstruction Removal and reconstruction

In addition, Schedule 10, Section 8, Table 8-5 would be modified with the requirement for the Onsite Detention Pond at Race Court being removed from the table, and the facility type change for the York East pond.

Table 8-5 Water Quality and Detention Ponds

Pond Name	I-70 Mainline Station	Facility Type
Brighton West	2000+00	Flood Control Pond
Brighton East	2012+00	Flood Control Pond
York East	2028+00	Water Quality and Flood Control Pond
Steele West	2050+00	Flood Control Pond
Steele East	2055+00	Flood Control Pond
Steele North	2055+00	Flood Control Pond
Colorado North	2080+00	Flood Control Pond
Colorado South	2080+00	Flood Control Pond
Quebec North	2185+00	Water Quality Pond
Havana North #1	2292+00	Water Quality Pond
Havana North #2	2292+00	Detention Pond
Havana South	2292+00	Water Quality and Detention Pond
Onsite North	Race Court and Brighton Boulevard	Water Quality and Detention Pond



**Attachment A
Design Exceptions**

No.	RFP Reference	Existing Condition and Applicable Standard (verbatim from standard)	Proposed Condition⁴	Procuring Authorities' Response⁵	FHWA Response⁶
1.					
2.					

⁴ Proposers should include in this column or attach to the relevant ATC Submission Form the information referred to in Section 9.4.15.b.ii of Schedule 10 (*Design and Construction Requirements*) to the Project Agreement.

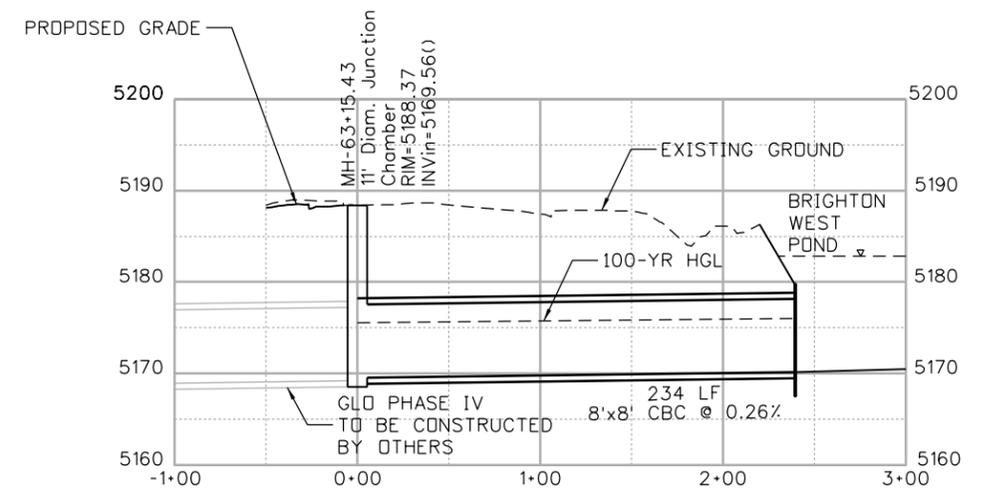
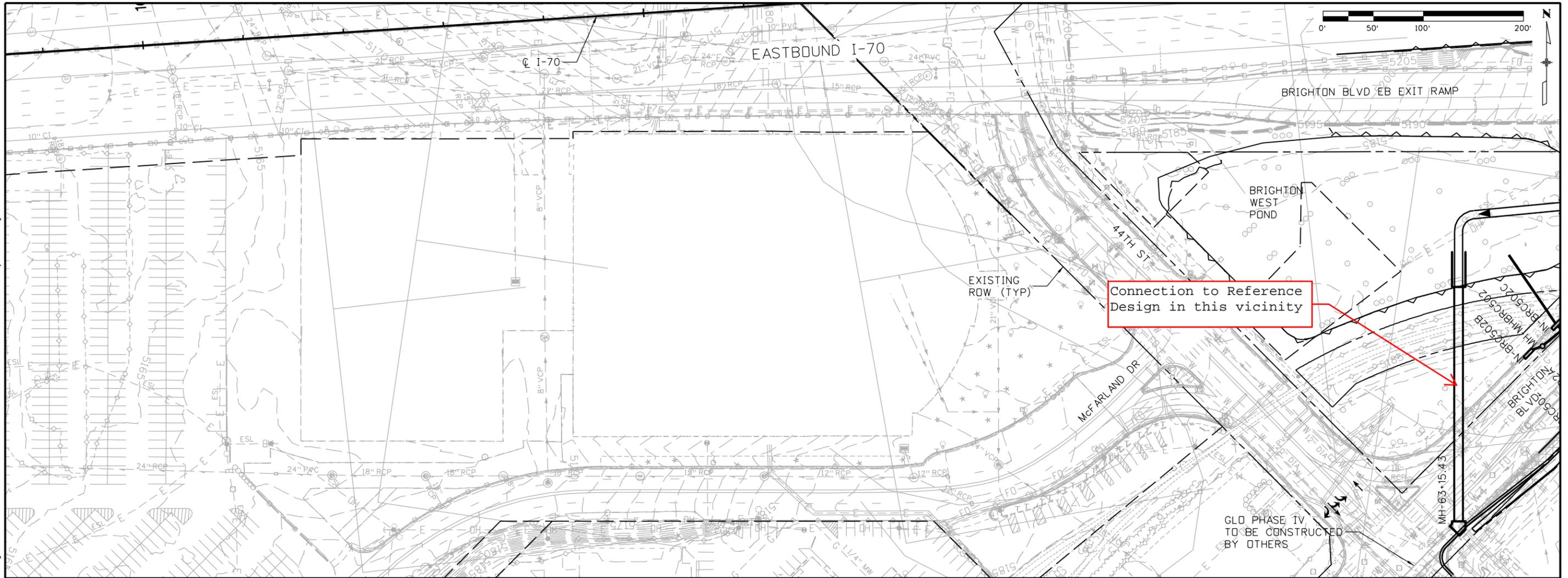
⁵ For Procuring Authorities' use only.

⁶ For FHWA use only.

Central 70 Project: Instructions to Proposers
Part G: Annex 3

ATC SUBMISSION No. 21.2

CONCEPTUAL DRAWINGS



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Print Date: 3/23/2017
 File Name: D007-13599-DRPL_006_Secondary Streets.dgn

Front Range Mobility Group

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

Sheet Revisions		
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 Denver, CO 80222
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CENTRAL 70 DRAINAGE PLAN AND PROFILE 46TH AVENUE

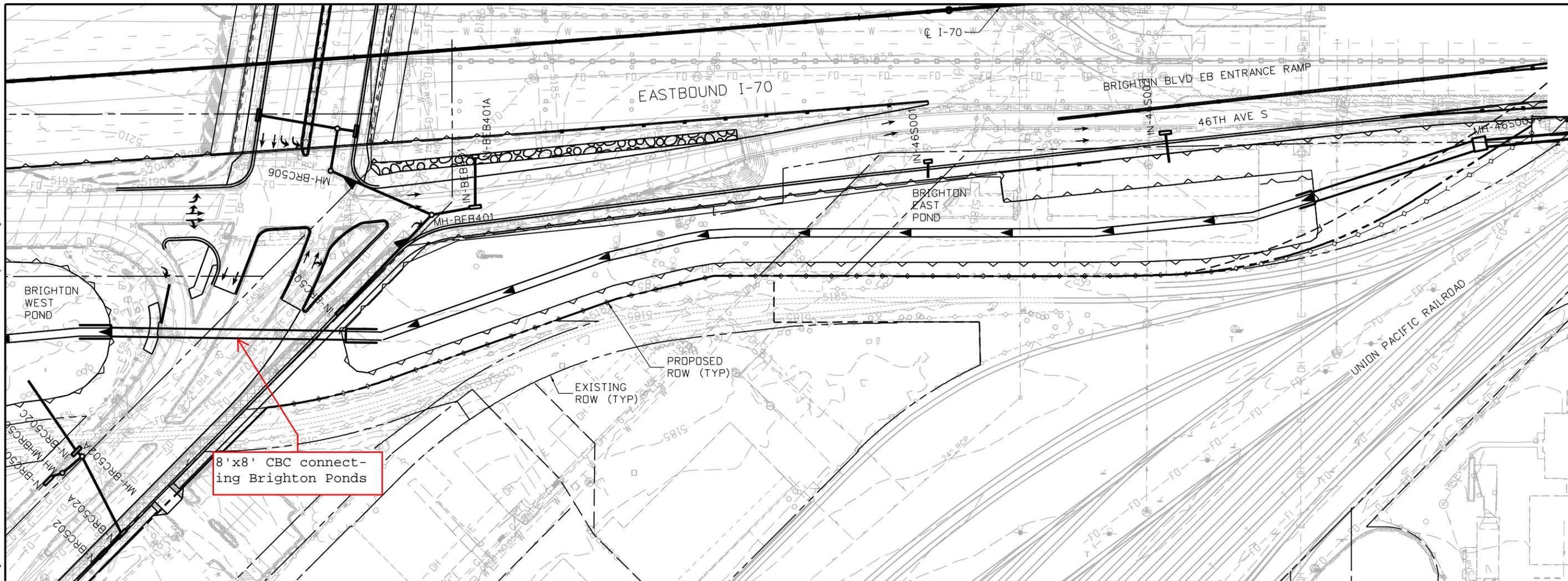
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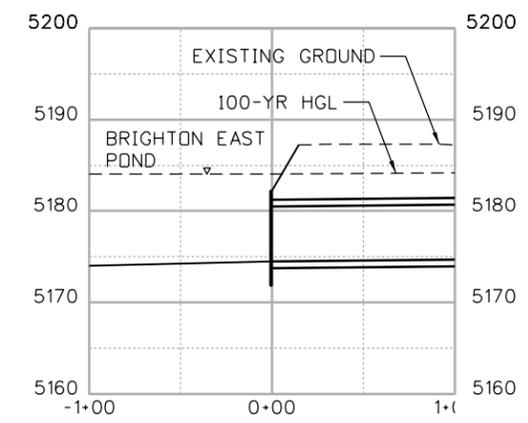
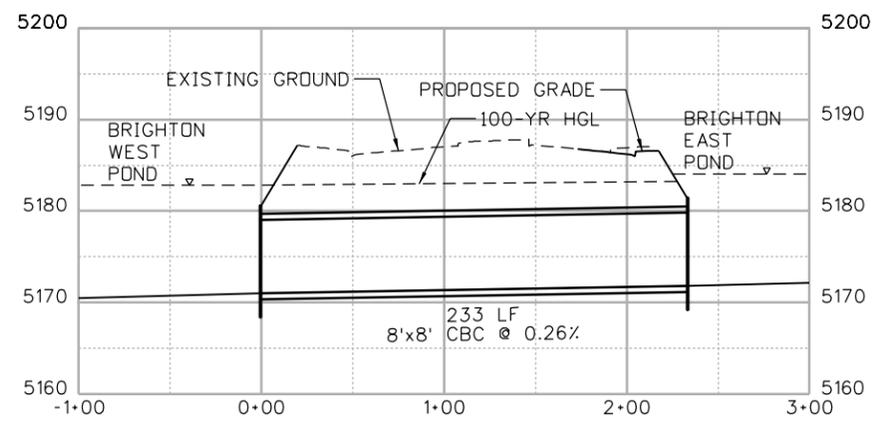
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8'x8' CBC connecting Brighton Ponds



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CENTRAL 70 DRAINAGE PLAN AND PROFILE 46TH AVENUE

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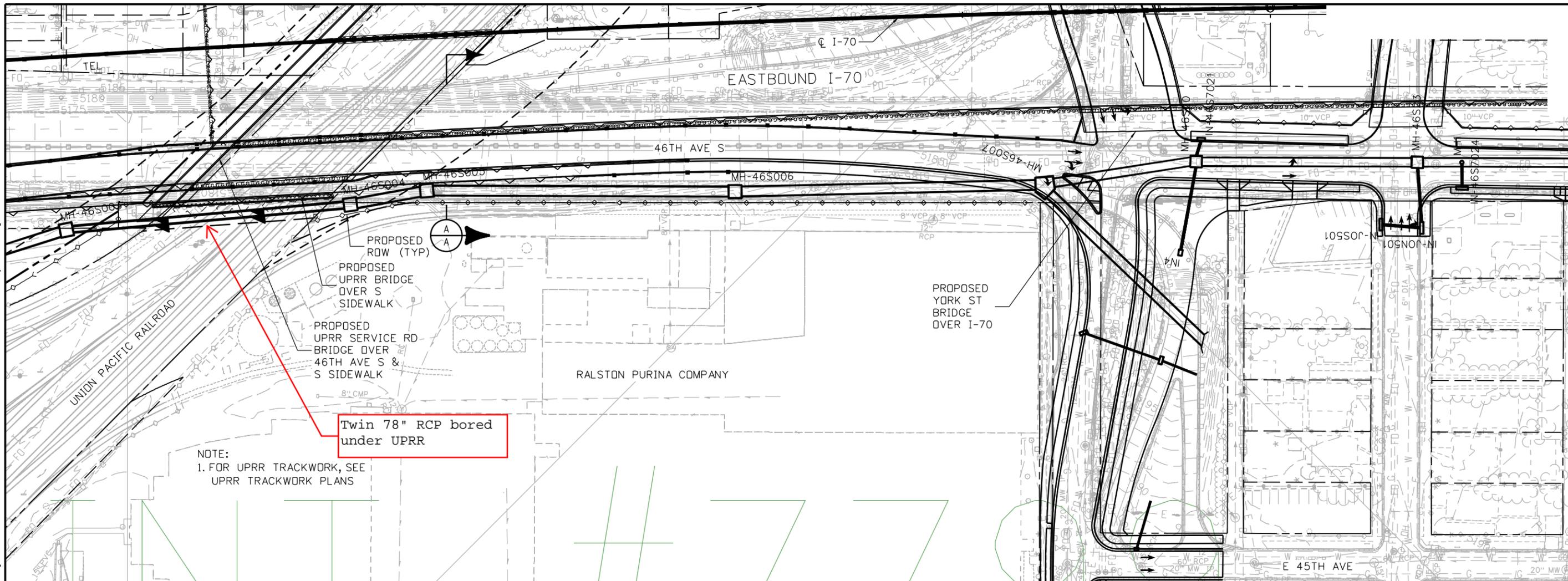
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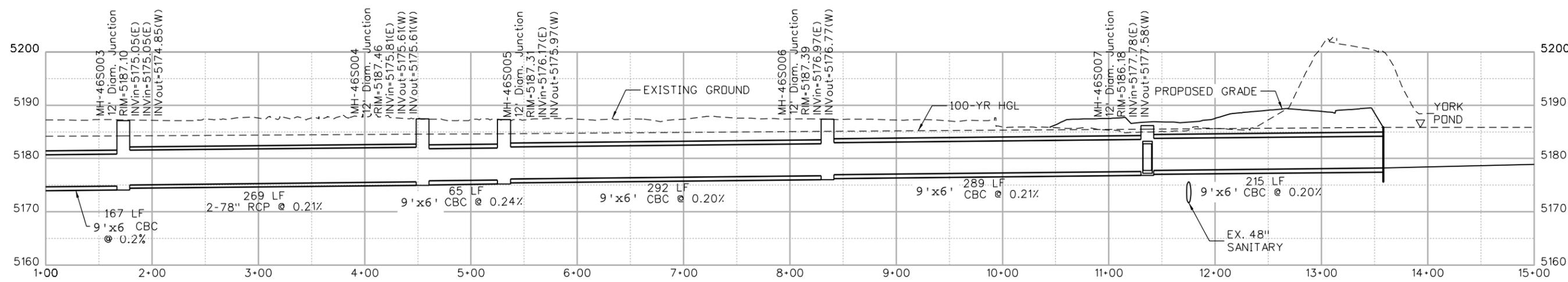
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NOTE:
1. FOR UPRR TRACKWORK, SEE UPRR TRACKWORK PLANS

Twin 78" RCP bored under UPRR



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**CENTRAL 70
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46TH AVENUE**

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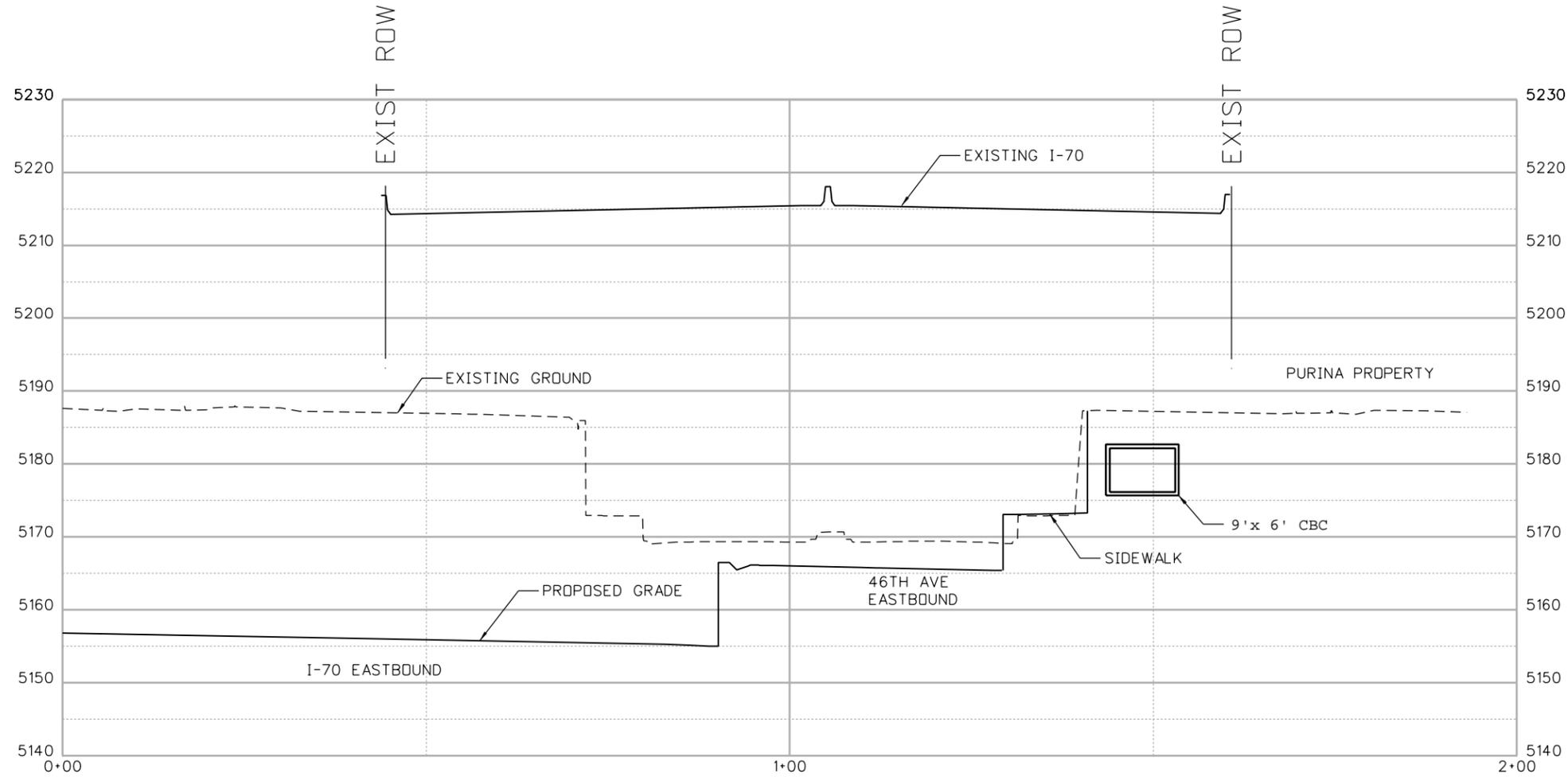
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SECTION A-A
(PROFILE STATION 5+50)

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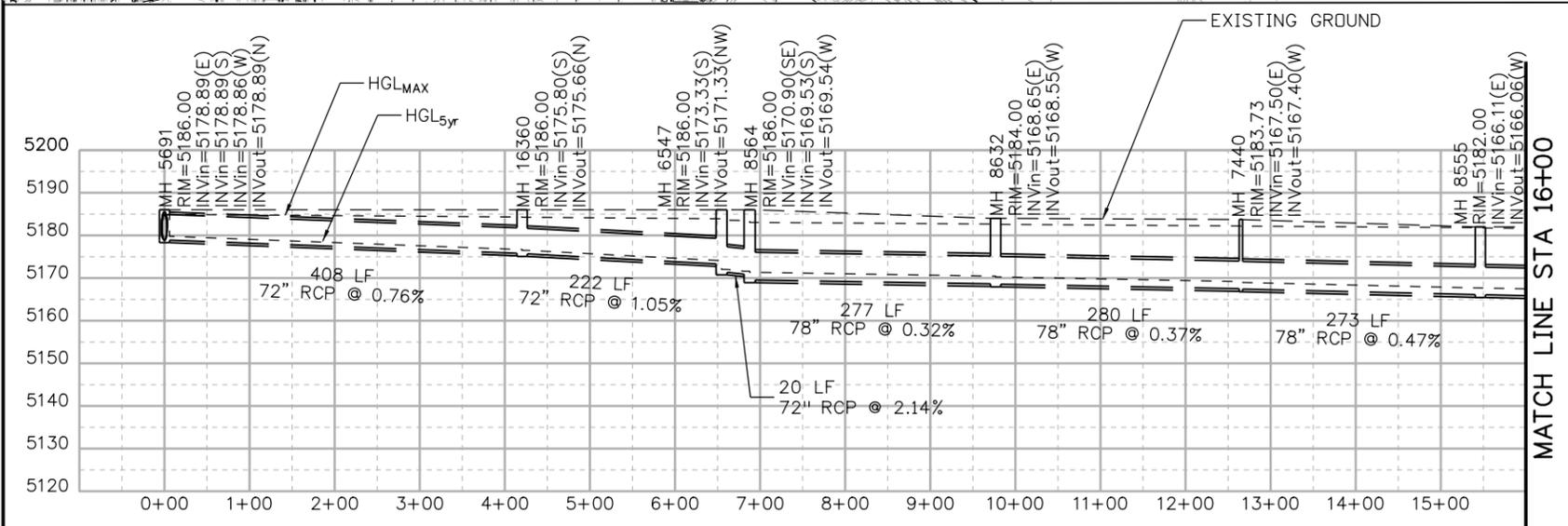
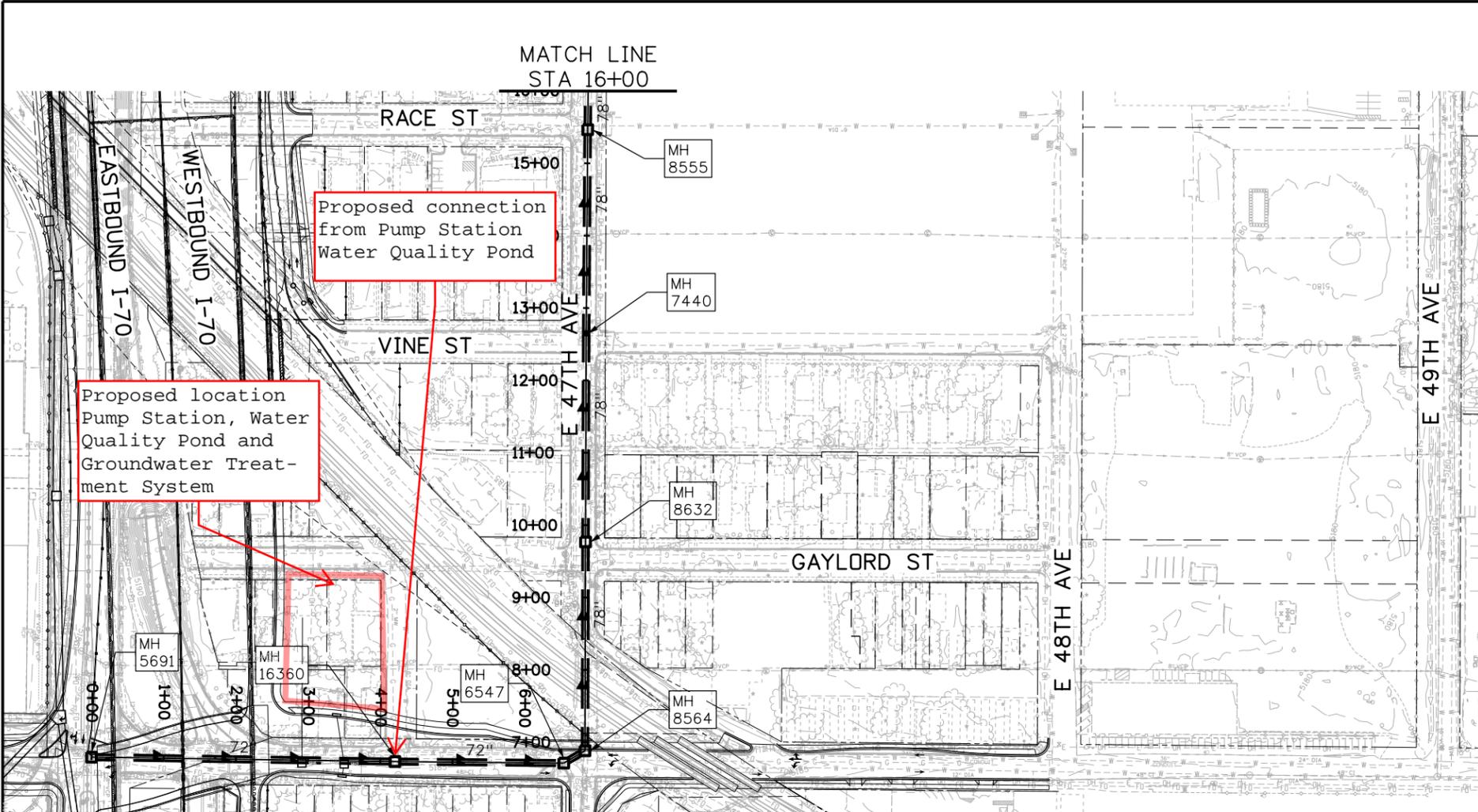
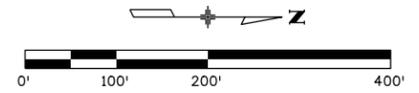
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Sheet Number



	TOTAL FLOW	STREET FLOW
Q _{5yr}	330 cfs	0 cfs
Q _{100yr}	866 cfs	388 cfs
Q _{max}	478 cfs	0 cfs
Q _{FRMG 5yr}	414 cfs	0 cfs
Q _{FRMG 100yr}	1036 cfs	558 cfs
Q _{RFP 5yr}	418 cfs	0 cfs
Q _{RFP 100yr}	1209 cfs	731 cfs

NOTE:
 Q_{5yr} = 5-YEAR LOCAL NORTH SYSTEM ONLY
 Q_{100yr} = 100-YEAR LOCAL NORTH SYSTEM ONLY
 Q_{max} = MAXIMUM FLOW BEFORE PIPE SURCHARGES
 Q_{FRMG 5yr} = FRONT RANGE MOBILITY GROUP COMPUTED 5-YEAR WITH LOCAL FLOW
 Q_{FRMG 100yr} = FRONT RANGE MOBILITY GROUP COMPUTED 100-YEAR WITH LOCAL FLOW
 Q_{RFP 5yr} = RFP 5-YEAR WITH LOCAL FLOW
 Q_{RFP 100yr} = RFP 100-YEAR WITH LOCAL FLOW

Print Date: 3/23/2017
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CENTRAL 70
DRAINAGE PLAN & PROFILE
EXISTING RACE STREET OUTFALL

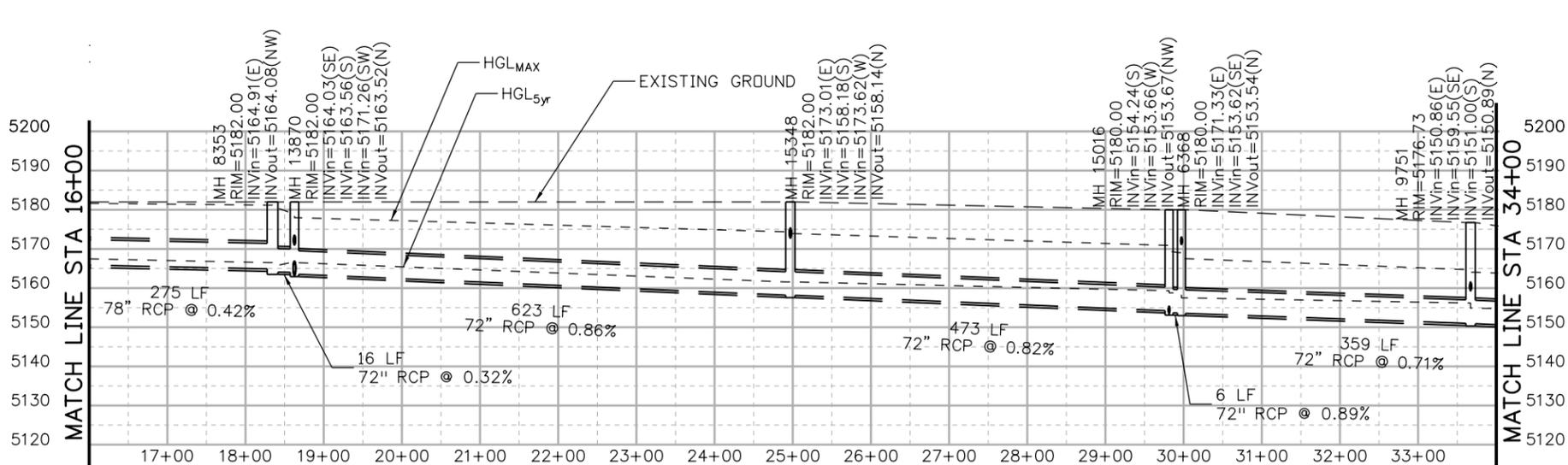
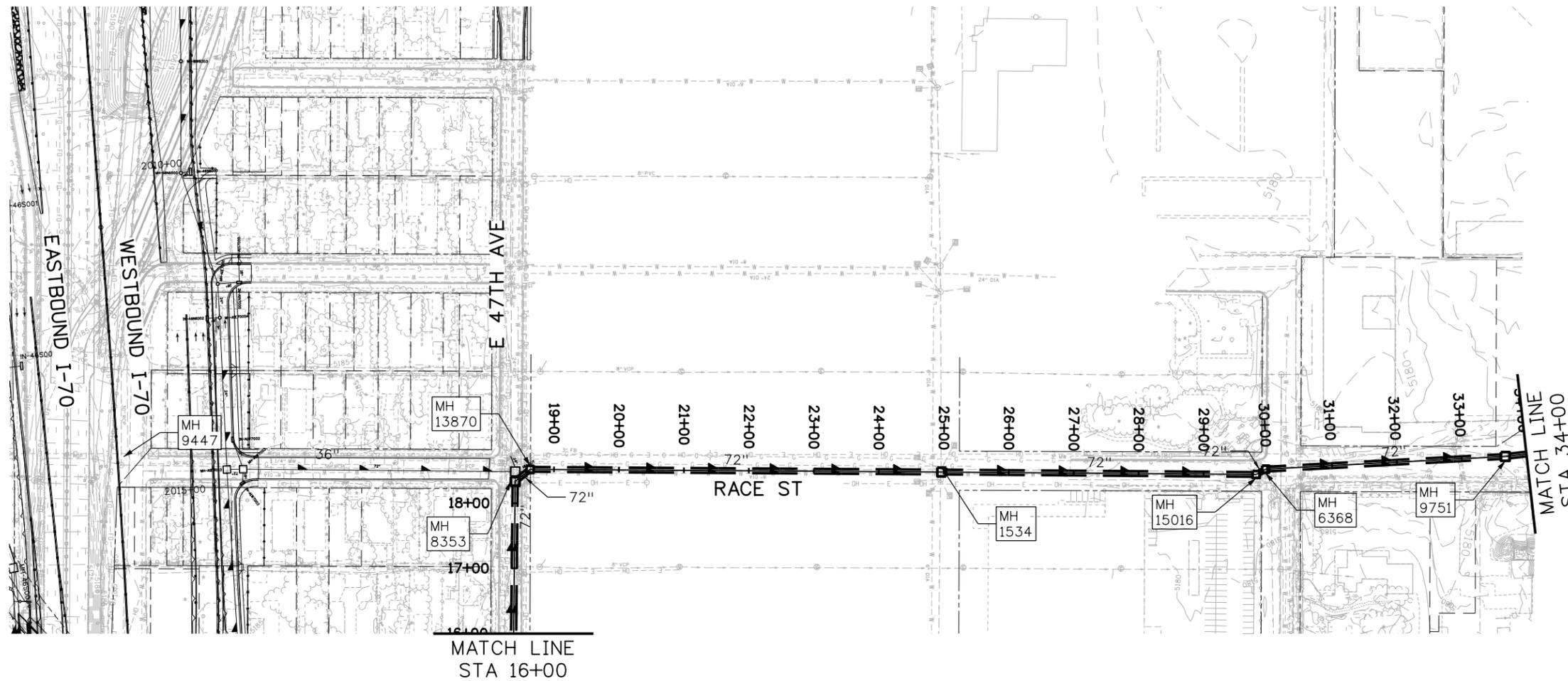
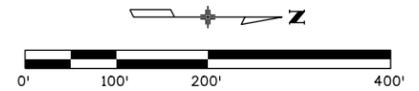
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Sheet Number

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Q _{FRMG 100yr}	1036 cfs	558 cfs
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Q _{RFP 100yr}	1209 cfs	731 cfs

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 Q_{FRMG 5yr} = FRONT RANGE MOBILITY GROUP COMPUTED 5-YEAR WITH LOCAL FLOW
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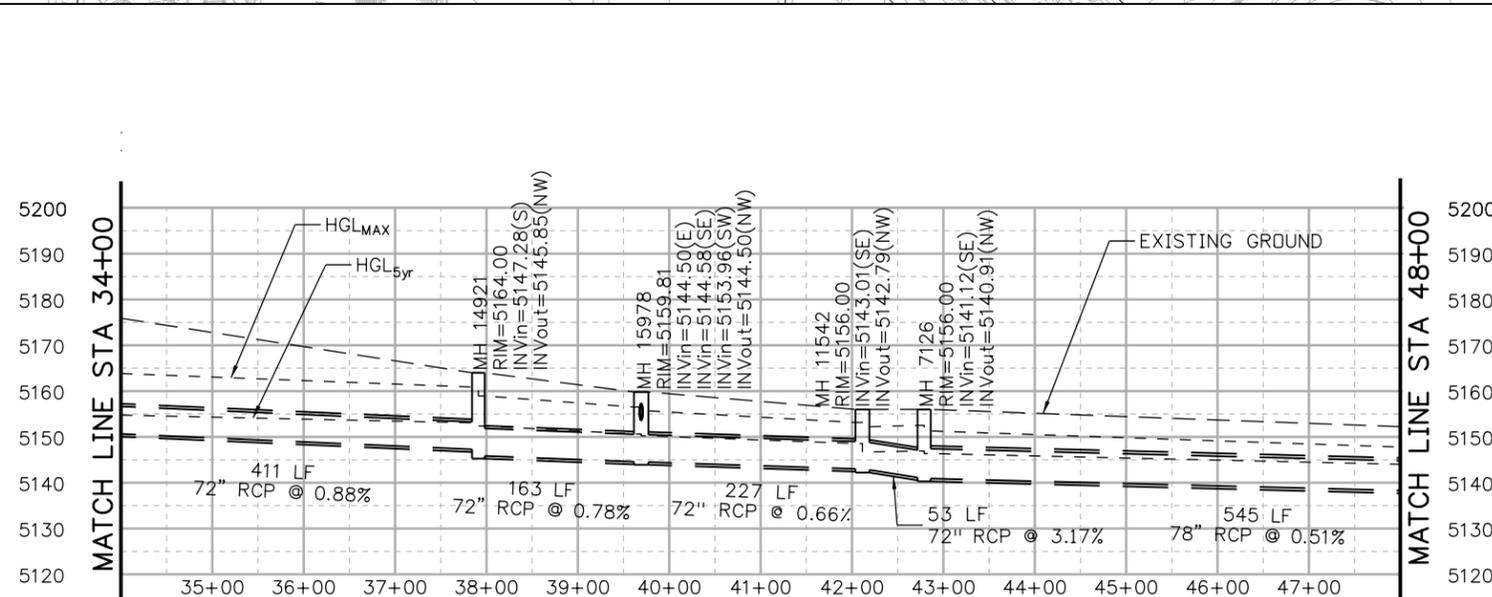
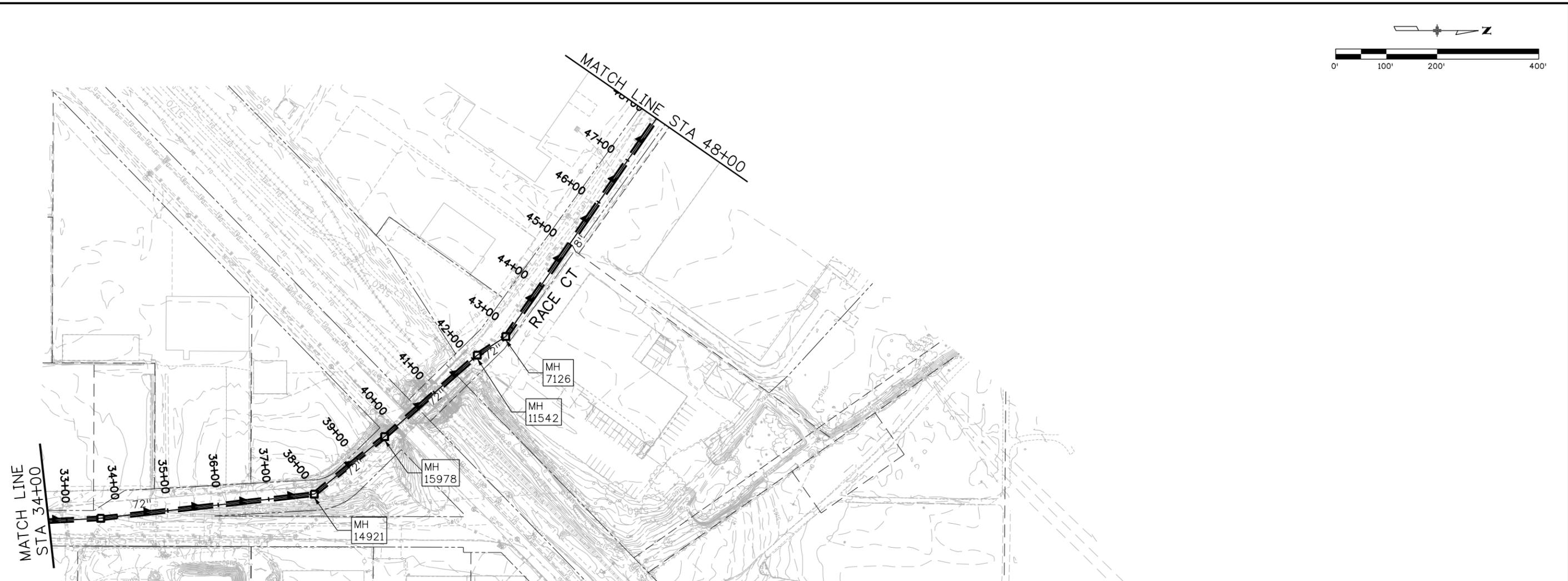
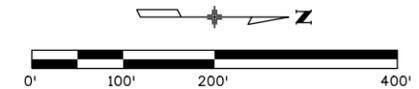
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Date:	Comments	Init.									



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Q _{max}	478 cfs	0 cfs
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**CENTRAL 70
 DRAINAGE PLAN & PROFILE
 EXISTING RACE STREET OUTFALL**

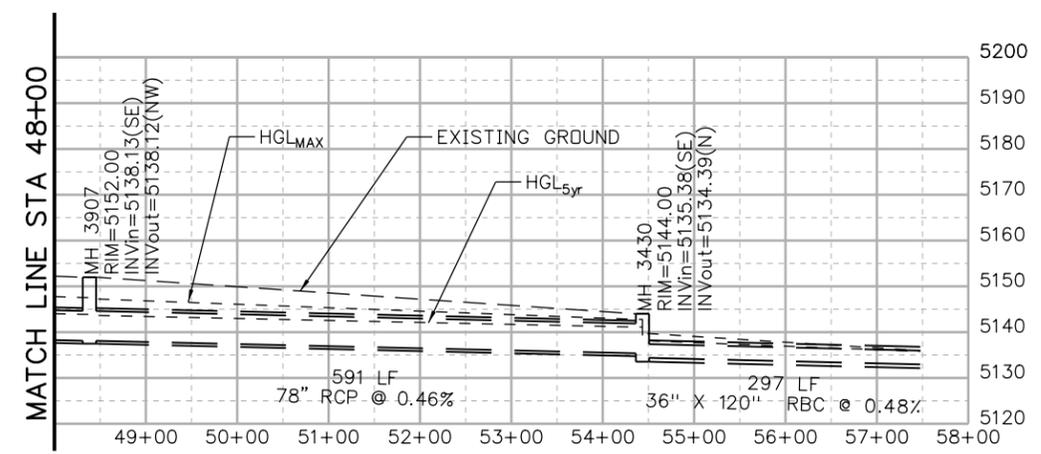
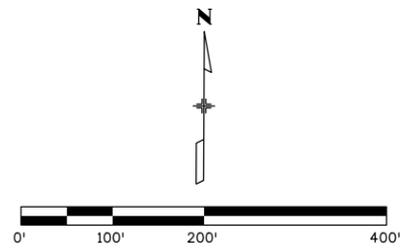
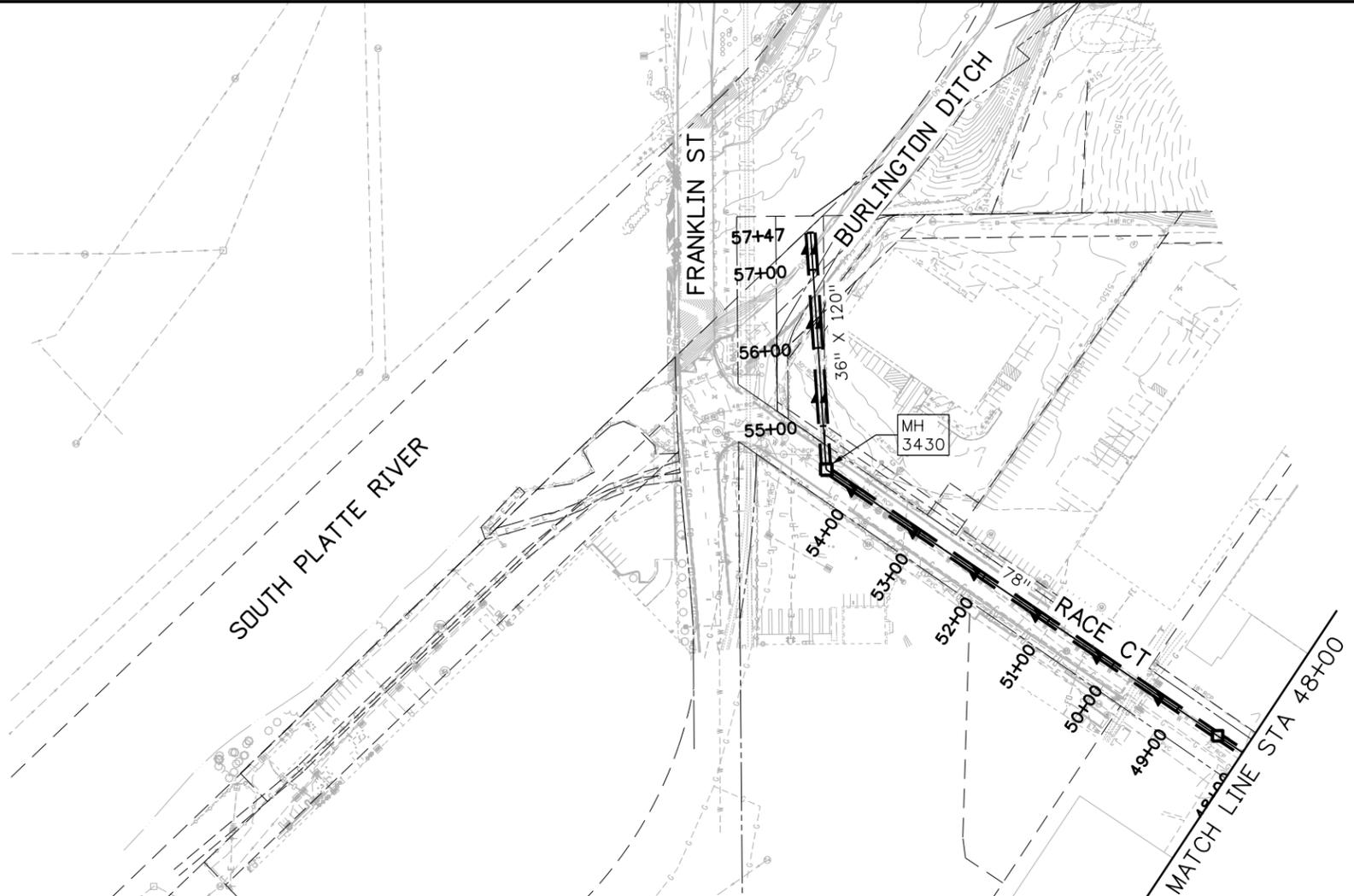
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ATC 21.2

Sheet Number

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Q _{100yr}	866 cfs	388 cfs
Q _{max}	478 cfs	0 cfs
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**CENTRAL 70
 DRAINAGE PLAN & PROFILE
 EXISTING RACE STREET OUTFALL**

Designer:
 Detailer:
 Sheet Subset: DRAINAGE Subset Sheets: D70 of

ATC 21.2

Sheet Number

DRAFT DESIGN DRAWINGS



DATE: December 16, 2016
TO: Front Range Mobility Group
FROM: Anthony DeVito P.E. Central 70 Project Director
Nicholas Farber, Central 70 Project
SUBJECT: Central 70 - Detailed Alternative Technical Concept (ATC) Response
Front Range Mobility Group - ATC No. 21.1

Dear Mr. Friedrich:

Your Team's ATC Submission Form for Detailed ATC 21.1 has been reviewed by the Procuring Authorities.

Detailed ATC 20.1 proposes to eliminate both the 72" storm sewer and bridge structure crossing of I-70 just east of York Street and the north drainage outfall system.

In accordance with the Instructions to Proposers ("ITP"), the Procuring Authorities will use reasonable efforts to provide a Proposer with the following written feedback on a ATC Submission within 15 Working Days following the later of (x) the date the relevant ATC Submission was submitted and (y) the One-on-One Meeting at which such submission is discussed. Below is the final response from the Procuring Authorities for your Detailed ATC:

- 1. unconditional approval;
- 2. conditional approval, subject to modifications and/or conditions;
 Re-submission required Re-submission not required
- 3. disapproval, with or without guidance that such ATC can be re-submitted under any circumstance;
- 4. notification that the incorporation of the proposed ATC in the Proposer's Proposal is already permitted under the terms of the RFP, and therefore does not qualify as an ATC (and will not be treated as such for purposes of Section 3.4 of Part C of the ITP).
- 5. subject to compliance with the confidentiality requirements set out in Section 3.4 of Part C of the ITP, the Procuring Authorities are considering amending (for the benefit of all Proposers) the terms of the RFP that are the subject-matter of the proposed ATC.

The ATC resubmission shall address the following items:

1. As discussed in the December One-on-One meeting, the Procuring Authorities will be providing updated information regarding the RFP drainage requirements in a Commercial Update in January 2017. Please evaluate the impacts of the new drainage requirements on this ATC and resubmit with any revisions necessary.
2. Provide a no adverse impact analysis for the existing 72" pipe in York Street. The analysis shall compare the reference design to the ATC. As part of the analysis, provide the storm event that would



fill the existing 72" pipe as well as the 5 year and 100 year flow conditions for both the reference design and if the ATC is implemented.

3. The Department is not Approving the use of equivalent areas for the Lowered Section. Please revise the ATC to provide permanent water quality for the Lowered Section prior to the connection to the 72" pipe in York Street.



ANNEX 3: ALTERNATIVE TECHNICAL CONCEPT SUBMISSION FORM

Proposer Name: Front Range Mobility Group
Date: November 16, 2016

Central 70 Project RFP: ATC Submission No. 21.1¹**A. Background Information****1. Type of Submission**

- Conceptual ATC
 Detailed ATC

2. Prior Submission(s)

- None (initial submission of ATC)
 Previously Submitted as Conceptual ATC
 Previously Submitted as Detailed ATC

3. Explanation of Reason for Resubmission

The Procuring Authorities requested that this ATC be resubmitted to stand on its own merits and not be tied to approval of any other ATCs.

4. Request for Discussion at One-on-One Meeting

- Meeting Requested
 Meeting Not Requested²

¹ Proposers to complete in accordance with instruction (2) to the Annex.

² In accordance with Section 3.2.1 of Part C, the Procuring Authorities may nevertheless require a Proposer to present an ATC Submission at a One-on-One Meeting.

B. General ATC Submission Requirements

1. Overview Description

Narrative overview description of the proposed ATC.

“This information has been amended since the submission of the conceptual version of this ATC.”

FRMG proposes this ATC to eliminate the 72” Storm Sewer and bridge structure MISC-E-17-IU crossing I-70 just east of York Street. In addition, this ATC includes the elimination of the North Drainage Outfall System, which includes the Onsite Detention Pond at Race Court. The ATC is being pursued based on Denver Wastewater’s indication at the meetings with proposers that it would entertain a change to the storm and sanitary crossings adjacent to York Street.

FRMG’s revised design includes upsizing the storm sewer paralleling the south side of I-70 south of 46th Avenue from a 7’ x 6’ concrete box culvert to a 96” RCP from York Street to Brighton Boulevard. This segment includes optimizing the two detention ponds at Brighton Boulevard. These ponds will have adequate capacity to address the increased flows that enter the system at York Street, rather than crossing I-70 in the 72” pipe that is being eliminated. Attachment A (sheet 1 of 2) shows the revised plan and profile for the 96” RCP. Attachment B shows a typical section through the 96” RCP relative to I-70 and 46th Ave.

North of I-70, we propose to use the available capacity in the existing 72” storm sewer in York Street to optimize drainage flows. Drainage from the Northeast Vasquez pond and drainage runoff that is tributary to 46th Avenue east of York Street will be conveyed by a proposed storm sewer that starts at Vasquez Boulevard as a 36” RCP and upsizes to a 48” RCP where it connects to the existing 72” RCP storm sewer in York Street.

To eliminate the North Drainage Outfall System and the Onsite Pond at Race Court, FRMG proposes to locate the pump station that collects the I-70 lowered section drainage in the Northwest quadrant of I-70 and York Street. The discharge from the pump station will flow by gravity to the east in a proposed 72” RCP and connect to the existing 72” RCP in York Street which ultimately discharges to the South Platte River.

To address the contractual detention and water quality requirements identified in Schedule 10 Section 8 Table 8-5, FRMG proposes to:

- Eliminate the Onsite North Water Quality and Detention Pond at Race Court along with the elimination of the North Outfall. In the design provided by the Procuring Authorities in the Reference Documents, the York Street pond discharges at a rate of 278 cubic feet per second (cfs). FRMG’s proposed flow in the York Street 72” RCP north of I-70 would be 270 cfs. Since we would be matching the previous flows in the York Street system, no additional detention is required.
- Convert the York Street pond from a flood control pond to primarily a water quality facility in order to compensate for elimination of the Onsite North Water Quality and Detention Pond, FRMG would provide the equivalent level of water quality treatment to that needed for the area tributary to the North Outfall pond in the proposed York Street pond. This type of arrangement has been accepted by the City and County of Denver and CDOT on the Pecos over I-70 project. The proposed York Street pond would still capture offsite surface flows from the Montclair Basin during the major event.
- Increase the flood control volumes in the Brighton East and Brighton West ponds to accommodate the elimination of flood control at York Street.

Benefits of eliminating the North Drainage Outfall system include:

- Easing the impact to the local neighborhood with reduced construction activity. This eliminates the need to re-route the existing utilities to allow for large bore pits which would be required to install the North Drainage Outfall design as shown in the Reference Documents. Utility relocations that would be eliminated include Denver Water Conduit 83 in 49th Avenue, as well as numerous other water, sanitary sewer, storm sewer, and gas lines.
- Eliminating road closures required for the bore pits
- Eliminating easements required to install the North Drainage Outfall System
- Eliminating the need to relocate the existing Delgany Interceptor upstream of the outfall at the South Platte River
- Eliminating the 404 permit to establish a new outfall to the South Platte River

2. Relevant RFP Requirements

List all material RFP requirements that are inconsistent with, and would require amendment to accommodate, the proposed ATC³.

"This information has been amended since the submission of the conceptual version of this ATC."

- Schedule 10, Section 13.5.2 Table 13-2 identifies MISC-E-17-IU as a required new bridge structure included in the project that carries a 72" storm sewer.
- Schedule 10 Section 8 Table 8-5 shows the Onsite North Pond at Race Court as a required detention and water quality pond.
- The Reference Documents also show the North Outfall System and the associated Onsite Pond at Race Court.

3. Rationale

Explanation of how, where and why the ATC would be used on the Project, including how it aligns with the Project Goals.

"This information has been amended since the submission of the conceptual version of this ATC."

The rationale for using this ATC on the Project includes:

- Providing a conveyance path for drainage to the South Platte River without the use of Structure MISC-E-17-IU across I-70.
- Eliminating the North Outfall System.
- Making use of available capacity in existing storm drainage systems to convey drainage from the lowered portion of I-70 and the area north of I-70 to the South Platte River.
- York Street Pond converted from detention to a water quality pond.

This ATC supports the Project Goal of optimizing scope of the transportation and supporting infrastructure delivered through the project in order to promote corridor wide economic and community vitality.

³ Proposers are not required to propose RFP drafting amendments when completing Part B, but are required to do so when completing Section 5 of Part C.

4. Impacts

A preliminary analysis of potential environmental, social, economic, community, traffic, safety, operations and maintenance or third party impacts (positive and negative), including specific separate identification and analysis of any such impacts that are not reflected in the final EIS.

“This information has been amended since the submission of the conceptual version of this ATC.”

This ATC includes elimination of Structure MISC-E-17-IU crossing I-70 as well as the North Drainage Outfall System and the Onsite Detention Pond at Race Court. It provides an alternate conveyance path for the storm drainage flows that would have been carried across I-70 and to the North Outfall System. This ATC has several positive impacts which include:

- Allowing the profile of I-70 to be raised, reducing excavation and wall heights.
- Minimizing initial cost of the Project
- Reducing the construction schedule
- Removing an additional structure crossing I-70, thus eliminating long term maintenance associated with that structure
- Increasing safety due to the elimination of a center pier for the utility bridge crossing I-70.

Elimination of the Onsite Detention Pond at Race Court and the North Drainage Outfall System have the positive impact of optimizing the use of existing and proposed infrastructure in the project area and avoiding several costly and disruptive utility relocations. This in turn reduces construction traffic, noise, and safety concerns in the neighborhood.

FRMG does not anticipate any negative impacts to the Project associated with the approval of this alternative solution.

5. Cost and Benefit Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely costs, and savings, that are likely to result from implementation of such ATC, including reference to assumptions on which such estimate is based.

“This information has been amended since the submission of the conceptual version of this ATC.”

The proposed ATC will realize the following cost benefits:

- Eliminating the costs associated with the construction of structure MISC-E-17-IU as well as long-term maintenance of the structure.
- Cost savings obtained by raising the I-70 profile from that shown in the Reference Documents.
- Eliminating the cost of the Onsite Detention Pond at Race Court and the North Drainage Outfall System by utilizing the pump station near Claude Court to convey flows to the existing 72" storm sewer system in York Street
- Eliminating utility relocation costs that would be associated with the North Outfall construction including numerous water lines, sanitary sewers (including the Delgany interceptor), storm sewers, gas lines, and Denver Water's Conduit 83 in 49th Avenue.

FRMG anticipates savings of \$17.7M associated with the components of this ATC as follows:

Cost saving items

Elimination of Structure MISC-E-17-IU crossing I-70 – \$300,000

Reduction in Retaining Walls -- \$2,500,000

Reduction in Earthwork/Paving – \$3,100,000

Elimination of North Outfall – \$18,300,000

Additional Cost Items

Upsizing pump station --\$6,500,000

The operating cost of the pump station has not been included as this is a minor cost. The pump station is designed to use a small pump for flows up to the 10 year event. The large pumps will operate only during the 10 year event and higher.

6. Schedule Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely design and construction time period impacts (positive and negative) of such ATC, including reference to assumptions on which such estimate is based.

“This information has been amended since the submission of the conceptual version of this ATC.”

This ATC does not affect the critical path, therefore there is not a schedule saving to the overall project meantime FRMG is estimating a saving of about six months of construction time and mainly associated with the elimination of the north outfall.

7. Conceptual Drawings

At Proposer’s discretion, unless otherwise requested by the Procuring Authorities, conceptual drawings.

“This information has been amended since the submission of the conceptual version of this ATC.”

FRMG developed detailed drawings showing the alignment and cross section of the proposed storm sewer system to eliminate Structure MISC-E-17-IU, the North Drainage Outfall, and the Onsite Detention Pond at Race Court. These are shown on Attachments A and B.

8. Past Use

Identification of other projects on which the ATC (or a substantially similar approach) has been implemented, regardless of the results, and the relevance of such experience.

“This information has been amended since the submission of the conceptual version of this ATC.”

The York Street Storm Sewer crossing over I-70 in the Reference Documents is driving the need for Structure MISC-E-17-IU. If FRMG can reroute the York Street storm sewer as requested in this ATC, Structure MISC-E-17-IU would not be required. A similar rerouting of the Mississippi Street outfall was carried out on CDOT’s T-REX project.

Optimizing the use of existing and proposed infrastructure is proposed in this ATC. Previous use of a pump station on a CDOT project includes the recently completed pump station for I-25 at Alameda Avenue to drain a lowered section of I-25.

9. Additional Information

With respect to previous submitted ATC Submissions only, additional information as requested by the Procuring Authorities following review of such prior submissions.

“This information has been amended since the submission of the conceptual version of this ATC.”

ATC 21 was initially denied by the Procuring Authorities because it was tied to approval of ATC 20. The Procuring Authorities allowed for resubmission as long as the ATC 21 was able to stand on its own merit.

The Procuring Authorities requested that this Detailed ATC include cross sections, profile and plan view alignments, to demonstrate the viability of re-routing the flow carried by bridge MISC-E-17-IU. See Attachment A for storm sewer routing.

North of I-70 a detailed plan and profile showing the location of the lowered section pump station and the proposed outlet to the existing 72” storm sewer in York Street is shown on Attachment A (sheet 2 of 2). A summary flow table on Attachment A shows the net balance of flow to the existing York Street storm sewer is reduced from those shown in the Reference Documents.

C. Detailed ATC Requirements

1. Risks

To the extent not otherwise addressed by the responses to Part B above, an analysis of any additional risks to the Procuring Authorities, CDOT, the State or third parties associated with implementation of the ATC, including discussion of how such risks are, or are proposed to be, allocated under the terms of the Project Agreement.

No additional risk is incurred by elimination of bridge MISC-E-17-IU, the North Drainage Outfall System or the Onsite Detention Pond at Race Court.

Construction of the lowered section pump station on the north side of I-70 provides resiliency of the lowered section and would provide the drainage path for the lowered section to the existing York Street storm sewer.

2. Handback

Description of any proposed changes in handback procedures and/or the Handback Requirements associated with the ATC, if any are expected.

There are no changes in handback procedures and/or Handback Requirements associated with the approval of this ATC.

3. Right-of-Way

A description, estimated cost and proposed procurement schedule of any Additional Right-of-Way expected to be required to implement the ATC, if any.

There will be elimination of ROW and easements associated with removing the North Outfall System and the Onsite Detention Pond at Race Court.

4. List of Required Approvals

A list of required, or likely to be required, third party and Governmental Approvals, including any Design Exceptions (which should be summarized in the form of Attachment A (Design Exceptions)).

No additional approvals are required for elimination of bridge MISC-E-17-IU.

Approvals from City and County of Denver Wastewater Division would be required for the rerouting of the drainage system along the north and south sides of I-70.

5. Proposed Drafting Revisions

(a) List all RFP requirements that are inconsistent with the proposed ATC and (b) attach in the form of a mark-up (for amendments to existing drafting) and/or a rider (with respect to newly proposed drafting) proposed revisions to address those inconsistencies.

Upon approval of this ATC, Schedule 10, Section 13.5.2 Table 13-2 would be modified as follows, with the requirement for Structure MISC E-17-IU being removed from the table.

Table 13-2 Actions for bridge structures

Existing Structure No.	New Structure No.	Structure Location and Description	Action
E-17-UY	E-17-AEU	I-70 westbound over Brighton Boulevard	Removal and reconstruction
E-17-US	E-17-AEV	I-70 eastbound over Brighton Boulevard	Removal and reconstruction
E-17-FX	N/A	I-70 Viaduct (Brighton Boulevard to Colorado Boulevard)	Removal

E-17-Z	N/A	UPRR Bridge under I-70	Removal
N/A	E-17-AEW E-17-AEX	UPRR over I-70 UPRR Service Road over I-70	New construction New construction
N/A	MISC-E-17-IT	Sanitary Sewer Bridge over I-70 (at York Street)	New construction
N/A	E-17-AEY	York Street over I-70	New construction
N/A	MISC-E-17-IU	Storm Sewer Bridge over I-70 (at York Street)	New construction
N/A	E-17-AEZ	Josephine Street over I-70	New construction
N/A	E-17-AEL	Cover (Columbine to Clayton)	New construction
N/A	E-17-AEN	Fillmore Street over I-70	New construction
N/A	E-17-AEO	Steele Street over I-70	New construction
N/A	E-17-AEP	Cook Street over I-70	New construction
N/A	E-17-AFA	BNSF Market Lead over I-70	New construction
N/A	E-17-AFC	Monroe Street over I-70	New construction
E-17-HU E-17-HT	E-17-AFD	Colorado Boulevard over I-70	Removal and reconstruction
E-17-HY E-17-HZ	E-17-AFF E-17-AFG	I-70 westbound over Dahlia Street I-70 eastbound over Dahlia Street	Removal and reconstruction Removal and reconstruction
E-17-HW E-17-HX	E-17-AFH E-17-AFI	I-70 westbound over Holly Street I-70 eastbound over Holly Street	Removal and reconstruction Removal and reconstruction
E-17-GC E-17-GD	E-17-AFJ E-17-AFK	I-70 westbound over Monaco Street I-70 eastbound over Monaco Street	Removal and reconstruction Removal and reconstruction
N/A	E-17-ADT	N Stapleton Drive over Denver Rock Island Railroad	Removal and reconstruction
E-17-EW E-17-DF	E-17-AFN E-17-AFO	I-70 westbound over Denver Rock Island Railroad I-70 eastbound over Denver Rock Island Railroad	Removal and reconstruction Removal and reconstruction
N/A	E-17-ADU	Quebec eastbound exit ramp over Denver Rock Island Railroad	New construction
E-17-GA E-17-GB	E-17-AFQ E-17-AFR	I-70 westbound over Quebec Street I-70 eastbound over Quebec Street	Removal and reconstruction Removal and reconstruction
E-17-AER	N/A	I-70 over Sand Creek	Existing bridge previously constructed
E-17-KR	E-17-AFS	Eastbound I-270 over I-70	Removal and reconstruction
E-17-VD	N/A	I-70 over Havana Street	Bridge constructed under Havana Design Build Project
E-17-VE	N/A	I-70 over UPRR spur track (near Havana Street)	Bridge constructed under Havana Design Build Project
E-17-IQ	E-17-AFT E-17-AFU	I-70 westbound over Peoria Street I-70 eastbound over Peoria Street	Removal and reconstruction Removal and reconstruction

In addition, Schedule 10, Section 8, Table 8-5 would be modified with the requirement for the Onsite Detention Pond at Race Court being removed from the table, and the facility type change for the York East pond.

Table 8-5 Water Quality and Detention Ponds

Pond Name	I-70 Mainline Station	Facility Type
Brighton West	2000+00	Flood Control Pond
Brighton East	2012+00	Flood Control Pond
York East	2028+00	Water Quality and Flood Control Pond

Steele West	2050+00	Flood Control Pond
Steele East	2055+00	Flood Control Pond
Steele North	2055+00	Flood Control Pond
Colorado North	2080+00	Flood Control Pond
Colorado South	2080+00	Flood Control Pond
Quebec North	2185+00	Water Quality Pond
Havana North #1	2292+00	Water Quality Pond
Havana North #2	2292+00	Detention Pond
Havana South	2292+00	Water Quality and Detention Pond
Onsite North	Race Court and Brighton Boulevard	Water Quality and Detention Pond



**Attachment A
Design Exceptions**

No.	RFP Reference	Existing Condition and Applicable Standard (verbatim from standard)	Proposed Condition⁴	Procuring Authorities' Response⁵	FHWA Response⁶
1.					
2.					

⁴ Proposers should include in this column or attach to the relevant ATC Submission Form the information referred to in Section 9.4.15.b.ii of Schedule 10 (*Design and Construction Requirements*) to the Project Agreement.

⁵ For Procuring Authorities' use only.

⁶ For FHWA use only.



Addendum No.5
Release of October 27, 2016

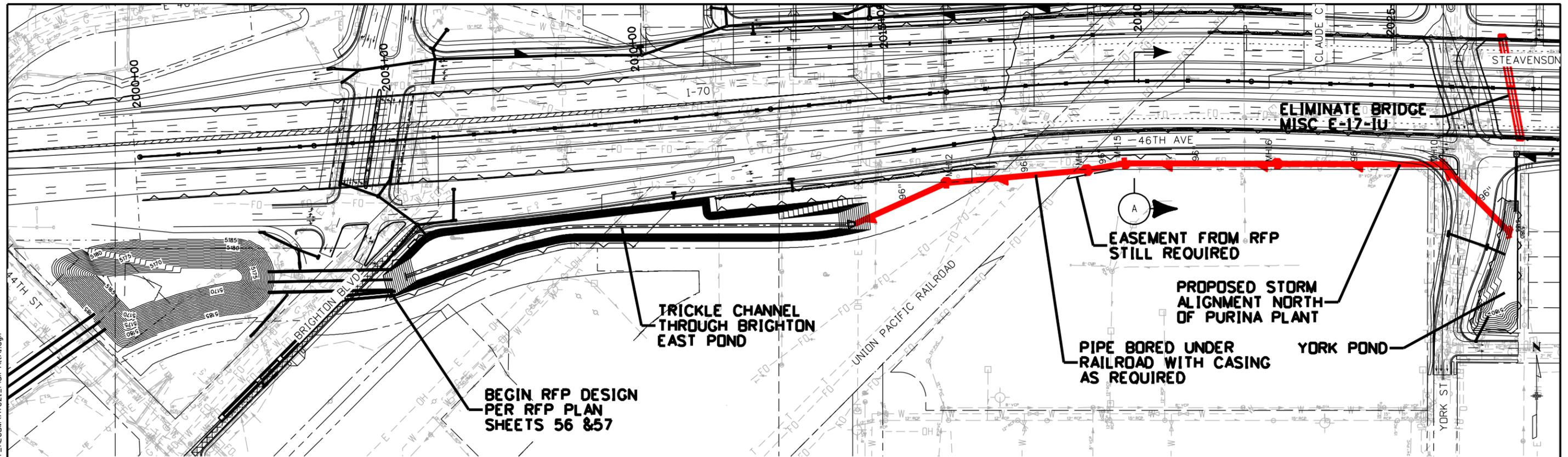
Central 70 Project: Instructions to Proposers
Part I: Exhibit 1

ATC SUBMISSION No. 21.1

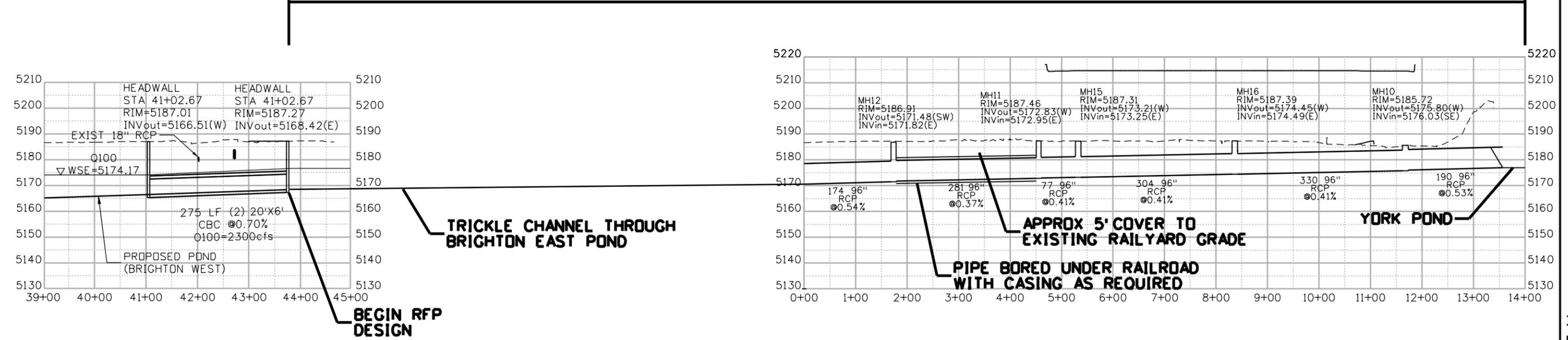
CONCEPTUAL DRAWINGS

CONFIDENTIAL

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AREA AFFECTED BY ATC-21



Print Date: 11/4/2016

File Name: ATC21_Plan AttA1.dgn



Horiz. Scale: 1:200
 Vert. Scale: - -
 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**

As Constructed
No Revisions:
Revised:
Void:

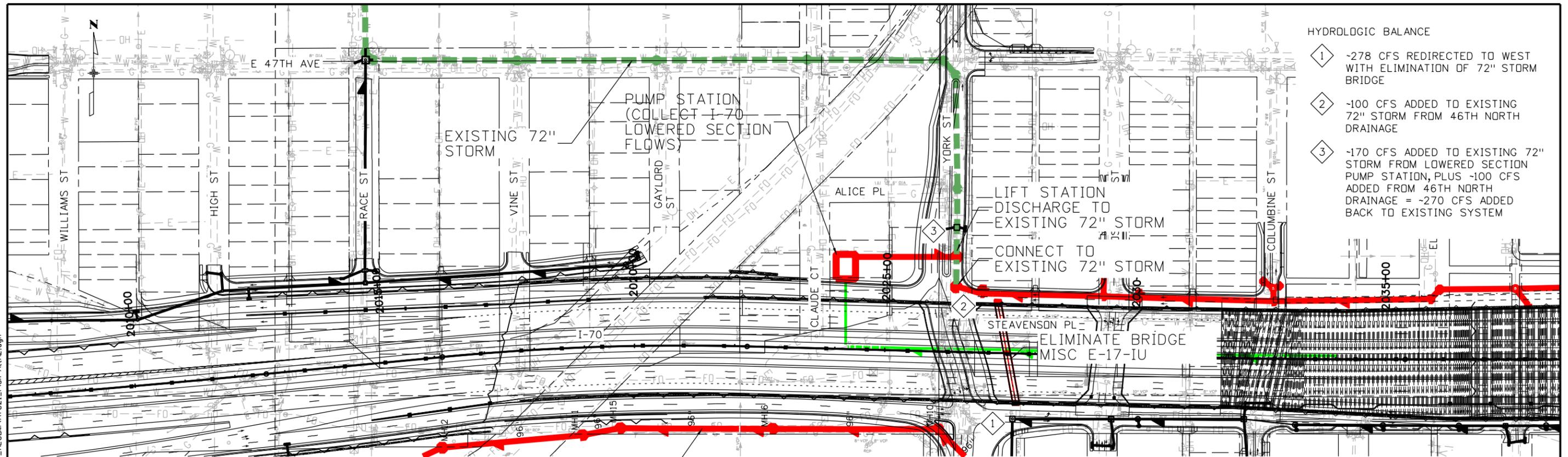
ATTACHMENT A SOUTH SIDE STORM SEWER	
Designer:	Structure Numbers
Detailer:	Subset Sheets: of
Sheet Subset:	

ATC-21
Project No./Code
Sheet Number 1 OF 2

CONFIDENTIAL

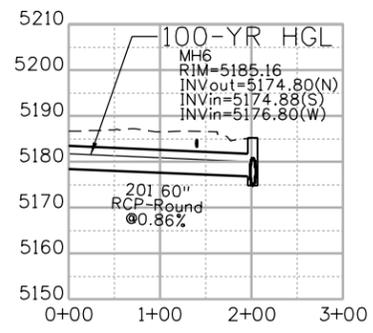
ATC SUBMITTAL

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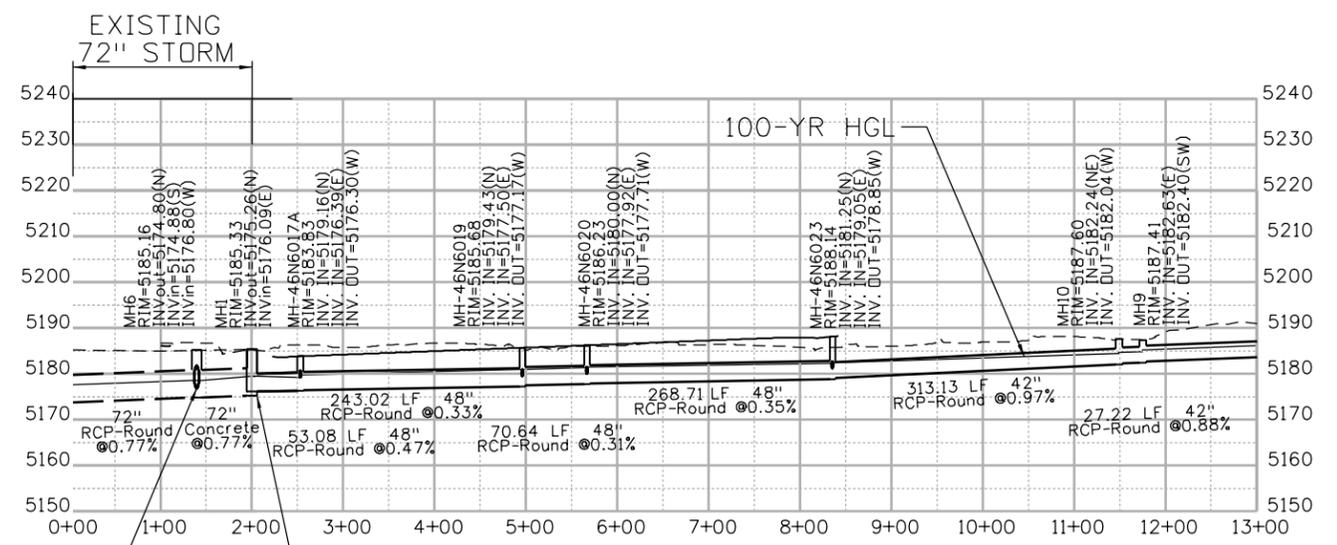


- HYDROLOGIC BALANCE
- 1 -278 CFS REDIRECTED TO WEST WITH ELIMINATION OF 72" STORM BRIDGE
 - 2 -100 CFS ADDED TO EXISTING 72" STORM FROM 46TH NORTH DRAINAGE
 - 3 -170 CFS ADDED TO EXISTING 72" STORM FROM LOWERED SECTION PUMP STATION, PLUS -100 CFS ADDED FROM 46TH NORTH DRAINAGE = -270 CFS ADDED BACK TO EXISTING SYSTEM

SEE ATTACHMENT A SHEET 1 FOR FULL ALIGNMENT AND PROFILE



PUMP STATION DISCHARGE LINE



PUMP STATION DISCHARGE TO EXISTING 72" STORM

CONNECT TO EXISTING 72" STORM

46TH NORTH TRUNK LINE

Print Date: 11/4/2016

File Name: ATC21_Plan AttA2.dgn



Horiz. Scale: 1:200
 Vert. Scale:
 Unit Information
 Unit Leader



Sheet Revisions		
Date:	Comments	Init.

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 Region 1 KJS

As Constructed
 No Revisions:
 Revised:
 Void:

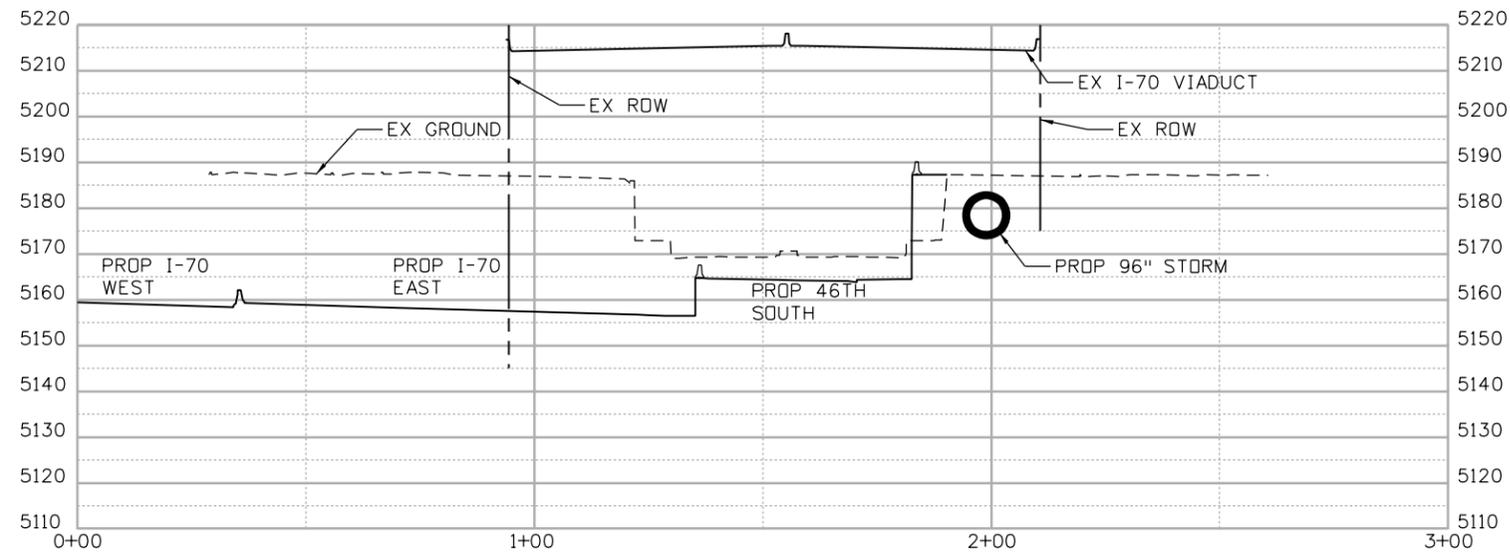
ATTACHMENT A
 46TH NORTH STORM SEWER
 Designer:
 Detailer:
 Sheet Subset:
 Structure Numbers
 Subset Sheets: of

ATC 21
Project No./Code
Sheet Number 2 OF 2

CONFIDENTIAL

ATC SUBMITTAL

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SECTION A
SEE ATTACHMENT A FOR PLAN VIEW LOCATION

Print Date: 9/21/2016
File Name: ATC21_Plan AttB.dgn

	Horiz. Scale: 1:200
	Vert. Scale:
	Unit Information
	Unit Leader

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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

As Constructed
No Revisions:
Revised:
Void:

ATTACHMENT B
STORM SEWER TYPICAL SECTION

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

ATC-21
Project No./Code
Sheet Number 1 OF 1

CONFIDENTIAL

ATC SUBMITTAL



DATE: July 8, 2016

TO: Front Range Mobility Group

FROM: Anthony DeVito P.E. Central 70 Project Director
Nicholas Farber, Central 70 Project

SUBJECT: Central 70 - Conceptual Alternative Technical Concept (ATC) Response
Front Range Mobility Group - ATC No. 21.0

Dear Mr. Friedrich:

Your Team's ATC Submission Form for Conceptual ATC 21.0 was reviewed by the Procuring Authorities prior to the June One-on-One Meetings and an initial response was sent to you on June 23, 2016. As discussed during the June One-on-One Meeting, the Procuring Authorities committed to provide a final response to your Conceptual ATC. The ATC proposes to modify the North Outfall System as shown in the Schedule 29 Reference Drawings.

In accordance with the Instructions to Proposers ("ITP"), the Procuring Authorities will use reasonable efforts to provide a Proposer with the following written feedback on a ATC Submission within 15 Working Days following the later of (x) the date the relevant ATC Submission was submitted and (y) the One-on-One Meeting at which such submission is discussed. Below is the final response from the Procuring Authorities for your Conceptual ATC:

- 1. unconditional approval and waiver of requirement for re-submission as a Detailed ATC;
- 2. unconditional approval for re-submission as a Detailed ATC;
- 3. conditional approval for re-submission as a Detailed ATC, subject to modifications and/or conditions;
- 4. disapproval, with or without guidance that such ATC can be re-submitted under any circumstance;
- 5. notification that the inclusion of the proposed ATC in the Proposer's Proposal is already permitted under the terms of the RFP, and therefore does not qualify as an ATC (and will not be treated as such for purposes of Section 3.4 of Part C of the ITP; or
- 6. subject to compliance with the confidentiality requirements set out in Section 3.4 of Part C of the ITP, the Procuring Authorities are considering amending (for the benefit of all Proposers) the terms of the RFP that are the subject-matter of the proposed ATC.

Following our discussions at the One-on-One Meeting, the Procuring Authorities have not changed their initial response to your above mentioned Conceptual ATC Submission. Each ATC must be able to stand on its own merits and shall not be contingent upon approval of other ATCs. This ATC mentions that it works in conjunction with ATC 20.0. Please remove references to the other ATC and resubmit if desired.



The Procuring Authorities continue to reserve the right to modify the above evaluation and/or discuss the Conceptual ATC with FHWA and the City of Denver.





ANNEX 3: ALTERNATIVE TECHNICAL CONCEPT SUBMISSION FORM

Proposer Name: Front Range Mobility Group
Date: June 13, 2016

Central 70 Project RFP: ATC Submission No. 21.0¹

A. Background Information

1. Type of Submission

- Conceptual ATC
 Detailed ATC

2. Prior Submission(s)

- None (initial submission of ATC)
 Previously Submitted as Conceptual ATC
 Previously Submitted as Detailed ATC

3. Explanation of Reason for Resubmission

n/a

4. Request for Discussion at One-on-One Meeting

- Meeting Requested
 Meeting Not Requested²

¹ Proposers to complete in accordance with instruction (2) to the Annex.

² In accordance with Section 3.2.1 of Part C, the Procuring Authorities may nevertheless require a Proposer to present an ATC Submission at a One-on-One Meeting.

B. General ATC Submission Requirements

1. Overview Description

Narrative overview description of the proposed ATC.

We propose to modify the North Outfall System as shown in the Schedule 29 Reference Drawings. The ATC will be developed in conjunction with prior ATC submission no.20.0 for the elimination of the Storm Sewer crossing on structure MISC-E-17-IU that is adjacent to York Street (submitted separately).

The ATC will utilize the existing storm system capacity (vacated by re-routing the York Street flows (see prior ATC submission No.20.0) to carry pumped discharge from the depressed section in existing storm sewer to the South Platte River.

The pump system and related features will be designed to provide the same level of drainage service to the lowered section as the current design.

2. Relevant RFP Requirements

List all material RFP requirements that are inconsistent with, and would require amendment to accommodate, the proposed ATC³.

Plan and profile documents for the north outfall will require modifications. Preliminary designs that include the calculations for the replacement system will be included in the detailed ATC submission.

3. Rationale

Explanation of how, where and why the ATC would be used on the Project, including how it aligns with the Project Goals.

The ATC aligns with the intent of the Schedule 29 Reference Drawings as it will provide an equivalent level of service draining the lowered section. It minimizes the initial cost to the Project, it is consistent with sustainability principles by maximizing the use of the existing system, and it will decrease the construction footprint by eliminating construction of the north outfall and thereby minimizing inconvenience to residents and businesses in the vicinity of the Project.

While gravity flow is preferred, the depth of the partially covered lowered section of roadway precludes this approach. Therefore, pumped storm flows should be considered if the design incorporates sufficient safety measures and backup systems, as is the intent of the ATC.

4. Impacts

A preliminary analysis of potential environmental, social, economic, community, traffic, safety, operations and maintenance or third party impacts (positive and negative), including specific separate identification and analysis of any such impacts that are not reflected in the final EIS.

The proposed ATC design will address the potential risk associated with the reliance on a mechanical pump system for drainage of the depressed section, where there is limited hydraulic storage at the pump inlet. Our design would increase the capacity of the pump system (currently at 10cfs in the concept design) in order to provide the adequate capacity and redundancy to mitigate this risk of mechanical systems in drainage applications.

³ Proposers are not required to propose RFP drafting amendments when completing Part B, but are required to do so when completing Section 5 of Part C.

5. Cost and Benefit Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely costs, and savings, that are likely to result from implementation of such ATC, including reference to assumptions on which such estimate is based.

The cost associated with constructing the current design (72" RCP, over 40 feet deep requiring tunneling) is significant. The ATC will yield substantial reductions over the cost of constructing the North Outfall, while it will necessitate an increase in size of the pump station to convey the flows at I-70 with increased initial costs. Long term operation and maintenance costs associated with the larger pump station are also anticipated to increase.

The original design (as shown in the Schedule 29 Reference Drawings) had the outfall pipes at a 0.2% slope, which would increase long term maintenance of these pipes due to sedimentation and required cleaning to maintain capacities. Raising these pipes through the use of a pump station would allow for increased slopes which would have increase slopes providing scour velocities at lower storm events, reducing the long term maintenance costs.

We anticipate a substantial CapEx and O&M savings that exceeds \$10M as a result of the alternate drainage layout proposed under the ATC. We will provide a detailed computation in the subsequent, detailed ATC submission, following further discussions with the Procuring Authorities on the feasibility of this proposal.

6. Schedule Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely design and construction time period impacts (positive and negative) of such ATC, including reference to assumptions on which such estimate is based.

We anticipate a substantial schedule savings as a result of the ATC for the elimination of the bored outfall. We will provide a detailed schedule fragnet for this effort in the subsequent, detailed ATC submission, following further discussions with the Procuring Authorities.

7. Conceptual Drawings

At Proposer's discretion, unless otherwise requested by the Procuring Authorities, conceptual drawings.

See attached.

8. Past Use

Identification of other projects on which the ATC (or a substantially similar approach) has been implemented, regardless of the results, and the relevance of such experience.

CDOT currently has pump stations in operation at SH-6 and Vasquez Blvd., and at I-25 at Alameda Avenue.

9. Additional Information

With respect to previously submitted ATC Submissions only, additional information as requested by the Procuring Authorities following review of such prior submissions.

n/a.

C. Detailed ATC Requirements

1. Risks

To the extent not otherwise addressed by the responses to Part B above, an analysis of any additional risks to the Procuring Authorities, CDOT, the State or third parties associated with implementation of the ATC, including discussion of how such risks are, or are proposed to be, allocated under the terms of the Project Agreement.

n/a

2. Handback

Description of any proposed changes in handback procedures and/or the Handback Requirements associated with the ATC, if any are expected.

n/a

3. Right-of-Way

A description, estimated cost and proposed procurement schedule of any Additional Right-of-Way expected to be required to implement the ATC, if any.

n/a

4. List of Required Approvals

A list of required, or likely to be required, third party and Governmental Approvals, including any Design Exceptions (which should be summarized in the form of Attachment A (Design Exceptions)).

n/a

5. Proposed Drafting Revisions

(a) List all RFP requirements that are inconsistent with the proposed ATC and (b) attach in the form of a mark-up (for amendments to existing drafting) and/or a rider (with respect to newly proposed drafting) proposed revisions to address those inconsistencies.

n/a



Attachment A Design Exceptions

No.	RFP Reference	Existing Condition and Applicable Standard (verbatim from standard)	Proposed Condition ⁴	Procuring Authorities' Response ⁵	FHWA Response ⁶
1.					
2.					

⁴ Proposers should include in this column or attach to the relevant ATC Submission Form the information referred to in Section 9.4.15.b.ii of Schedule 10 (*Design and Construction Requirements*) to the Project Agreement.

⁵ For Procuring Authorities' use only.

⁶ For FHWA use only.



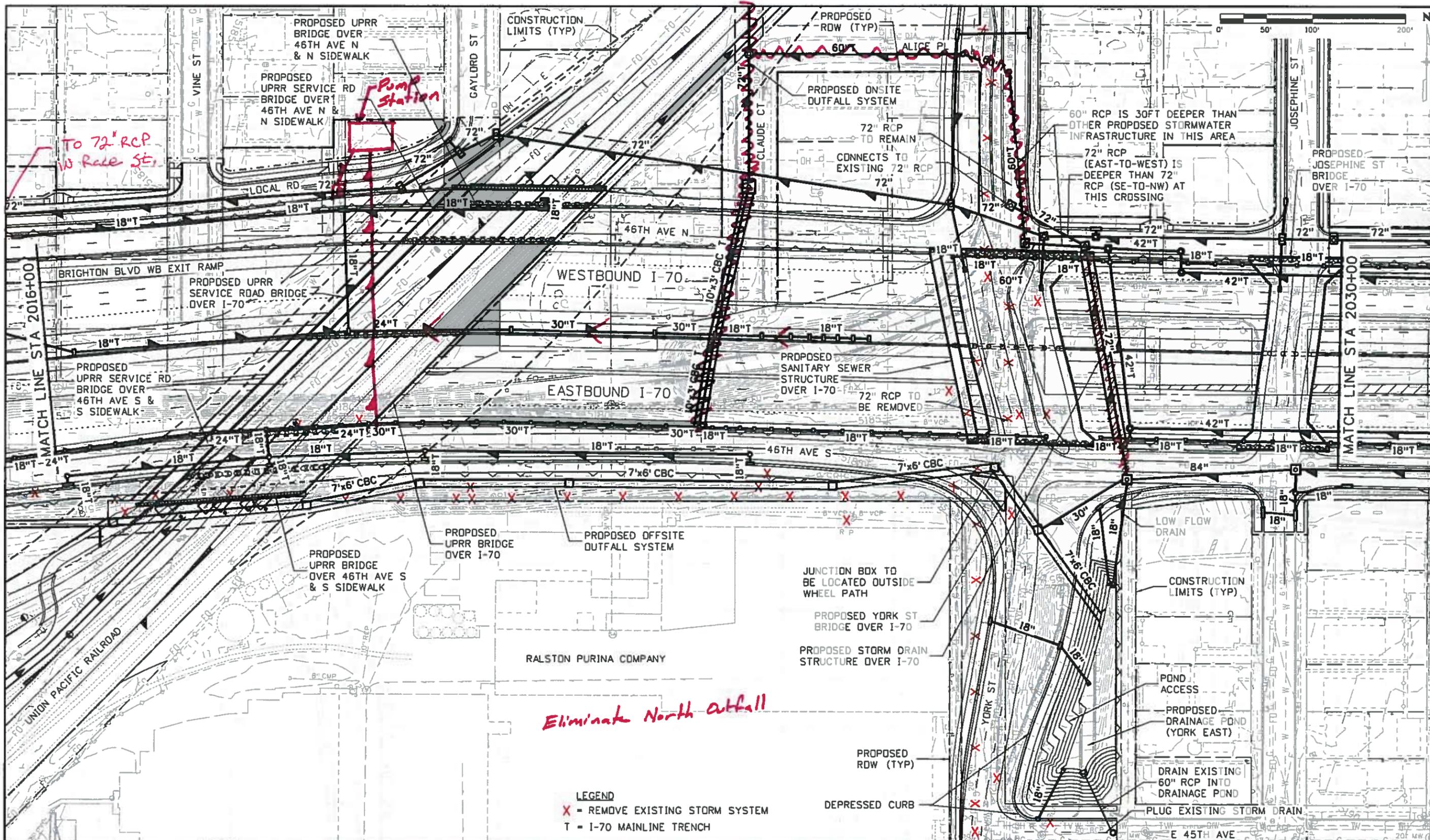
Addendum No.2
Release of February 23, 2016

Central 70 Project: Instructions to Proposers
Part I: Exhibit 1

ATC SUBMISSION No. 21.0

CONCEPTUAL DRAWINGS

CONFIDENTIAL



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File Name: 13599HYDR_Procurement_Plan 08_Base_I-70.dgn	
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Unit Information	Unit Leader Initials
ATKINS	7604 Technology Way, Suite 400 Denver, CO 80237 Phone: (303) 221-7275 Fax: (303) 221-7276

Sheet Revisions		
Date:	Comments	Init.

Colorado Department of Transportation



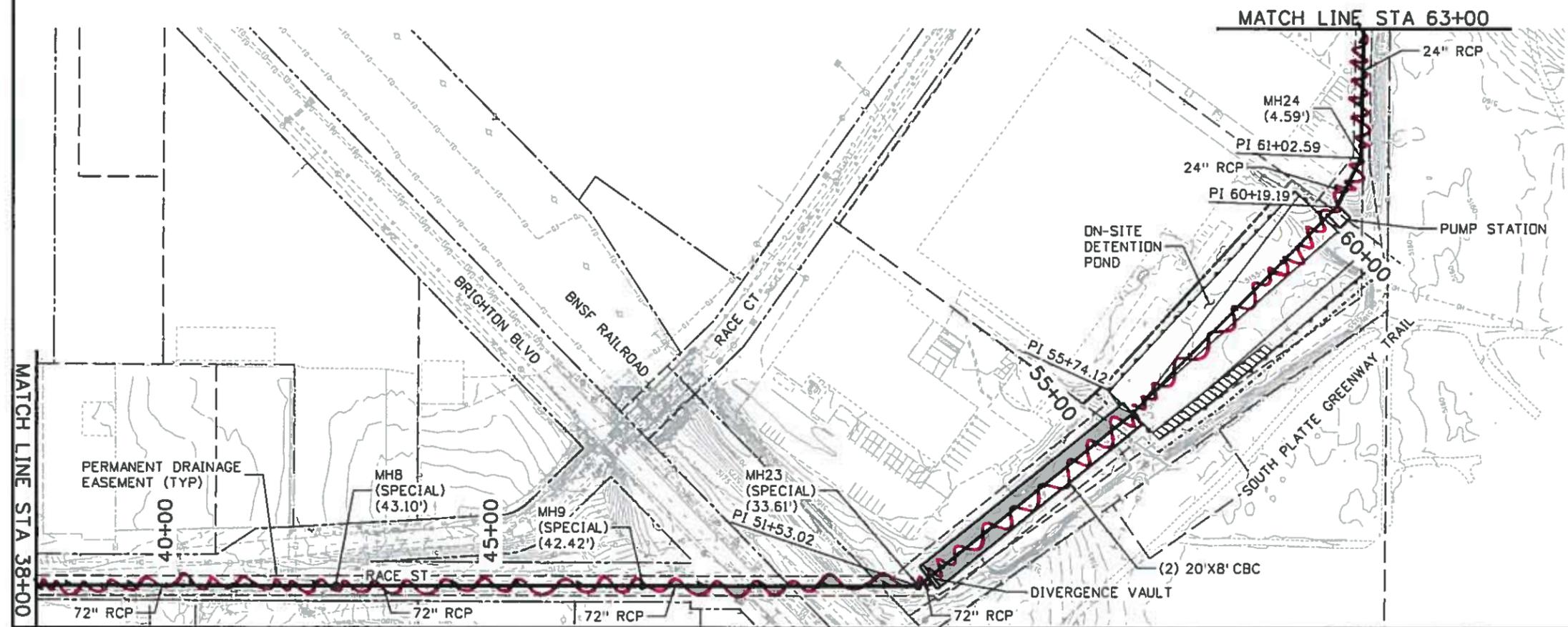
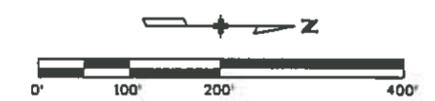
2000 South Holly Street
Denver, CO 80222
Phone: 303-757-9934 FAX: 303-757-9907

Region 1 KJS

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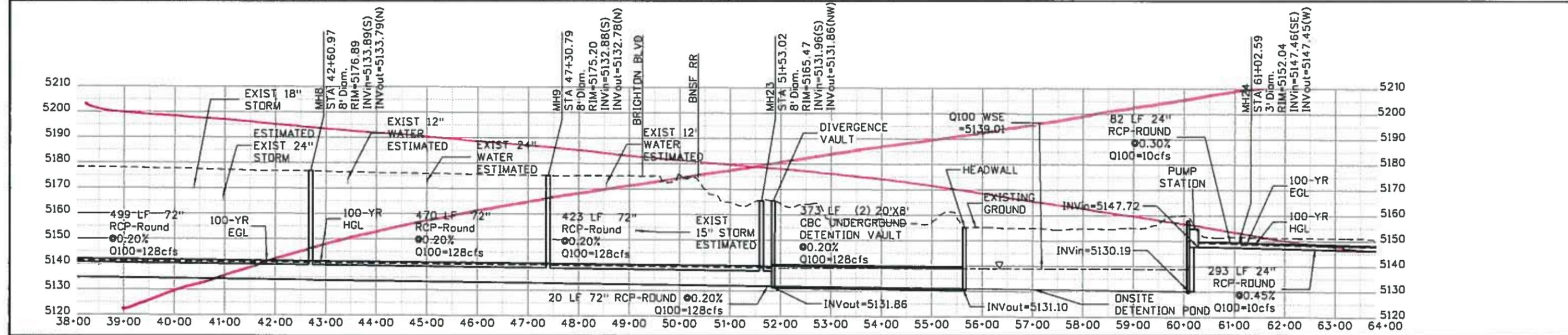
I-70 ROADWAY DRAINAGE PLAN	
STA 2016+00 TO 2030+00	
Designer:	Structure Numbers
Detailer:	
Sheet Subset: Hydr Plan	Subset Sheets: 8 of 58

Project No./Code
FBR 0704-234
19631
Sheet Number 290



Eliminate North outfall

NOTE:
1. PROTECT IN PLACE ALL UTILITIES.



Print Date: 3/31/2016
 File Name: 13599HYDR_Procurement_Plan 54_On-site Outfall.dgn
 Horiz. Scale: 1:200 Vert. Scale: As Noted
 Unit Information Unit Leader Initials
ATKINS 7604 Technology Way, Suite 400
 Denver, CO 80237
 Phone: (303) 221-7275 Fax: (303) 221-7276

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**

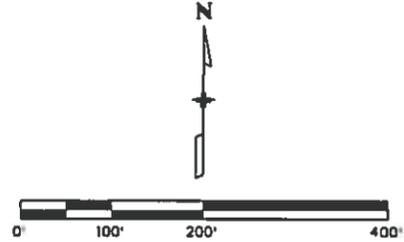
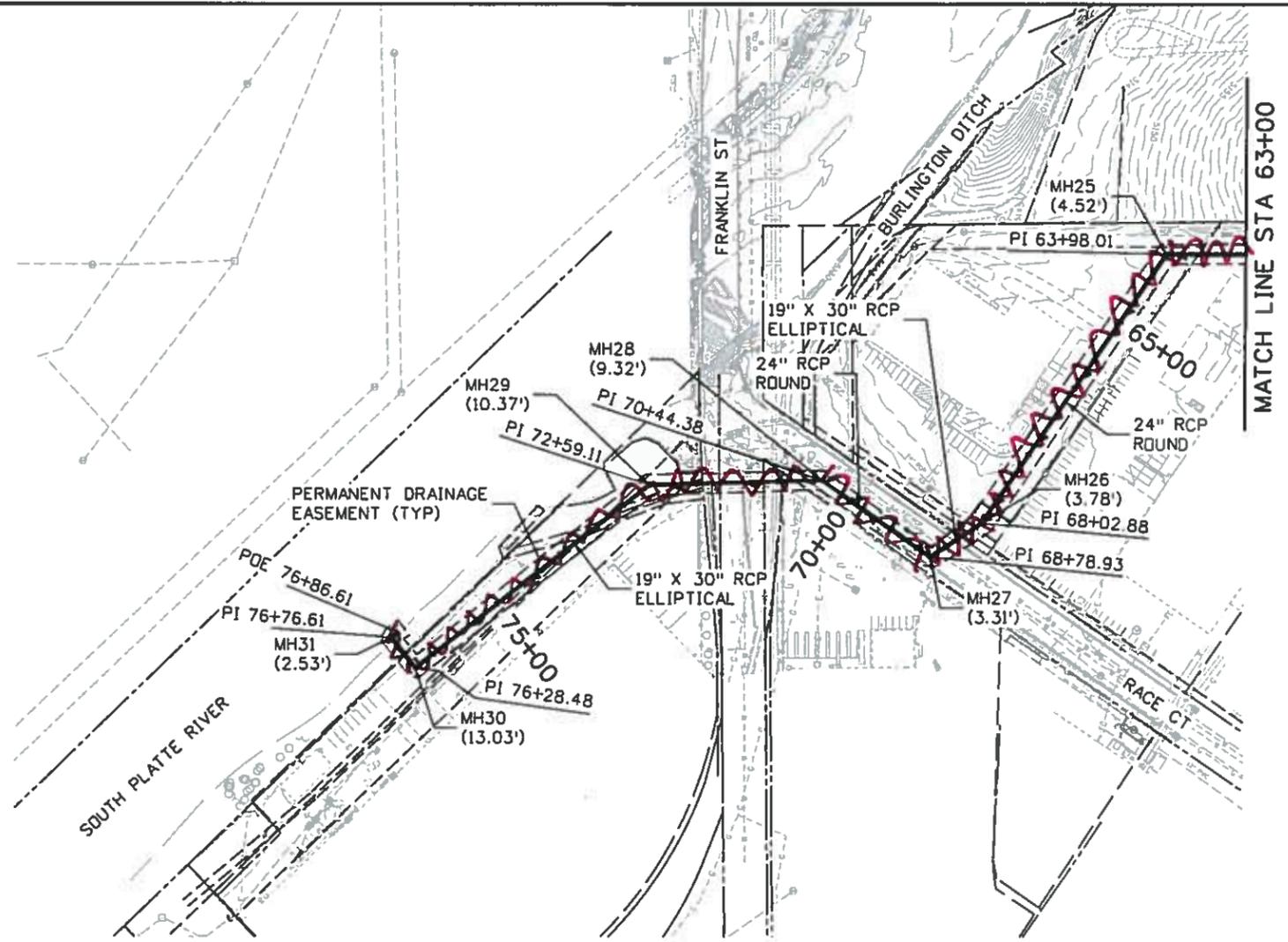
PRELIMINARY
 No Revisions:
 Revised:
 Void:

**I-70 ROADWAY
 ONSITE DRAINAGE OUTFALL
 PLAN AND PROFILE**
 Designer:
 Detailer:
 Sheet Subset: Hydr PnP Subset Sheets: 54 of 58

Project No./Code
 FBR 0704-234
 19631
 Sheet Number 336

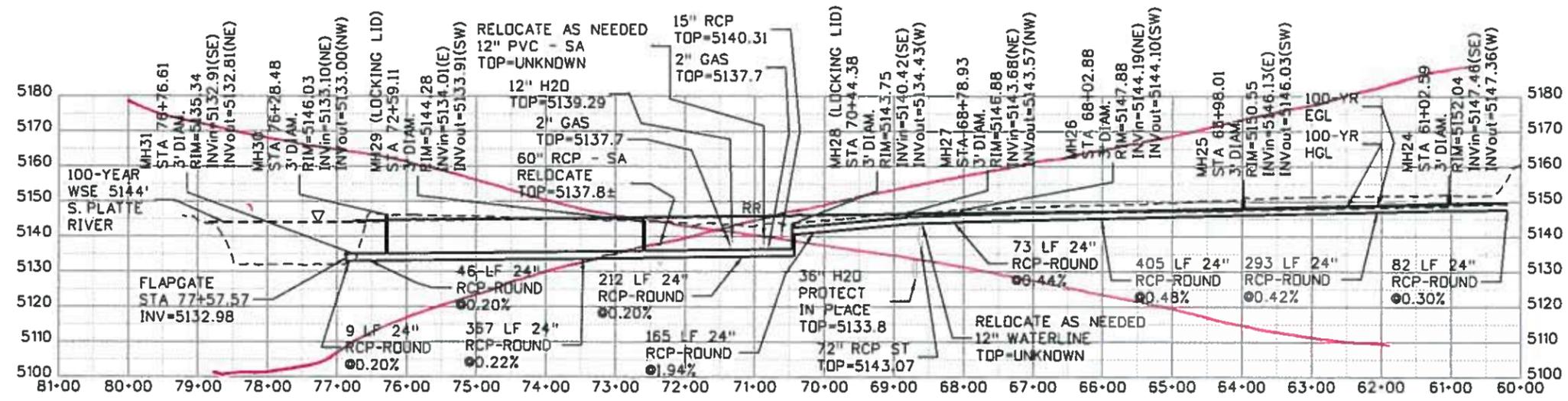
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Eliminate North outfall

NOTE:
1. PROTECT IN PLACE ALL UTILITIES.



Print Date: 3/31/2016 File Name: 13599HYDR_Procurement_Plan 55_On-site Outfall.dgn Horiz. Scale: 1:200 Vert. Scale: As Noted Unit Information Unit Leader Initials ATKINS 7604 Technology Way, Suite 400 Denver, CO 80237 Phone: (303) 221-7275 Fax: (303) 221-7276	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">Sheet Revisions</th> </tr> <tr> <th>Date:</th> <th>Comments</th> <th>Init.</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	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	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">PRELIMINARY</td> <td colspan="2"></td> </tr> <tr> <td>No Revisions:</td> <td>Designer:</td> <td>Structure Numbers:</td> </tr> <tr> <td>Revised:</td> <td>Detailer:</td> <td></td> </tr> <tr> <td>Void:</td> <td>Sheet Subset: Hydr PnP</td> <td>Subset Sheets: 55 of 58</td> </tr> </table>	PRELIMINARY			No Revisions:	Designer:	Structure Numbers:	Revised:	Detailer:		Void:	Sheet Subset: Hydr PnP	Subset Sheets: 55 of 58	I-70 ROADWAY ONSITE DRAINAGE OUTFALL PLAN AND PROFILE	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Project No./Code</td> <td>FBR 0704-234</td> </tr> <tr> <td> </td> <td>19631</td> </tr> <tr> <td>Sheet Number</td> <td>337</td> </tr> </table>	Project No./Code	FBR 0704-234		19631	Sheet Number	337
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	19631																																					
Sheet Number	337																																					

ATC 25



SWANSEA ELEMENTARY SCHOOL



CONNECTING COMMUNITIES



DATE: August 31, 2016

TO: Front Range Mobility Group

FROM: Anthony DeVito P.E. Central 70 Project Director
Nicholas Farber, Central 70 Project

SUBJECT: Central 70 - Conceptual Alternative Technical Concept (ATC) Response
Front Range Mobility Group - ATC No. 25.0

Dear Mr. Friedrich:

Your Team's ATC Submission Form for Conceptual ATC 25.0 was reviewed by the Procuring Authorities prior to the August One-on-One Meetings and an initial response was sent to you on August 4, 2016. As discussed during the August One-on-One Meeting, the Procuring Authorities committed to provide a final response to your Conceptual ATC. The ATC proposes to move the Ultimate configuration of I-70 eastbound pavement within the future I-70/I-270 interchange approximately 20 feet to the north to accommodate a simplified and more optimal layout of the proposed I-270 eastbound proposed bridge.

In accordance with the Instructions to Proposers ("ITP"), the Procuring Authorities will use reasonable efforts to provide a Proposer with the following written feedback on a ATC Submission within 15 Working Days following the later of (x) the date the relevant ATC Submission was submitted and (y) the One-on-One Meeting at which such submission is discussed. Below is the final response from the Procuring Authorities for your Conceptual ATC:

- 1. unconditional approval and waiver of requirement for re-submission as a Detailed ATC;
- 2. unconditional approval for re-submission as a Detailed ATC;
- 3. conditional approval for re-submission as a Detailed ATC, subject to modifications and/or conditions;
- 4. disapproval, with or without guidance that such ATC can be re-submitted under any circumstance;
- 5. notification that the inclusion of the proposed ATC in the Proposer's Proposal is already permitted under the terms of the RFP, and therefore does not qualify as an ATC (and will not be treated as such for purposes of Section 3.4 of Part C of the ITP; or
- 6. subject to compliance with the confidentiality requirements set out in Section 3.4 of Part C of the ITP, the Procuring Authorities are considering amending (for the benefit of all Proposers) the terms of the RFP that are the subject-matter of the proposed ATC.

Following our discussions at the One-on-One Meeting, the Procuring Authorities have not changed their initial response to your above mentioned Conceptual ATC Submission.

The approval of this Conceptual ATC by the Procuring Authorities does not constitute an approval of specific drafting modifications to the RFP necessary to incorporate this ATC into the Project Agreement pursuant to



Section 7.2.1.c of Part C of the ITP, which modifications shall be agreed by the Procuring Authorities and the Proposer (each acting reasonably) following issuance of a Notice of Award to such Proposer.



ANNEX 3: ALTERNATIVE TECHNICAL CONCEPT SUBMISSION FORM

Proposer Name: Front Range Mobility Group
Date: July 13, 2016

Central 70 Project RFP: ATC Submission No. 25.0¹

A. Background Information

1. Type of Submission

- Conceptual ATC
 Detailed ATC

2. Prior Submission(s)

- None (initial submission of ATC)
 Previously Submitted as Conceptual ATC
 Previously Submitted as Detailed ATC

3. Explanation of Reason for Resubmission

n/a

4. Request for Discussion at One-on-One Meeting

- Meeting Requested
 Meeting Not Requested²

¹ Proposers to complete in accordance with instruction (2) to the Annex.

² In accordance with Section 3.2.1 of Part C, the Procuring Authorities may nevertheless require a Proposer to present an ATC Submission at a One-on-One Meeting.

B. General ATC Submission Requirements

1. Overview Description

Narrative overview description of the proposed ATC.

This ATC proposes moving the ultimate configuration of I-70 eastbound pavement within the future I-70 / I-270 interchange approximately 20 feet to the north to accommodate a simplified and more optimal layout of the proposed I-270 eastbound proposed bridge E-17-AFS.

2. Relevant RFP Requirements

List all material RFP requirements that are inconsistent with, and would require amendment to accommodate, the proposed ATC³.

- Schedule 10, Section 9.4.3.e.i I-270 Eastbound to I-70 Mainline Connection (requirement listed for reference; no change to text proposed)
- Provided ultimate layout configuration of I-70 / I-270 Interchange
Modification of ultimate layout configuration proposed.

3. Rationale

Explanation of how, where and why the ATC would be used on the Project, including how it aligns with the Project Goals.

By slightly modifying the proposed ultimate configuration of the I-70 / I-270 interchange, roadway geometrics of the proposed interchange will be improved and will accommodate a more optimal layout configuration for proposed structure E-17-AFS. The current CDOT reference drawings detailing the conceptual layout for structure E-17-AFS show a 4 span bridge with spans of 186.1-ft, 2 @ 238.15-ft, 146.25-ft and a total length of 812.64-ft. Our proposed modification to the I-70 / I-270 ultimate configuration will allow a revised layout of bridge E-17-AFS that accommodates a more uniform span arrangement and lowers the maximum required span to approximately 203.5-ft. This will result in a shallower overall depth structure by accommodating shallower depth bridge girders. Approach retaining wall heights will also be reduced. These refinements represent overall reduced cost for construction of structure E-17-AFS. Without the revision to the ultimate interchange geometry, this proposed layout for E-17-AFS would require a large straddle ben pier. Refer to the attached drawings for a visual representation of the requested revision.

The proposed geometric revision to the I-70 / I-270 interchange requests moving the future I-70 eastbound pavement approximately 20 feet to the north; more closely following the alignment of the eastbound managed toll lanes. By closing the gap between the proposed I-70 eastbound mainline and eastbound managed toll lanes, a pier column for E-17-AFS can be optimally located on the south side of the I-70 eastbound pavement. Roadway geometry for this revision have been evaluated and found to conform to all current CDOT and AASHTO design requirements for I-70 with no design exceptions required.

4. Impacts

A preliminary analysis of potential environmental, social, economic, community, traffic, safety, operations and maintenance or third party impacts (positive and negative), including specific separate identification and analysis of any such impacts that are not reflected in the final EIS.

This ATC is better in quality than the indicative design because it accommodates a more optimal layout configuration for proposed structure E-17-AFS. There are no negative environmental, social, community traffic, or operation impacts.

³ Proposers are not required to propose RFP drafting amendments when completing Part B, but are required to do so when completing Section 5 of Part C.

5. Cost and Benefit Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely costs, and savings, that are likely to result from implementation of such ATC, including reference to assumptions on which such estimate is based.

This ATC results in reduced cost for proposed bridge E-17-AFS by eliminating the need for deeper and longer U96-in girders for which there are a limited number of pre-casters with the ability to provide this deeper section. It further accommodates the improved layout of proposed E-17-AFS without need for a large straddle bent pier (pier no. 4 in attached sketch). FRMG estimates a substantial CapEx and O&M savings under \$3.5M as a result of this ATC associated with a more optimal bridge design.

6. Schedule Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely design and construction time period impacts (positive and negative) of such ATC, including reference to assumptions on which such estimate is based.

FRMG estimates the approval of this ATC will allow about six weeks in construction time saving associated with the elimination of one straddle bent.

7. Conceptual Drawings

At Proposer's discretion, unless otherwise requested by the Procuring Authorities, conceptual drawings.

See the attached PDF drawings showing the proposed concept of the requested revision to the ultimate configuration of I-70 / I-270 Interchange.

8. Past Use

Identification of other projects on which the ATC (or a substantially similar approach) has been implemented, regardless of the results, and the relevance of such experience.

Bridge structures with U84-in girders have been successfully used on numerous projects across the State. By comparison, the conceptual layout for the I-270 flyover detailed in the reference drawings requires U96-in girders. U96-in girders are not made by all pre-casters and relatively few bridges with U96-in girders have been built.

9. Additional Information

With respect to previously submitted ATC Submissions only, additional information as requested by the Procuring Authorities following review of such prior submissions.

n/a

C. Detailed ATC Requirements

1. Risks

To the extent not otherwise addressed by the responses to Part B above, an analysis of any additional risks to the Procuring Authorities, CDOT, the State or third parties associated with implementation of the ATC, including discussion of how such risks are, or are proposed to be, allocated under the terms of the Project Agreement.

n/a

2. Handback

Description of any proposed changes in handback procedures and/or the Handback Requirements associated with the ATC, if any are expected.

n/a

3. Right-of-Way

A description, estimated cost and proposed procurement schedule of any Additional Right-of-Way expected to be required to implement the ATC, if any.

n/a

4. List of Required Approvals

A list of required, or likely to be required, third party and Governmental Approvals, including any Design Exceptions (which should be summarized in the form of Attachment A (Design Exceptions)).

n/a

5. Proposed Drafting Revisions

(a) List all RFP requirements that are inconsistent with the proposed ATC and (b) attach in the form of a mark-up (for amendments to existing drafting) and/or a rider (with respect to newly proposed drafting) proposed revisions to address those inconsistencies.

n/a



Attachment A Design Exceptions

<u>No.</u>	RFP Reference	Existing Condition and Applicable Standard (verbatim from standard)	Proposed Condition ⁴	Procuring Authorities' Response ⁵	FHWA Response ⁶
1.					
2.					

⁴ Proposers should include in this column or attach to the relevant ATC Submission Form the information referred to in Section 9.4.15.b.ii of Schedule 10 (Design and Construction Requirements) to the Project Agreement.

⁵ For Procuring Authorities' use only.

⁶ For FHWA use only.



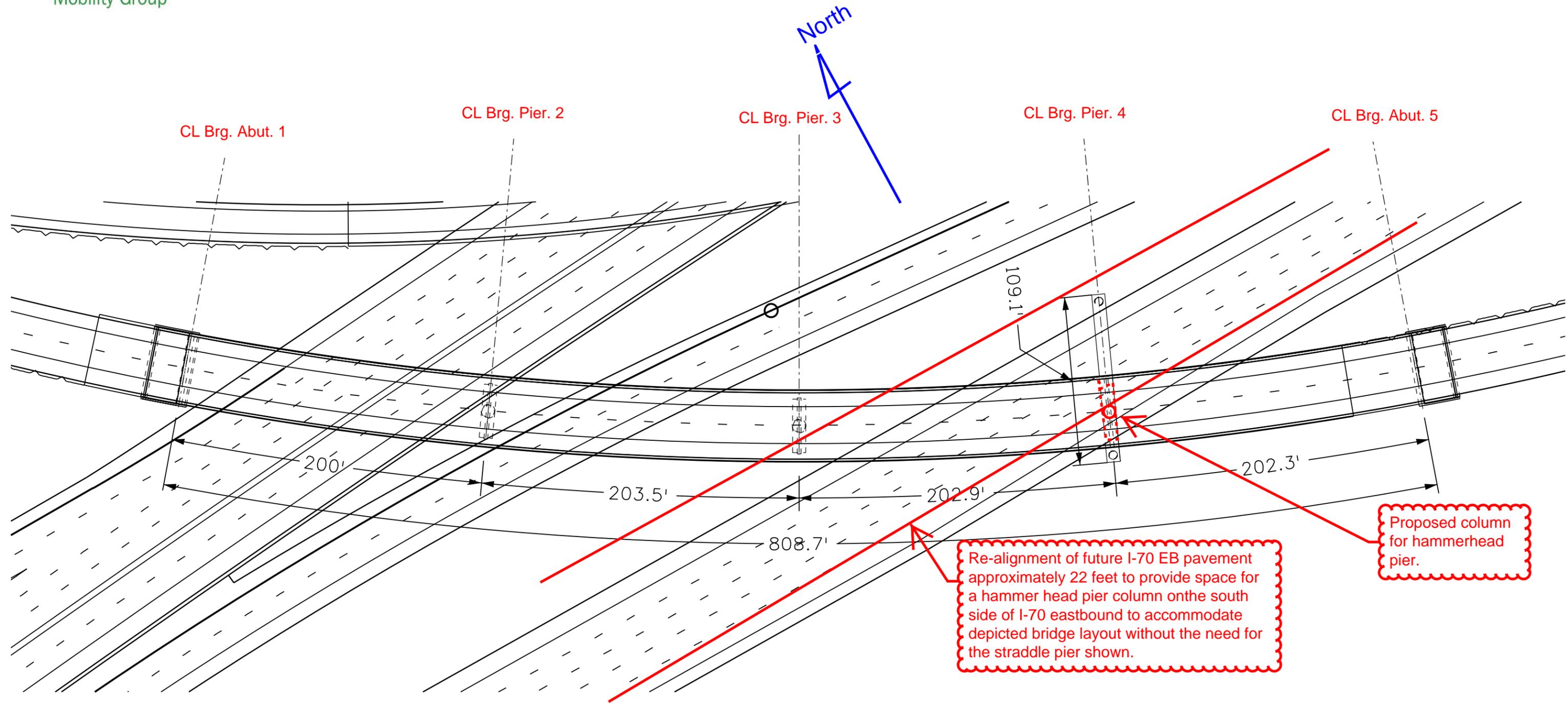
Addendum No.3
Release of June 14, 2016

Central 70 Project: Instructions to Proposers
Part I: Exhibit 1

ATC SUBMISSION No. 25.0

CONCEPTUAL DRAWINGS

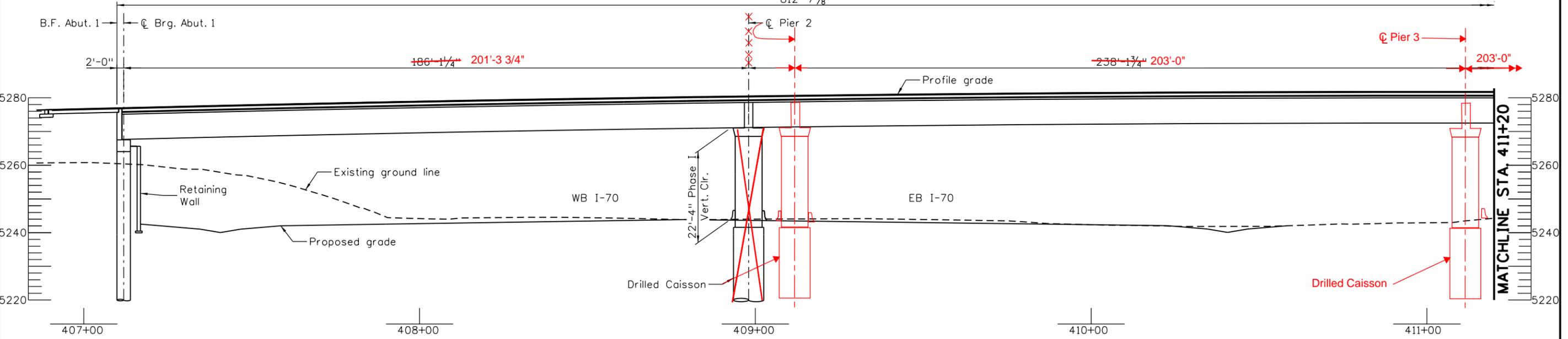
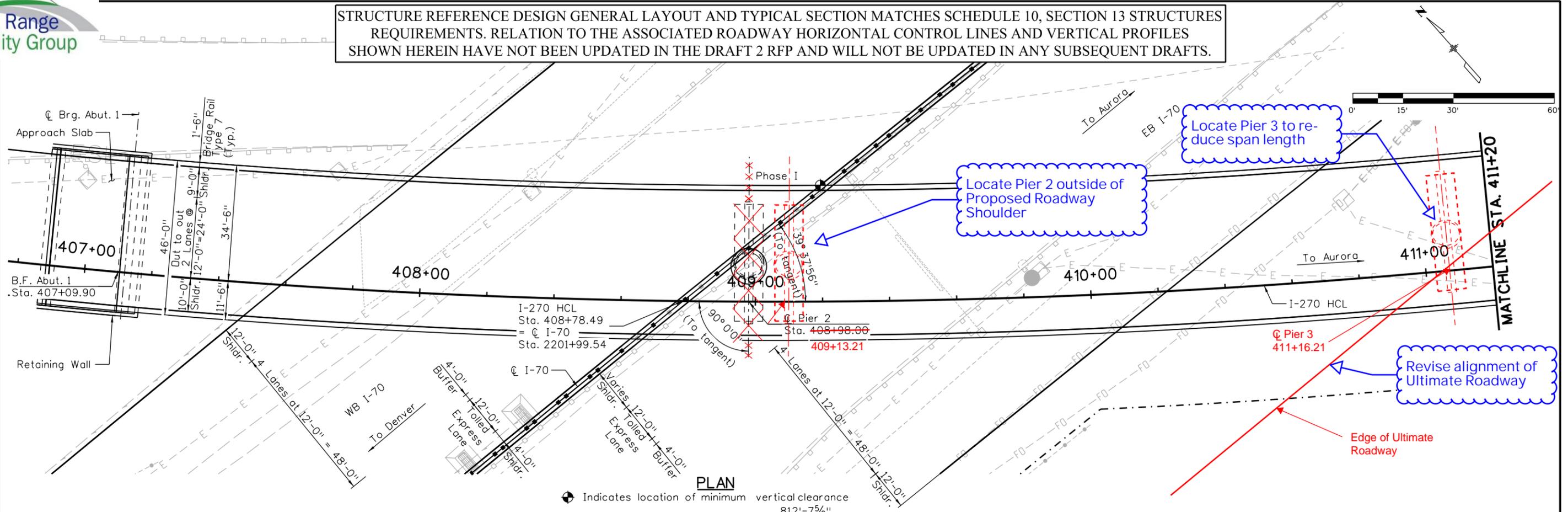
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I-270 over I-70 U-84 Girder Configuration



STRUCTURE REFERENCE DESIGN GENERAL LAYOUT AND TYPICAL SECTION MATCHES SCHEDULE 10, SECTION 13 STRUCTURES REQUIREMENTS. RELATION TO THE ASSOCIATED ROADWAY HORIZONTAL CONTROL LINES AND VERTICAL PROFILES SHOWN HEREIN HAVE NOT BEEN UPDATED IN THE DRAFT 2 RFP AND WILL NOT BE UPDATED IN ANY SUBSEQUENT DRAFTS.



NOTE:
1. For additional horizontal and vertical geometry, see Roadway Plans.

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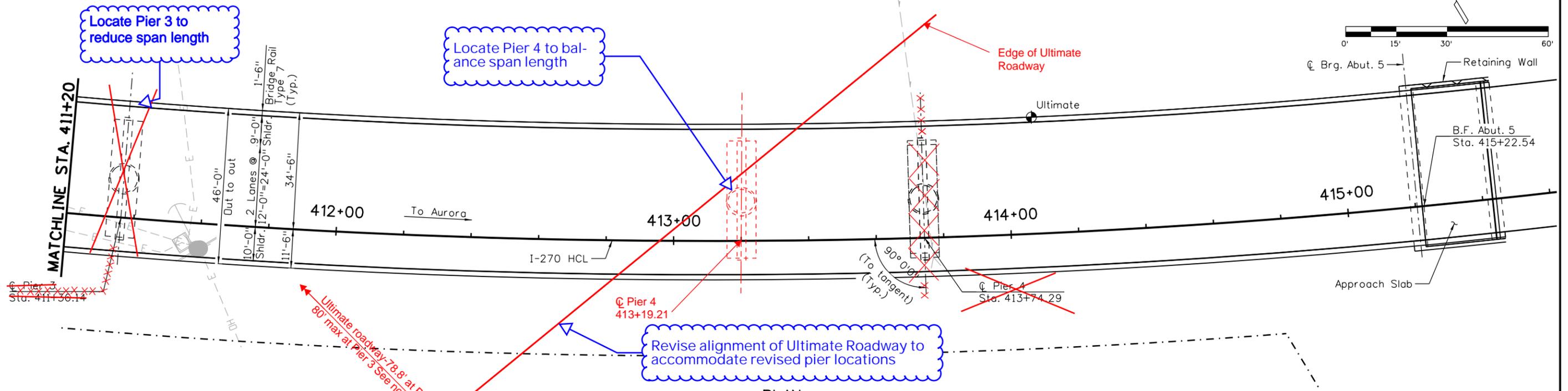
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File Name: 13599BRDC_General-Layout_1-270EBConn01.dgn	Date:	Comments:	Init.			Designer: Detailer: Sheet Subset: Bridge			FBR 0704-234
Horiz. Scale: 1:30	Unit Information			7604 Technology Way, Suite 400 Denver, CO 80237 Phone: (303) 221-7275 Fax: (303) 221-7276	KJS	Structure Numbers: E-17-AFS Subset Sheets: B01 of 3			19631
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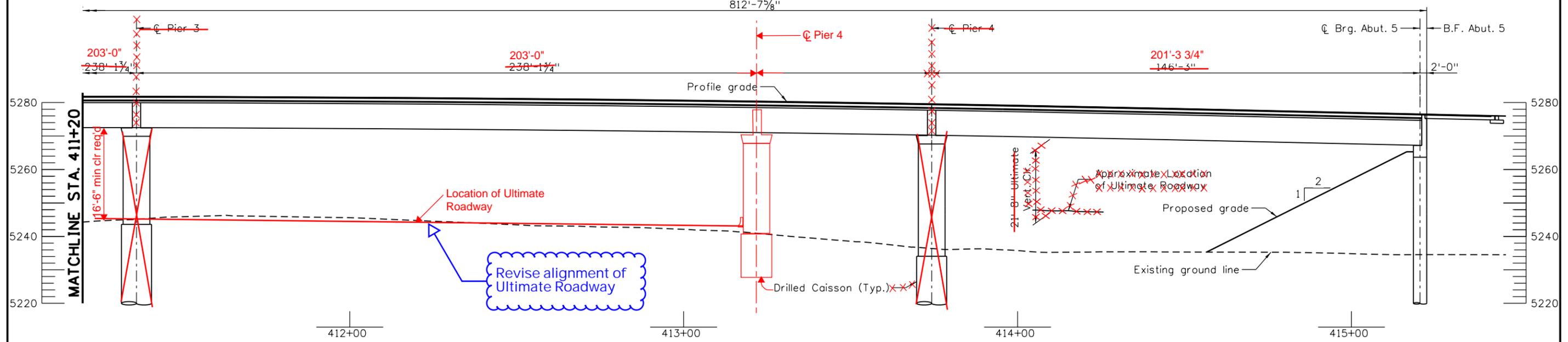
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STRUCTURE REFERENCE DESIGN GENERAL LAYOUT AND TYPICAL SECTION MATCHES SCHEDULE 10, SECTION 13 STRUCTURES REQUIREMENTS. RELATION TO THE ASSOCIATED ROADWAY HORIZONTAL CONTROL LINES AND VERTICAL PROFILES SHOWN HEREIN HAVE NOT BEEN UPDATED IN THE DRAFT 2 RFP AND WILL NOT BE UPDATED IN ANY SUBSEQUENT DRAFTS.



PLAN
 Indicates location of minimum vertical clearance
 Ultimate roadway - 3 lanes at 12' and 1 lane varies



SECTION
 (Taken along I-270 HCL)

NOTE:
 1. For additional horizontal and vertical geometry, see Roadway Plans.

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Design		Detail		Quantities	
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Unit Information Unit Leader Initials	
ATKINS 7604 Technology Way, Suite 400 Denver, CO 80237 Phone: (303) 221-7275 Fax: (303) 221-7276	

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

PRELIMINARY
No Revisions:
Revised:
Void:

I-270 EB CONNECTOR BRIDGE OVER I-70 GENERAL LAYOUT			
Designer:	Structure Numbers	E-17-AFS	
Detailer:			
Sheet Subset: Bridge	Subset Sheets: B02 of 3		

Project No./Code
FBR 0704-234
19631
Sheet Number 391

CONFIDENTIAL

ATC 26



SWANSEA ELEMENTARY SCHOOL



CONNECTING COMMUNITIES



DATE: December 23, 2016
TO: Front Range Mobility Group
FROM: Anthony DeVito P.E. Central 70 Project Director
Nicholas Farber, Central 70 Project
SUBJECT: Central 70 - Detailed Alternative Technical Concept (ATC) Response
Front Range Mobility Group - ATC No. 26.1

Dear Mr. Friedrich:

Your Team's ATC Submission Form for Detailed ATC 26.1 has been reviewed by the Procuring Authorities.

Detailed ATC 26.1 proposes an alternative ventilation system approach in the Central 70 covered section.

In accordance with the Instructions to Proposers ("ITP"), the Procuring Authorities will use reasonable efforts to provide a Proposer with the following written feedback on a ATC Submission within 15 Working Days following the later of (x) the date the relevant ATC Submission was submitted and (y) the One-on-One Meeting at which such submission is discussed. Below is the final response from the Procuring Authorities for your Detailed ATC:

- 1. unconditional approval;
- 2. conditional approval, subject to modifications and/or conditions;
 Re-submission required Re-submission not required
- 3. disapproval, with or without guidance that such ATC can be re-submitted under any circumstance;
- 4. notification that the incorporation of the proposed ATC in the Proposer's Proposal is already permitted under the terms of the RFP, and therefore does not qualify as an ATC (and will not be treated as such for purposes of Section 3.4 of Part C of the ITP).
- 5. subject to compliance with the confidentiality requirements set out in Section 3.4 of Part C of the ITP, the Procuring Authorities are considering amending (for the benefit of all Proposers) the terms of the RFP that are the subject-matter of the proposed ATC.

Conditions of Approval:

- 1. The NFPA 502 2017 edition shall be used for the final design and analysis requirements.
- 2. The ventilation design shall be coordinated with the I-70 cover top design and Swansea Elementary School outdoor areas. Access points for maintenance and operations shall be located outside of all active use areas for the cover park area and subject to Approval by the Department.
- 3. The ventilation system, including all ductwork, shall be required to fit within the original construction limits with no increase to these limits.
- 4. The Developer shall define new design criteria for the semi-transverse ventilation concept. The new criteria shall be subject to Approval by the Department. The final design of the semi-transverse



ventilation concept shall be based on the agreed upon design criteria. Key elements of the design criteria to be defined by the Developer, include, but are not limited to:

- a. Evacuation timeline details, including the elements of pre-movement time and movement time, taking into account potential bus traffic;
 - b. Design fire details, including fire growth rate and fire peak heat release rate, for the ventilation system. The design fire criteria shall be in compliance with the appropriate NFPA standards and shall be approved by the AHJ; and
 - c. Tenability criteria for evacuation considering both integration of the fixed fire suppression system and ventilation.
5. Accommodation for utilities (including horizontal and vertical separation requirements) shall be provided. Developer shall be responsible for coordination with and approval by all Utilities for Utility design requirements to implement the semi-transverse ventilation concept.
 6. The Developer shall obtain approval from the AHJ for the semi-transverse ventilation concept design. Developer shall be responsible to provide, install, test, and commission the entirety of the Cover MEP System utilizing the semi-transverse ventilation concept.
 7. The Developer shall be solely responsible for obtaining any additional approvals or permits (e.g., Environmental Approvals) required for this ATC. This includes any necessary public outreach, as directed by the Department in its sole discretion, to be performed by the Developer. All costs or schedule impacts associated with approvals required to implement this ATC (including, for certainty, costs or schedule impacts associated with the failure to obtain any necessary approvals) shall be the sole responsibility of the Developer.

The approval of this Detailed ATC by the Procuring Authorities does not constitute an approval of specific drafting modifications to the RFP necessary to incorporate this ATC into the Project Agreement pursuant to Section 7.2.1.c of Part C of the ITP, which modifications shall be agreed by the Procuring Authorities and the Proposer (each acting reasonably) following issuance of a Notice of Award to such Proposer.



ANNEX 3: ALTERNATIVE TECHNICAL CONCEPT SUBMISSION FORM

Proposer Name: Front Range Mobility Group
Date: November 16, 2016

Central 70 Project RFP: ATC Submission No. 26.1¹

A. Background Information

1. Type of Submission

- Conceptual ATC
 Detailed ATC

2. Prior Submission(s)

- None (initial submission of ATC)
 Previously Submitted as Conceptual ATC
 Previously Submitted as Detailed ATC

3. Explanation of Reason for Resubmission

The Procuring Authorities ask that the following items are addressed in the Detailed ATC submission:

1. The exhaust duct adjacent to the tunnel appears to require additional underground space. The duct shall be required to fit within the original construction limits with no increase these limits.
2. In congested traffic, this proposal would have emissions from both carriageways exhausted at a single point. Provide a discussion on how Front Range Mobility Group would address stakeholders concerns regarding this point discharge. Support for a point discharge on the north side of the Cover near the elementary school will be very difficult to garner.
3. Any required environmental impact study associated therewith will be the sole responsibility of Front Range Mobility Group.
4. Demonstrate reliable control of air quality in both carriageways using a single system.
5. The ATC has asserted that a safe egress environment can be maintained during the evacuation period. What period has been considered? If it is short, e.g. on the order of a few minutes, is the assumption that the fire does not reach its full intensity? Can the ventilation system be used to assist fire-fighter intervention? Has the effect of wind been considered?
6. Please consider flow velocities in the ventilation ducts, corresponding hydraulic resistance, fan capacity and plant room size.
7. Front Range Mobility Group would need to provide testing to demonstrate the adequate performance of the system.

4. Request for Discussion at One-on-One Meeting

- Meeting Requested
 Meeting Not Requested²

¹ Proposers to complete in accordance with instruction (2) to the Annex.

² In accordance with Section 3.2.1 of Part C, the Procuring Authorities may nevertheless require a Proposer to present an ATC Submission at a One-on-One Meeting.

B. General ATC Submission Requirements

1. Overview Description

Narrative overview description of the proposed ATC.

This information has been amended since the submission of the previous version of this ATC.

This ATC is being submitted to propose an alternative ventilation approach in the Central 70 cover section. The ATC proposes the use of a semi-transverse mechanical ventilation system with exhaust air ducted from the tunnel via dedicated exhaust ductwork and fan(s) with fresh air drawn into the tunnel via the portals. The ventilation equipment would be located in a plant room located below grade on 46th Avenue North between Fillmore and Clayton Streets. Fire rated, low leakage dampers would be located above the roadway in order to provide local control. CFD analysis performed confirms that it is possible to maintain a safe tenable egress environment and prevent smoke propagation outside of the ventilation zones during the evacuation time.

This approach also provides improved control during normal operations when pollution from vehicle emissions would initiate a ventilation response for the purpose of air quality control. Using a variable frequency drive motor on the fan, air will be exhausted from openable dampers above the roadway. The pollution sensors would be used to automatically modulate damper openings so that air in the areas with the highest concentrations of pollutants is exhausted.

2. Relevant RFP Requirements

List all material RFP requirements that are inconsistent with, and would require amendment to accommodate, the proposed ATC³.

This information has been amended since the submission of the previous version of this ATC.

- RFP Schedule 10, Section 12 Cover MEP System [12.1.3 a) ii, 12.13.2, 12.13.7, 12.13.8, 12.13.10 g), 12.14.10 b),

3. Rationale

Explanation of how, where and why the ATC would be used on the Project, including how it aligns with the Project Goals.

This information has been amended since the submission of the previous version of this ATC.

The ATC would be implemented along the length of the cover section of I-70 and constructed as part of the project. The ATC would replace jet fans identified in the Schedule 10, Section 12 documents with a vane axial fan(s) located in a plantroom below grade. This ATC is consistent with the Project Goals as indicated below:

Maximize Scope

This ATC improves the ventilation design by removing the emergency mechanical ventilation fans above the roadway in the covered portion of the highway.

Minimize Maintenance

The removal of the longitudinal (jet fans) mechanical ventilation system from the covered portion of the highway will remove long term maintenance issues associated with the jet fans and require less electrical power. The covered portion of the highway will be mechanically ventilated during normal, congested and emergency periods using an axial fan located in a plant room, requiring less maintenance and no lane closures.

Enhance Community Values and Project Benefits

³ Proposers are not required to propose RFP drafting amendments when completing Part B, but are required to do so when completing Section 5 of Part C.

As a result of removing the emergency mechanical ventilation fans above the roadway, the maintenance requirements and resulting lane closures are significantly reduced. Maintenance of fan equipment can be undertaken from a much safer environment within plant rooms.

During normal or congested operations vehicle emissions are not ventilated to atmosphere via the tunnel portals, with the potential for recirculation. Exhaust air can be ventilated via dedicated exhaust vents and can be more effectively controlled.

Protect Safety of Work Force and Public

Jet Fan Maintenance - The ATC removes the need for lane closures and reduces the working time of staff within the covered roadway.

Minimizes Impacts to travelers and nearby communities

The ATC reduces potential lane closure requirements as a result of equipment failure and maintenance.

4. Impacts

A preliminary analysis of potential environmental, social, economic, community, traffic, safety, operations and maintenance or third party impacts (positive and negative), including specific separate identification and analysis of any such impacts that are not reflected in the final EIS.

This information has not been amended since the submission of the previous version of this ATC.

There are no identified negative environmental, social, economic, community, operations and maintenance or third party impacts associated with this ATC. This ATC operates in an equivalent or better manner than the longitudinal ventilation system in the Reference Design. Air quality and CFD analyses for the semi-transverse ventilation option are included at the end of this ATC.

This ATC has a positive impact on safety by removing the emergency mechanical ventilation fans above the roadway. The maintenance requirements and resulting lane closures are significantly reduced. Maintenance of fan equipment can be undertaken from a much safer environment within plant rooms.

This ATC requires plant room access from either the roadway or from above. Maintenance access requirements for routine equipment maintenance would require a standard door access route. For overhaul or replacement of the fan a means of removal and replacement requires suitably sized access doors or hatch from above. Each of these items will be accommodated within FRMG's design.

5. Cost and Benefit Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely costs, and savings, that are likely to result from implementation of such ATC, including reference to assumptions on which such estimate is based.

This information has been amended since the submission of the previous version of this ATC.

This ATC removes the jet fans in the covered portion of the Central 70 project, simplifies the structure girder requirements for the cover, and reduces the need to lower the tunnel to provide clearance for the jet fans system. Emergency power requirements are also reduced. We anticipate a substantial CapEx savings of \$20.7 Million as a result of this ATC. The cost savings is broken down as follows:

Item	Savings/Additional Cost
------	-------------------------

Walls	\$14.1 Million
Excavation	\$10.3 Million
Cover/MEP/Fireproofing	-\$3.7 Million

6. Schedule Analysis

An estimate (which in the case of a Conceptual ATC can be limited to an order of magnitude) of likely design and construction time period impacts (positive and negative) of such ATC, including reference to assumptions on which such estimate is based.

“This information has been amended since the submission of the previous version of this ATC.”

This ATC will not have an effect on the total duration of the project; however it will expedite construction of walls and excavation in the Lowered Section of the project.

7. Conceptual Drawings

At Proposer’s discretion, unless otherwise requested by the Procuring Authorities, conceptual drawings.

“This information has been amended since the submission of the previous version of this ATC.”

See Attachment A showing the proposed transverse ventilation concept.

8. Past Use

Identification of other projects on which the ATC (or a substantially similar approach) has been implemented, regardless of the results, and the relevance of such experience.

This information has not been amended since the submission of the previous version of this ATC.

See below a partial list of projects utilizing the alternative ventilation method proposed with this ATC.

- Fort McHenry Tunnel, Baltimore, MD – Transverse
- Columbus Center, Boston, MA - Transverse
- Baltimore Harbor tunnel, Baltimore, MD – Transverse
- Lincoln Tunnel, NJ/NY – Transverse
- Thomas P. O’Neil Jr. Tunnel, Boston, MA. (Central Artery - The Big Dig project) – Transverse
- Ted Williams Tunnel , Boston, MA.(Big Dig Project) – Transverse
- Holland Tunnel, NYC, NJ/NY– Transverse
- Queens Midtown Tunnel, NYC, NY– Transverse
- Brooklyn Battery Tunnel, NYC,NY– Transverse
- Mersey Kingsway Tunnel, Liverpool, Merseyside, UK – Semi Transverse
- Tyne Tunnel, Newcastle Upon Tyne, UK – Semi Transverse
- Dartford Crossing Tunnel (West Tunnel), Kent/Essex, UK - – Semi Transverse
- Dartford Crossing Tunnel (East Tunnel), Kent/Essex, UK – Semi Transverse
- Cointe Tunnel, Belgium – Semi Transverse
- Siaix Tunnel, France – Semi Transverse
- Tranchee Remise de Verrou Tunnel, France – Semi Transverse
- Ambroise Pare Tunnel, France – Semi Transverse
- Front de Mer Tunnel, France – Semi Transverse
- Vieuxport Tunnel, France – Semi Transverse
- Parc des Princes Tunnel, Paris, France – Semi Transverse
- Orly 1 Tunnel, France – Semi Transverse
- Reine B1 Tunnel - Grandchamps, France – Semi Transverse

- General Holmes Drive tunnel, Sydney – Semi Transverse

9. Additional Information

With respect to previously submitted ATC Submissions only, additional information as requested by the Procuring Authorities following review of such prior submissions.

This information has been amended since the submission of the previous version of this ATC.

1. Procuring Authorities' comment: The exhaust duct adjacent to the tunnel appears to require additional underground space. The duct shall be required to fit within the original construction limits with no increase these limits.

Response: There is no increase to the construction limits. The longitudinal duct remains within the contract construction limits.

2. Procuring Authorities' comment: In congested traffic, this proposal would have emissions from both carriageways exhausted at a single point. Provide a discussion on how Front Range Mobility Group would address stakeholders concerns regarding this point discharge. A point discharge on the north side of the Cover near the elementary school will be very difficult to garner support.

Response: Per Attachment A, the discharge location has been moved from that in the Reference Design. It is now approximately 100 feet further east of the school. Exhaust air is ventilated to the atmosphere at a height of at least 10 feet above grade. Dispersion analysis conducted (report attached) indicates there is no adverse impact to sensitive receptors such as the school.

3. Procuring Authorities' comment: All risk associated with any required environmental impact study would be the responsibility of Front Range Mobility Group.

Response: FRMG understands that should any modification to the environmental impact statement be required, it would be the responsibility of (and at the risk of) FRMG.

4. Procuring Authorities' comment: Demonstrate reliable control of air quality in both carriageways using a single system.

Response: The attached CFD report includes CFD analysis for a congested operations scenario with ventilation in both carriageways. Analysis concludes that the semi-transverse ventilation system is adequately sized and able to maintain air quality in both carriageways simultaneously.

5. Procuring Authorities' comment: The ATC has asserted that a safe egress environment can be maintained during the evacuation period. What period has been considered? If it is short, e.g. on the order of a few minutes, is the assumption that the fire does not reach its full intensity? Can the ventilation system be used to assist fire-fighter intervention? Has the effect of wind been considered?

Response: The attached CFD analysis report includes egress time calculations. Based upon three cross passageway doors, an egress time of 6.1 minutes has been calculated. The semi-transverse ventilation system has been sized and designed to provide a safe, tenable environment in any tunnel ventilation zone for at least 9.1 minutes. If the number of cross passageway doors in increased to five, the egress time will be reduced further.

The extended time of tenability provided (9.1 minutes with an adverse wind condition) should aid in fire fighter intervention. In addition, the dampers, fans and all other equipment will be fire rated to comply with all Schedule 12 requirements and NFPA 502 (2014) and so can be used to assist fire fighter intervention even in the event there are no occupants within the tunnel during an emergency.

An adverse wind condition has been applied and the worst case fire event modeled. The analysis allows for “backing up” of traffic behind the incident vehicle. Refer to the attached CFD report for more information.

6. Procuring Authorities’ comment: Please consider flow velocities in the ventilation ducts, corresponding hydraulic resistance, fan capacity and plant room size.

Response: The ducts have been sized to minimize flow velocities to the greatest extent possible. Hydraulic loss calculations have been undertaken and the fan has been sized in order to ensure adequate pressure. The plant room has been sized to allow ease of maintenance and access.

7. Procuring Authorities’ comment: Front Range Mobility Group would need to provide testing to demonstrate the adequate performance of the system.

Response: Front Range Mobility Group will undertake in approved and supervised commissioning of the ventilation system based upon cold flow analysis to ensure adequate performance of the semi-transverse ventilation system.

C. Detailed ATC Requirements

1. Risks

To the extent not otherwise addressed by the responses to Part B above, an analysis of any additional risks to the Procuring Authorities, CDOT, the State or third parties associated with implementation of the ATC, including discussion of how such risks are, or are proposed to be, allocated under the terms of the Project Agreement.

FRMG has analyzed this ATC from a risk perspective and believes that there are no risks associated with the use of a semi-transverse ventilation system.

2. Handback

Description of any proposed changes in handback procedures and/or the Handback Requirements associated with the ATC, if any are expected.

There are no changes in handback procedures and/or Handback Requirements associated with the approval of this ATC.

3. Right-of-Way

A description, estimated cost and proposed procurement schedule of any Additional Right-of-Way expected to be required to implement the ATC, if any.

There is no Additional Right-of-Way expected to be required to implement this ATC.

4. List of Required Approvals

A list of required, or likely to be required, third party and Governmental Approvals, including any Design Exceptions (which should be summarized in the form of Attachment A (Design Exceptions)).

No third party or other government approvals are expected to be required for this ATC.

5. Proposed Drafting Revisions

(a) List all RFP requirements that are inconsistent with the proposed ATC and (b) attach in the form of a mark-up (for amendments to existing drafting) and/or a rider (with respect to newly proposed drafting) proposed revisions to address those inconsistencies.

This ATC will require modification to several sections in Schedule 10, Section 12 as noted below.

Section	Existing Text	Recommended revision
12.1.3 a) ii)	A Fixed Firefighting System (FFFS) and associated water supply systems (required to limit the maximum reasonable design fire to that which is manageable by the longitudinal ventilation system);	A Fixed Firefighting System (FFFS) and associated water supply systems (required to limit the maximum reasonable design fire to that which is manageable by the longitudinal ventilation system);
12.13.2,	System Requirements The CVS shall be of longitudinal concept comprising jet fans. The system shall be developed for the following two principal operating modes: a. Normal and congested operations: in	System Requirements The CVS shall be of longitudinal <u>semi-transverse</u> concept comprising <u>transverse ducts above the roadway and ventilation plant located in a secure, maintainable facility</u> . The system shall be developed for the following two

	<p>situations where the traffic induced airflow is insufficient to maintain vehicle emitted pollutants to within acceptable levels, additional airflow will be generated by the ventilation system; and</p> <p>b. Emergency operations: in the event of an Emergency incident, the ventilation system shall be operated to control the smoke and hot gasses and shall discharge the smoke and gases via the exit Portal.</p>	<p>principal operating modes:</p> <p>a. Normal and congested operations: in situations where the traffic induced airflow is insufficient to maintain vehicle emitted pollutants to within acceptable levels, additional airflow will be generated by the ventilation system; and</p> <p>b. Emergency operations: in the event of an Emergency incident, the ventilation system shall be operated to control the smoke and hot gasses and shall discharge the smoke and gases via <u>an above grade ventilation grating</u>.</p>
<p>12.13.7,</p>	<p>12.13.7. Jet fans</p> <p>a. The jet fans shall be of the horizontal shaft unidirectional type complete with silencers with bell mouth on both ends of the jet fan and shall fit outside of the headroom and width clearances. The mounting of jet fans parallel or inclined to the roadway surface shall be taken into account in their selection, design and manufacture. The jet fans may be inclined, fitted with adjustable air flow directors or fixed deflectors for setting the optimum jet effect.</p> <p>b. Each jet fan unit shall be capable of producing a minimum design thrust to meet the specified design criteria under local worst case atmospheric conditions. The thrust developed per power of motor input power shall be taken as an assessment of the fan efficiency.</p> <p>c. The complete jet fan assembly, including but not limited to the fan, fan motor and cables shall be capable of operating in the ambient temperature during normal operation.</p> <p>d. Anti-vibration mountings shall be provided to reduce the transmission of vibrations, at frequencies associated with the fan running speeds and their first three multiples (harmonics), to levels that are acceptable for transmission of noise and vibration through the structure.</p> <p>e. Jet fans shall be equipped with vibration monitors to enable the transmission of</p>	<p>12.13.7. <u>Axial</u> fans</p> <p>a. <u>The axial fans shall be of unidirectional type complete with a silencer on the outlet side and shall fit inside the plantroom. The maintenance of the fan shall take into account access requirements on both sides of the fan and allow for a complete fan assembly to be installed in place. Maintenance requirements shall be taken into account in their the selection, design and manufacture.</u></p> <p>b. Each <u>axial</u> fan unit shall be capable of producing the minimum <u>design flow rate at the approved hydraulic pressure</u> to meet the specified design criteria under local worst case atmospheric conditions. The <u>volumetric flow rate and pressure</u> developed per power of motor input power shall be taken as an assessment of the fan efficiency.</p> <p>c. The complete <u>axial</u> fan assembly, including but not limited to the fan, fan motor and cables shall be capable of operating in the ambient temperature during normal operation.</p> <p>d. Anti-vibration mountings shall be provided to reduce the transmission of vibrations, at frequencies associated with the fan running speeds and their first three multiples (harmonics), to levels that are acceptable for transmission of noise and vibration through the structure.</p> <p>e. <u>Axial</u> fans shall be equipped with vibration monitors to enable the</p>

	<p>vibration levels to the CCMS. The CCMS shall be programmed to provide an alarm indication when the level of vibration exceeds that specified by the manufacturer. The design shall be such that under Emergency operations any vibration alarms shall be inhibited and shall not result in the switching off of a jet fan.</p> <p>f. Jet fans shall be equipped with motor temperature monitors to enable the transmission of temperature levels to the CCMS. The CCMS shall be programmed to provide an alarm indication when the level of motor temperature exceeds that specified by the manufacturer. The design shall be such that under Emergency operations any motor temperature alarms shall be inhibited and shall not result in the switching off of a jet fan.</p> <p>g. The complete fan assembly, including but not limited to the fan, fan motor and cables, shall be designed and installed such that it not suffer mechanical, electrical or structural failure when operating at full capacity in smoke laden air with an ambient temperature of 482°F for a minimum period of one hour. The Developer shall include a manufacturer's type test certificate showing that the design meets these requirements as part of its design submittal.</p> <p>h. The whole fan assembly shall be waterproof and capable of withstanding water spray from maintenance washing vehicles and the FFFS. A drain fitting with cap shall be located in the lowest part of the fan housing, if not self-draining by manufacturers design.</p>	<p>transmission of vibration levels to the CCMS. The CCMS shall be programmed to provide an alarm indication when the level of vibration exceeds that specified by the manufacturer. The design shall be such that under Emergency operations any vibration alarms shall be inhibited and shall not result in the switching off of <u>the fan</u>.</p> <p>f. <u>Axial</u> fans shall be equipped with motor temperature monitors to enable the transmission of temperature levels to the CCMS. The CCMS shall be programmed to provide an alarm indication when the level of motor temperature exceeds that specified by the manufacturer. The design shall be such that under Emergency operations any motor temperature alarms shall be inhibited and shall not result in the switching off of <u>a fan</u>.</p> <p>g. The complete fan assembly, including but not limited to the fan, fan motor and cables, shall be designed and installed such that it not suffer mechanical, electrical or structural failure when operating at full capacity in smoke laden air with an ambient temperature of 482°F for a minimum period of one hour. The Developer shall include a manufacturer's type test certificate showing that the design meets these requirements as part of its design submittal.</p> <p>h. The whole fan assembly shall be waterproof and capable of withstanding water spray from maintenance washing vehicles and the FFFS. A drain fitting with cap shall be located in the lowest part of the fan housing, if not self-draining by manufacturers design.</p>
12.13.8,	<p>12.13.8. Jet fan motors</p> <p>The jet fan motors shall conform to the following requirements:</p> <p>a. Suitable for use in the corrosive atmosphere;</p> <p>b. Suitable for use with soft starters;</p> <p>c. Be totally enclosed fan ventilated cage rotor type;</p>	<p>12.13.8. <u>Axial</u> fan motors</p> <p>The <u>axial</u> fan motors shall conform to the following requirements:</p> <p>a. Suitable for use in the corrosive atmosphere;</p> <p>b. Suitable for use with soft starters;</p> <p>c. Be totally enclosed fan ventilated cage rotor type;</p>

	<p>d. Protected motor enclosure;</p> <p>e. Lifting lugs or eyes shall be provided; and</p> <p>f. Capable of being run in an inclined position, not greater than 15° from the horizontal with no detrimental effects.</p>	<p>d. Protected motor enclosure;</p> <p>e. Lifting lugs or eyes shall be provided; and</p> <p>f. Capable of being run in an inclined position, not greater than 15° from the horizontal with no detrimental effects.</p>
12.13.10 g)	<p>g. Monitoring equipment shall not be installed near to jet fan inlets and outlets so as to affect the performance of the CVS; and</p>	<p>g. Monitoring equipment shall not be installed near to <u>axial</u> fan inlets and outlets so as to affect the performance of the CVS; and</p>
12.14.10 b)	<p>b. The nozzle design shall allow for the expected ventilation velocities of the longitudinal ventilation system and shall be designed to deliver water droplets appropriate to meet the fire performance acceptance for the design fire.</p>	<p>b. The nozzle design shall allow for the expected ventilation velocities of the <u>semi-transverse</u> ventilation system and shall be designed to deliver water droplets appropriate to meet the fire performance acceptance for the design fire.</p>



**Attachment A
 Design Exceptions**

<u>No.</u>	RFP Reference	Existing Condition and Applicable Standard (verbatim from standard)	Proposed Condition ⁴	Procuring Authorities' Response ⁵	FHWA Response ⁶
1.					
2.					

⁴ Proposers should include in this column or attach to the relevant ATC Submission Form the information referred to in Section 9.4.15.b.ii of Schedule 10 (Design and Construction Requirements) to the Project Agreement.

⁵ For Procuring Authorities' use only.

⁶ For FHWA use only.



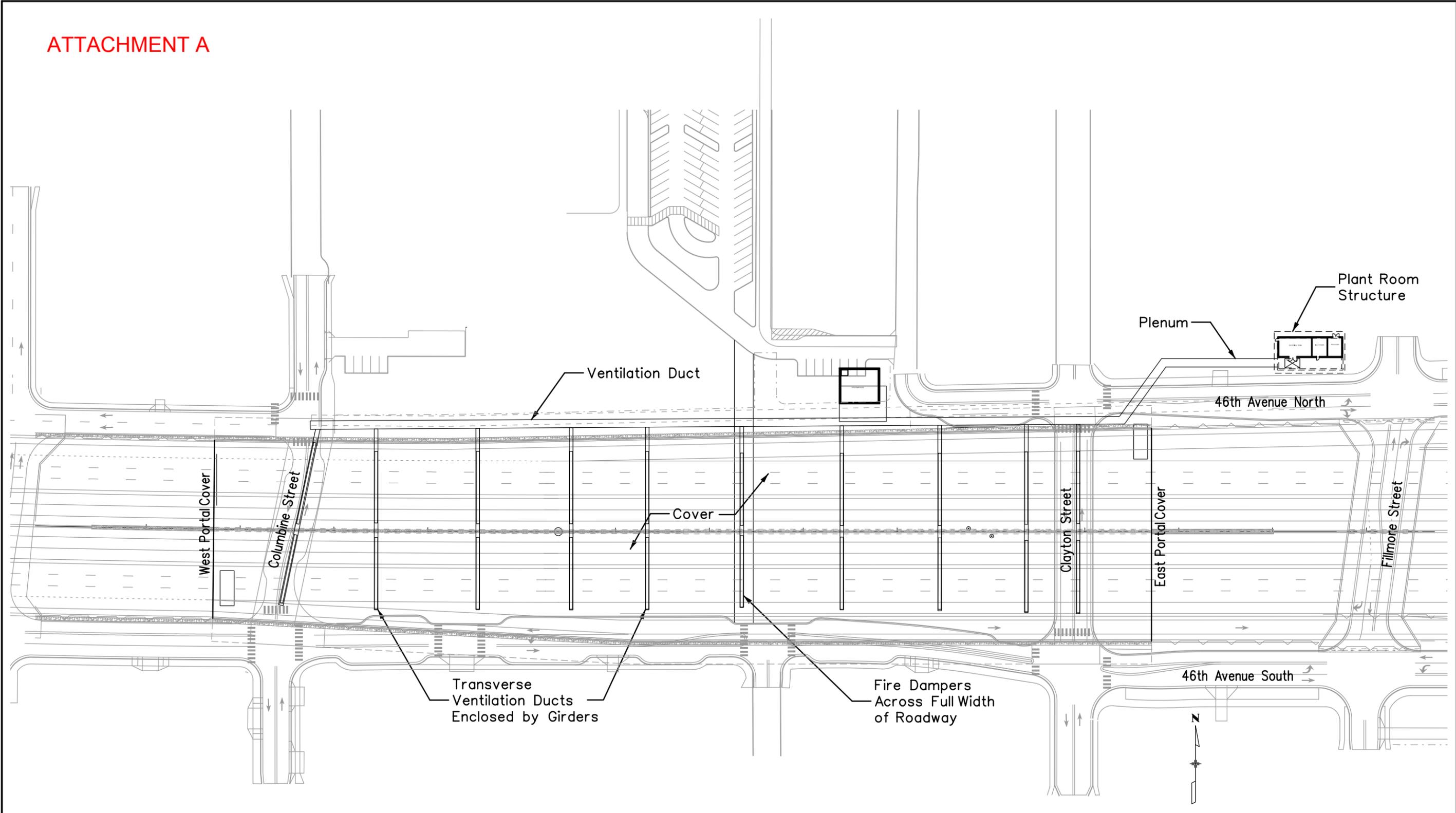
Addendum No.5
Release of October 27, 2016

Central 70 Project: Instructions to Proposers
Part I: Exhibit 1

ATC SUBMISSION No. 26.1 CONCEPTUAL DRAWINGS SUPPORT INFORMATION

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ATTACHMENT A



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Print Date: 11/4/2016
 File Name: C-70_CoverMEP_Master_rev00_For-ATC-26



Horiz. Scale: 1:99.9992
 Vert. Scale: - - -
 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

As Constructed
No Revisions:
Revised:
Void:

SEMI-TRANSVERSE VENTILATION SCHEME CENTRAL 70

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

ATC - 26
Project No./Code
Sheet Number

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ATC SUBMITTAL

AIR QUALITY EVALUATION OF ALTERNATIVE TUNNEL
VENTILATION DESIGN

CENTRAL 70 – DETAILED ALTERNATIVE
TECHNICAL CONCEPT (ATC) 26.1

September 21, 2016



CONFIDENTIAL

1.0 Introduction

The purpose of this document is to explore how the proposed Alternative Technical Concept for the covered portion of I-70 might alter air quality impact analyses conclusions found in the I-70 East Final Environmental Impact Statement (Final EIS) published in January 2016.

The Front Range Mobility Group (FRMG) has developed an Alternative Technical Concept (ATC26) to the design of the ventilation system for the covered portion of I-70 shown in the Final EIS (Reference Design). ATC26 includes a proposed ventilation system design for the covered portion of I-70 that includes transverse ducts and a longitudinal plenum to vent tunnel exhaust to an above ground structure northeast of the covered portion of I-70 (Alternative Design).

Using screening-level techniques, the analysis that is the subject of this memorandum explored to what degree the proposed Alternative Design might alter the air quality impact conclusions contained in the Final EIS. Based on the new analyses performed and discussed in this document, it is concluded that the alternate ventilation system design should not change the air quality-related conclusions documented in the Final EIS. Specifically, the Alternative Design will have no impact on predicted CO concentrations and though predicted PM₁₀ impacts are expected to increase in the near-field of the proposed ventilation structure, these impacts will still remain well below ambient air quality standards. Though this is the case, PM₁₀ impacts are expected to decrease under this new configuration at sensitive locations.

2.0 Proposed Design Changes

FRMG's Alternate Design considered in this memo includes the use of a semi-transverse mechanical ventilation system with exhaust air ducted from under the cover and discharged horizontally at high level at the dedicated plant room located near the northwest corner of 46th Avenue and Filmore Street shown in Figure 1. The semi-transverse ventilation system would work by exhausting tunnel air from dampers located above the roadway in order to provide local control and maintain a safe tenable egress environment and prevent smoke propagation outside of the ventilation zones in the case of a fire located on the roadway under the cover. This approach also provides control during normal operations when pollution from vehicle emissions would initiate a ventilation response for the purpose of air quality control within the covered area.

The Alternative Design is a change from the Reference Design analyzed in the I-70 East Final EIS, which included ventilation ducts suspended from the tunnel structure running east and west, longitudinal to the road (as shown in Figure 2). The Reference Design would exhaust emissions captured by the ventilation system above the westbound lanes near the west portal and above the eastbound lanes near the east portal of the covered portion of I-70. Therefore, the Reference Design would result in approximately half of emissions being exhausted near the west portal and the rest near the east portal of the covered portion of I-70.

3.0 Final EIS Air Quality Impacts and Conclusions

For the purposes of Transportation Conformity, air quality modeling analyses for the Final EIS focused on particulate matter less than 10 microns in diameter (PM₁₀) and carbon monoxide (CO) impacts from the proposed project alternatives. The air quality analyses were focused on localized hotspot areas associated with worst-case emissions due to an intersection or interchange.

In the case of CO, it was determined that the interchange at I-70 and Colorado Boulevard will have the highest CO concentrations in the study area and was the only location modeled. This modeling did not specifically simulate emissions from the ventilation system because it is located too far from receptors to have a significant impact. Therefore, this study did not need to include a CO analysis to conclude the Alternative Design would not change conclusions described in the I-70 East Final EIS.

For PM₁₀ two interchange locations were selected for analysis in the I-70 East Final EIS:

- The I-70/I-25 interchange and the area from I-25 to the Steele Street/Vasquez Boulevard interchange.
- The area around the I-70/I-225 interchange.

Only the analysis area from I-25 to the Steele Street/Vasquez Boulevard interchange originally included contributions from roadway sources and ventilation sources and was considered in this study.

Table 1 summarizes the Final EIS cumulative model-predicted 24-hour PM₁₀ Reference Design impacts at the I-70/I-25 and I-70/I-225 PM₁₀ hotspot locations. Modeled impacts (on a receptor by receptor basis) for the I-70/I-25 analysis are shown in Figure 3. Note that all high impacts (i.e. greater than 130 µg/m³) occur well west of the partial cover and near the Washington Street/I-70 intersection (over 1.9 km away from the cover). Impacts near the partial cover are no higher than 110 µg/m³. Also note that impacts for the I-70/I-225 analysis are not shown in this map as these impacts are over 9 km from the partial cover. Due to this large distance, receptors used in the I-70/I-225 analysis were not analyzed in this assessment.

Table 2 summarizes the cumulative model-predicted 24-hour PM₁₀ impacts at sensitive receptors identified at Swansea Elementary School as reported in the Final EIS. Swansea Elementary School is located immediately north of the proposed covered portion of I-70. Figure 2 illustrates the proximity of sensitive receptors at Swansea Elementary School to the proposed covered portion of I-70 as evaluated in the I-70 East Final EIS.

Based on modeling results, the following relevant conclusions related to air quality were outlined in the I-70 East Final EIS:

- Air quality conditions under the No-Action Alternative are similar to all alternatives analyzed.
- Traffic volume and traffic speed are the primary drivers of project-level air quality impacts.
- Road dust emissions are the primary indicators of future particulate matter emissions.
- The cover provides benefits to sensitive receptors located at Swansea Elementary School. PM_{10} concentrations are lower in this area (well below the National Ambient Air Quality Standards [NAAQS]) in close proximity to the roadway.
- The Preferred Alternative of the project will not cause new local violations of the NAAQS standards for PM_{10} , nor will it increase the severity or number of existing violations or required interim emission reductions or other milestones.

4.0 Modeling Assessments

Two AERMOD modeling assessments were performed to understand the differences in impacts for the Alternative Design. The first set of modeling analyzed receptors in the near-field of the ventilation systems and the second looked solely at impacts at sensitive receptors.

For each of these assessments, representative screening modeling was performed for both the Reference Design (to recreate Final EIS Reference Design modeling) and the Alternative Design. Each design's ventilation sources were modeled using AERMOD, and PM_{10} impacts from the two designs were then compared.

It was assumed for both assessments that all impacts are due to the ventilation sources and that the magnitude of emissions exhausted from either design will be the same between the two designs. The additional sources (roadway area sources and an OPEN PIT source to simulate exhaust at the below grade roadway) found in the Final EIS Reference Design modeling could not be replicated accurately as information could not be obtained. However, impacts due to these non-ventilation sources are not expected to change between the two design configurations. Only impacts due to alterations in the ventilation sources would change between the Reference and Alternative Design and were the focus of this analysis.

Modeling information presented in the Final EIS was used as a guide in order to characterize the ventilation sources for the Reference Design configuration. The emissions venting at the east and west portal were characterized as surface-based volume sources (similar to modeling used for Final EIS). Because emissions from the Alternative Design will be vented near the top of the plant building, the alternative ventilation design was characterized as elevated volume sources.

Though requested, the meteorological input data used to support modeling conducted in support of the Final EIS could not be obtained from CDOT. Furthermore, it could not be replicated since critical model inputs were not provided in the Final EIS. Therefore, screening level (default) data was used instead. This default data contains all the dispersion conditions present in the original analysis in addition to several dispersion conditions that were not leading to potential conservatism in this analysis (i.e., meteorological conditions were considered that will not occur).

For the current assessments, default meteorology data was developed using AERSCREEN's MAKEMET program and modeling was performed using AERMOD (Version 15181) in screening mode. Default MAKEMET settings were invoked, and urban terrain was utilized for proper characterization of surface characteristics used in the screening meteorology creation. Since the Reference Design modeling documented in the Final EIS focused on winter months as a worst-case, only hours associated with the winter time surface characteristics were considered in the development of the default meteorology.

Near-Field Receptor Modeling

This assessment looked solely at impacts within approximately 250 meters of the source (shown in Figure 3) for both Alternative and Reference Designs. This is because the ventilation sources would likely not impact receptors outside of this vicinity. Modeled Final EIS Reference Design impacts greater than 250 meters from the partial cover were likely dominated by road sources. Thus, they are not expected to be altered by changes in the ventilation system.

As in the Final EIS Reference Design modeling, modeled receptors were spaced at 25-meter distances. Modeled receptor locations are found in Figure 4 and were determined based on maps found in the Final EIS document. While the Final EIS did not model all locations within the grid shown in Figure 3, this assessment included all areas.

The emission rates used to simulate plumes from the ventilation ducts suspended from the tunnel structure running east and west (used in the Final EIS Reference Design modeling) were not documented in the Final EIS. Furthermore, CDOT was unable to provide the model input/output files used to support the Final EIS. Thus, emission rates had to be approximated based on running the dispersion model (AERMOD) several times using a variety of emission rates until Final EIS modeling results (as shown in Figure 3) were matched to $110 \mu\text{g}/\text{m}^3$. This value is the maximum concentration predicted in the vicinity of the partial cover as documented graphically in the Final EIS. This is a conservative assumption since concentrations predicted in the vicinity of the partial cover varied between 89 and $110 \mu\text{g}/\text{m}^3$.

Once an approximate emission rate was determined, the same emission rate was modeled for a set of volume sources developed to simulate the ventilation exhaust found in the Alternative Design. The Alternative Design ventilation exhaust exit was simulated as twelve 8' line volume sources placed at the plant building location. This placed the volume sources

approximately 35-meters south of the modeled receptors, near the northwest corner of 46th Avenue and Filmore Avenue (see Figure 4).

Results from this model run were then scaled to 24-hour average values (using AERSCREEN recommended scaling factors) for comparison to the NAAQS and Final EIS Reference Design modeling impacts found in Figure 3 and Table 1.

Sensitive Receptor Modeling

For this assessment, the receptors shown in Figure 2 were assessed. These receptors were classified as “sensitive” in the Final EIS. Due to the proximity of both ventilation design configurations to the school, these receptors warranted additional investigation to see if impacts will change with the Alternative Design. The sensitive receptor locations are found in Figure 2.

As in the near-field modeling assessment, the emission rates for the Final EIS Reference Design modeling were not documented nor could they be obtained from CDOT. Therefore, it was assumed that the east portal and west portal volume sources each emitted half the emissions of all traffic located under the cover. Since the objective of this analysis is to simply understand if impacts from the Alternative Design would result in an increase or decrease from the Reference Design, the magnitude of the modeled emissions is not important as long as the emissions modeled in both cases are the same. For this reason and because the emission rates modeled for the Final EIS were unavailable, for convenience, the emissions from all the traffic under the cover was assumed to be 1.0 g/s. A model run was performed for the Reference Design using the 1.0 g/s emission rate and impacts recorded.

A model run for the Alternative Design was then assembled assuming a 1.0 g/s emission rate. As in the near-field receptor modeling assessment, the new ventilation exhaust source was modeled as twelve 8' line volume sources and was placed on drawings and maps provided in the Final EIS. Results from this run were compared to the Reference Design model run. Final impacts were scaled to a 24-hour averaging period for comparison to the NAAQS using AERSCREEN's default scaling factor.

5.0 Results

The results of the Alternative Design near-field receptor analysis at each receptor are found in Figure 4. As can be seen only 2 receptors show estimated impacts in the 110-130 $\mu\text{g}/\text{m}^3$, which is slightly greater than impacts predicted for the Reference Case for the same vicinity and depicted for reference in Figure 3. Even though these are increased impacts, they are still well below the NAAQS of 150 $\mu\text{g}/\text{m}^3$ and less than the Final EIS Reference Design I-70 at I-25 maximum impacts found in Table 1.

The sensitive receptor analysis showed that the maximum modeled impacts from the Alternative Design ventilation system are estimated to decrease substantially as compared to

the Reference Design by 45-83% for the sensitive receptors located at and near Swansea Elementary School. The predicted change in impacts at each of the ten receptors at the school is shown in Table 3.

6.0 Conclusions

While impacts within the immediate vicinity of the Alternative Design ventilation system are expected to increase, the near-field assessment shows all impacts of the Alternative Design are well below the NAAQS and below or equivalent to maximum impacts found in the Final EIS Reference Design modeling assessment. Thus, no changes to the Final EIS conclusions are required.

It is possible that the predicted, elevated impacts in the vicinity of the Alternative Design ventilation system could be decreased by refining some of the simplifying modeling assumptions. For example, the use of volume sources to simulate ventilation sources within AERMOD is a potential conservative assumption that went into this analysis. AERMOD takes no consideration that there will be a structure associated with the vent outlet and assumes that the vent vents equally in all directions. This is an important assumption as the planned location of the Alternative Design vent is on the *south* side of a structure, and the receptors which showed highest impacts are north of that structure. It is expected that the structure would substantially modify the vent exhaust plume under southerly winds, dispersing the plume and decreasing plume concentrations prior to the plume impacting the nearby receptors.

While the assumptions built into this analysis are conservative, it is important also to note that the estimated predicted impacts on the very near field receptors (i.e. within approximately 100m of the ventilation source) are highly dependent on the assumed source/receptor distance and volume source specifications. It was assumed that the plant room structure was approximately 35 meters from the nearest receptor based on drawings and maps provided in the Final EIS. However, there is uncertainty in this distance due to the resolution of maps/drawings available. If the ambient boundary (i.e., nearest receptors) is actually further north of the structure, the impacts would be considerably lower at the nearest receptors since impacts rapidly decrease moving away from the modeled source. However, if the plant room is placed closer than 35 meters to receptors, the impacts would increase and a very accurate simulation of the venting/ambient air configuration may be needed to assess whether impacts will exceed the NAAQS.

Clearly, this is a simplified analysis and limited by the lack of access to the modeling files supporting the Final EIS. This has led to some conservatism such as using worst-case meteorological data. Regardless, the results indicate that PM₁₀ impacts from the Alternative Design ventilation system are consistent with, and in most cases lower than those published in the Final EIS. While some uncertainty exists, there are considerable additional mitigation measures that could be considered to reduce elevated impacts if the results change as a result of further design or incorporation of more refined data. These include:

- Additional fresh air could be pulled into the plenum prior to venting to dilute the emitted plume.
- The vent could be moved further from the nearest receptors.
- The vent exit could be changed to vertical and the height increased.
- The vent could be split into two vents and placed at either end of the structure to further spread out emissions.

In any case, to limit impacts to ambient air in neighborhoods to the north, it is recommended that the vent be located on the south side of the structure and as far from those receptors as possible.

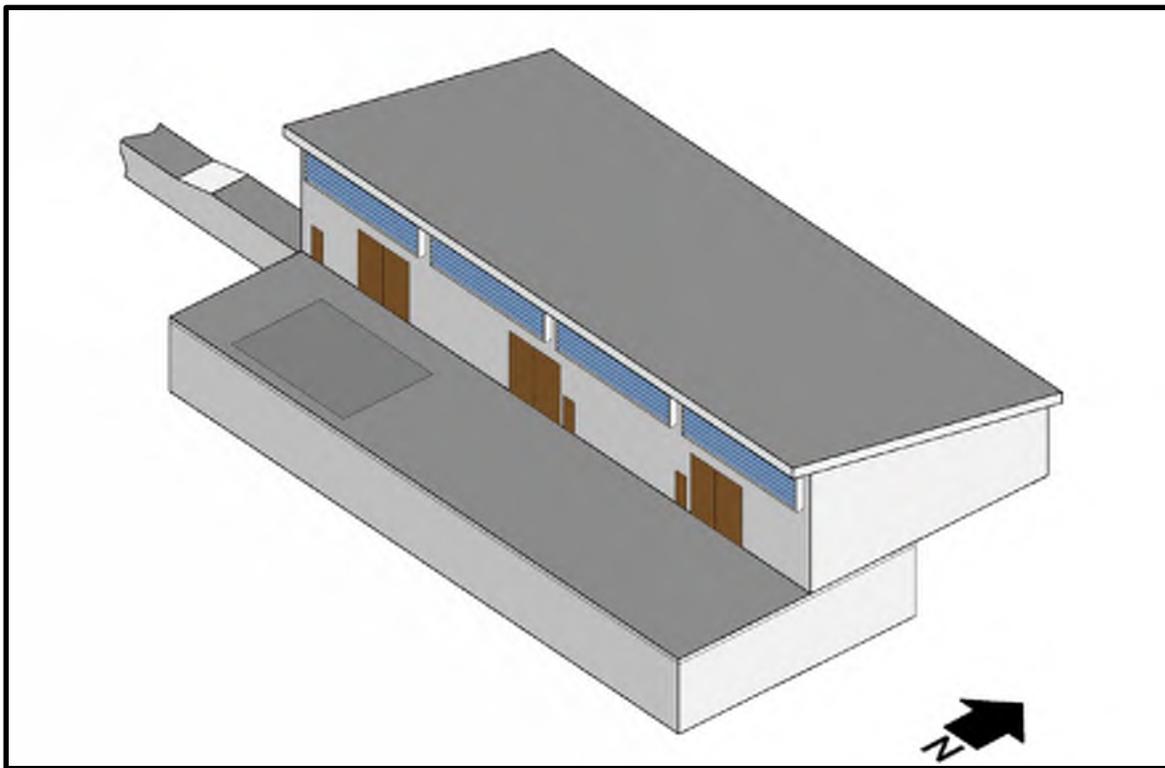
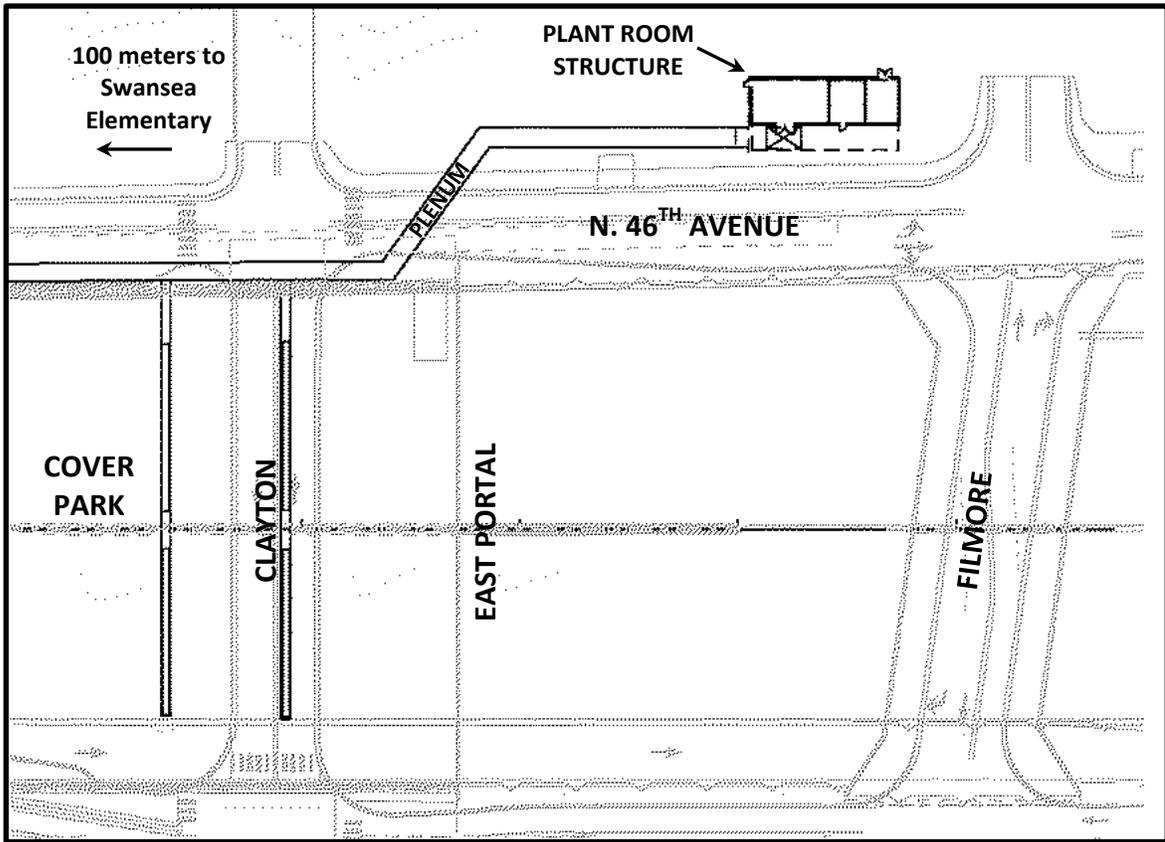


Figure 1 Proposed Alternate Ventilation Design (Not to Scale)

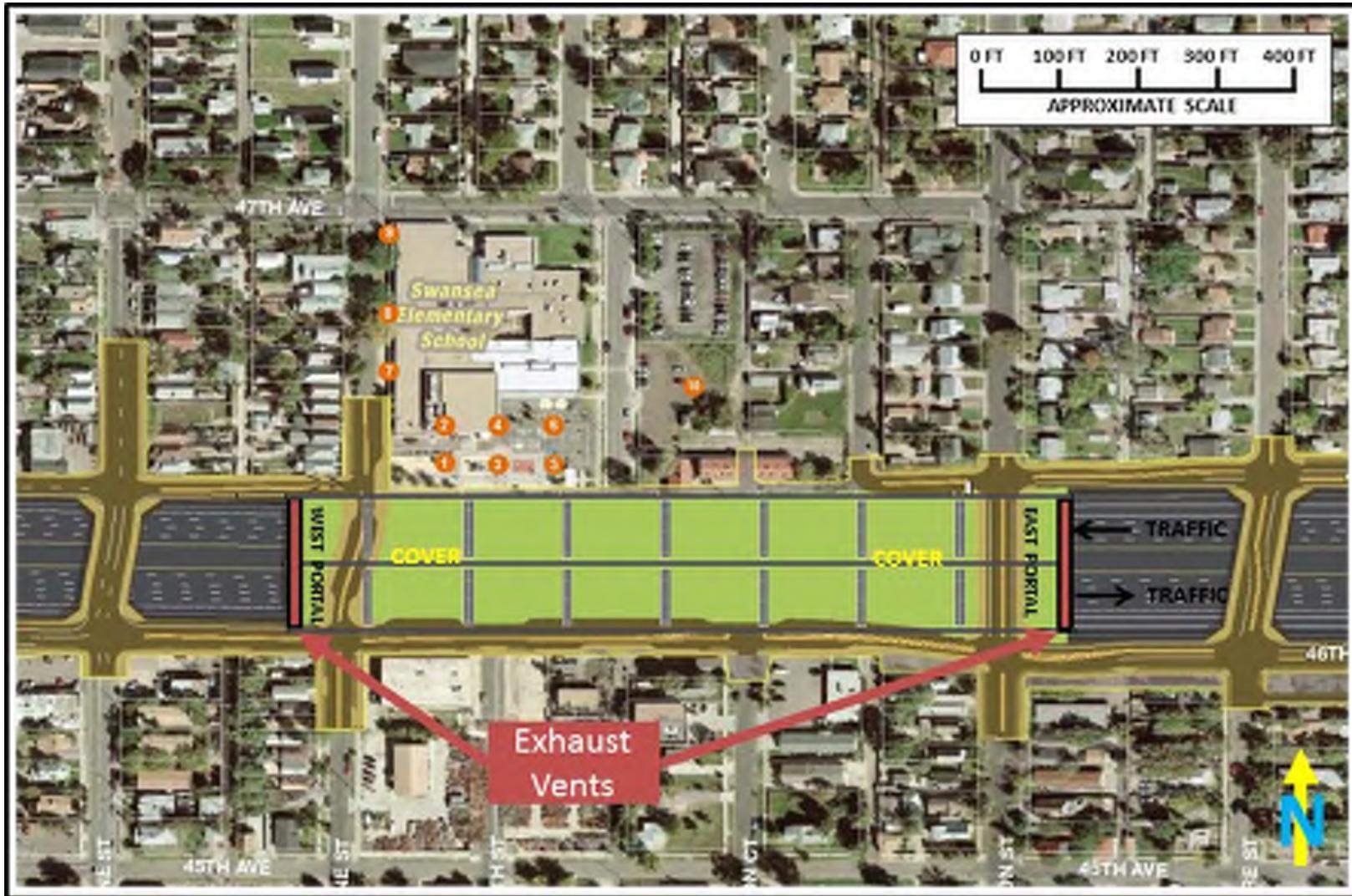


Figure 2 Reference Ventilation Design (Not to Scale) and sensitive receptor locations (orange numbered dots)

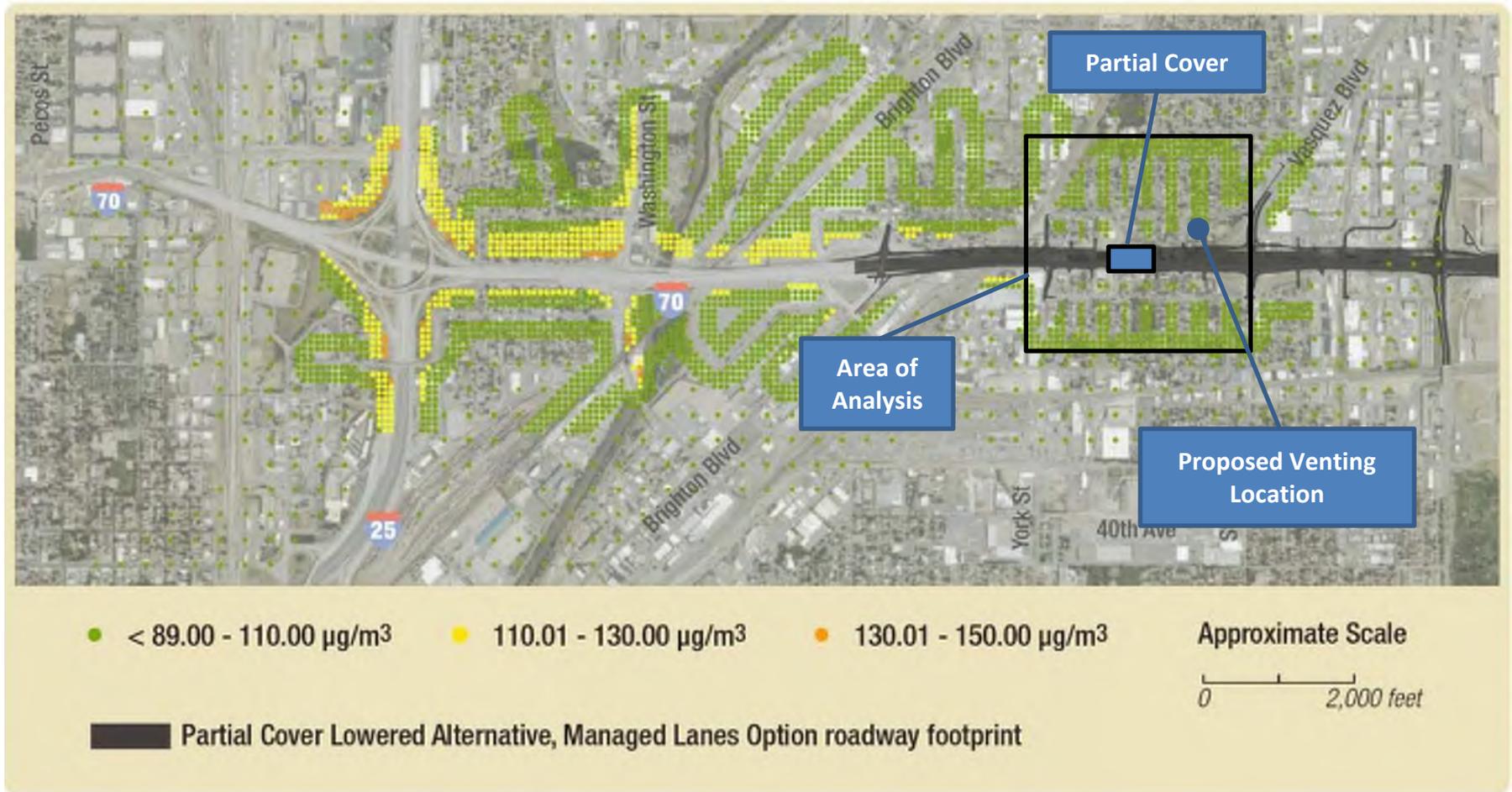


Figure 3 Reference Design Modeled Impacts

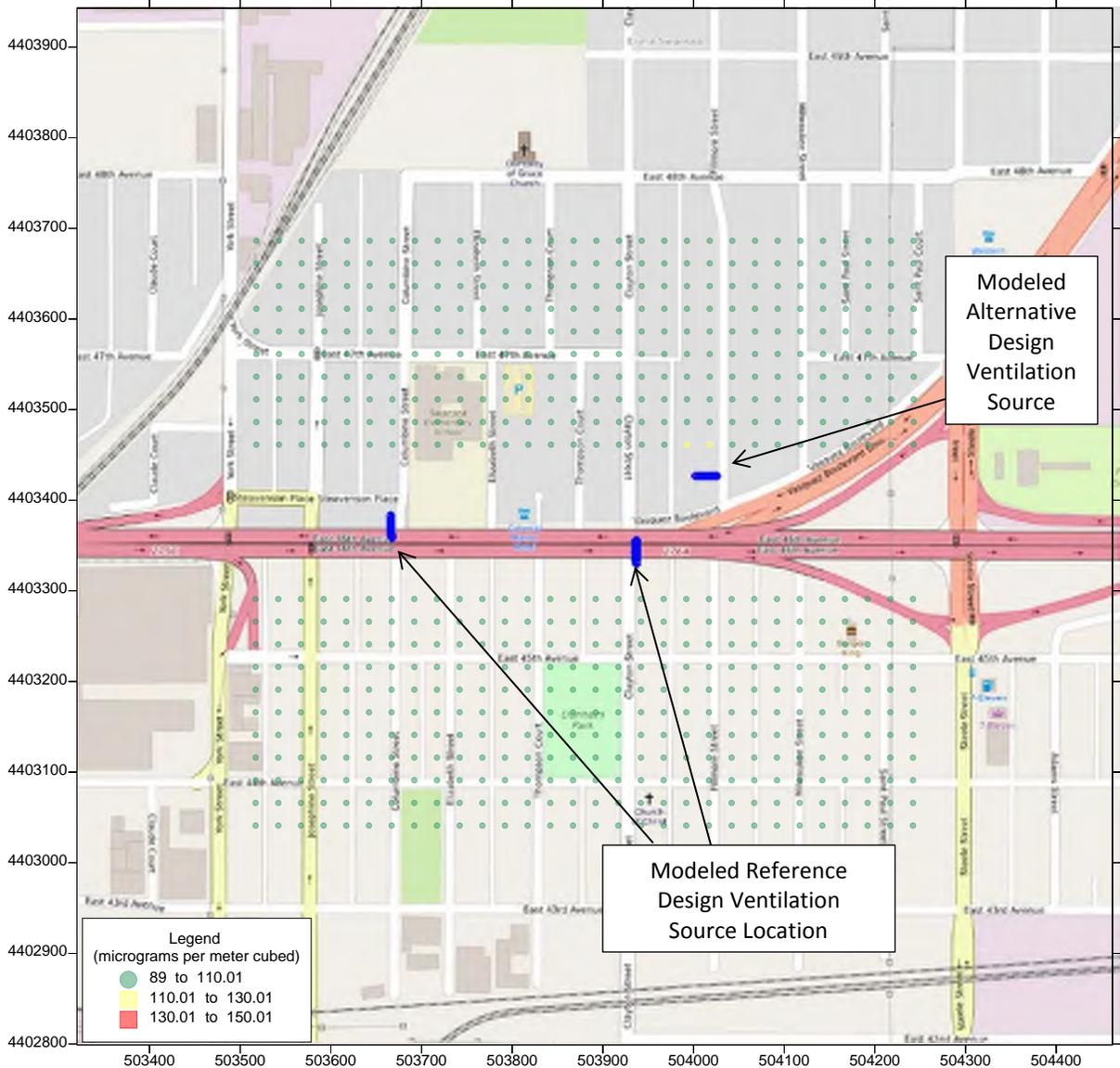


Figure 4 Proposed Alternative Ventilation Design (Not to Scale) Modeled Impacts at Near-Field Receptors and Ventilation Source Locations

Table 1 Final EIS PM₁₀ Hotspot Analysis¹

Alternative	Forecasted 2035 PM ₁₀ Concentrations (µg/m ³) ²					
	General-Purpose Lanes Option			Managed Lanes Option		
	Modeled Project	Project + Background ²	Design Value	Modeled Project	Project + Background ²	Design Value
I-70 at I-25						
No Action Alternative	62	151	150	N/A	N/A	N/A
Revised Viaduct Alternative	62	151	150	64	153	150
Partial Cover Lowered Alternative	63	152	150	57	46	150
I-70 at I-225						
No Action Alternative	26	115	120	N/A	N/A	N/A
Revised Viaduct Alternative	35	124	120	41	130	130
Partial Cover Lowered Alternative	46	135	140	40	129	130

¹ Impacts from Exhibit 5.10-12 in I-70 East Final EIS (2016). Note that the 24-hour PM₁₀ NAAQS is 150 µg/m³.

² Concentrations include project concentrations by alternative plus background concentration of 89 µg/m³.

Table 2 PM₁₀ Design Value Concentrations at Swansea Elementary School¹

Receptor Number and Location	Forecasted 2035 PM ₁₀ Concentrations (µg/m ³) ²		
	No Action Alternative	Revised Viaduct Alternative	Partial Cover Lowered Alternative
1. Playground Southwest	110	120	100
2. School Building Southwest Corner	110	110	100
3. Playground South	110	120	100
4. School Building South Edge	110	110	100
5. Playground Southeast	110	120	100
6. Playground Northeast	110	110	100
7. Columbine St – School Bus Loading Zone	110	110	100
8. Columbine St between 46 th Ave and 47 th Ave	110	110	100
9. Columbine St and 47 th Ave	100	100-110	100
Elizabeth St between 46 th Ave and 47 th Ave – unpaved parking lot across from school	110	110	100

¹ Impacts from Exhibit 5.10-12 in I-70 East Final EIS (2016). Note that the 24-hour PM₁₀ NAAQS is 150 µg/m³.

² Concentrations include project concentrations by alternative plus background concentration of 89 µg/m³.

³ Range in values reflects the lower concentration with the Managed Lanes Option (100) compared to the General-Purpose Lanes Option of 110. There are no differences between options for the other locations.

Table 3 PM₁₀ Design Value Concentrations at Swansea Elementary School

Receptor Number and Location	Predicted PM ₁₀ Concentrations (µg/m ³) for the Alternative Design as compared to the Reference Design
1. Playground Southwest	84%
2. School Building Southwest Corner	82%
3. Playground South	79%
4. School Building South Edge	76%
5. Playground Southeast	71%
6. Playground Northeast	67%
7. Columbine St – School Bus Loading Zone	76%
8. Columbine St between 46 th Ave and 47 th Ave	72%
9. Columbine St and 47 th Ave	62%
10. Elizabeth St between 46 th Ave and 47 th Ave – unpaved parking lot across from school	45%

CENTRAL 70 – DETAILED ALTERNATIVE TECHNICAL CONCEPT (ATC) 26.1

October 20, 2016



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Contents

- Document History** iii
- Contents** iv
 - Introduction** 1-1
 - Design Fire Scenario** 2-1
 - 2.1 Introduction..... 2-1
 - 2.2 Applicable Standards and Criteria 2-1
 - 2.3 Objective 2-1
 - 2.4 Design Fire 2-2
 - 2.5 CFD Model and Methodology 2-2
 - 2.5.1 CFD Geometry 2-3
 - 2.5.2 Ventilation Scheme 2-4
 - 2.5.3 Boundary Conditions 2-5
 - 2.6 Egress Calculations 2-6
 - 2.7 Results 2-7
 - 2.8 Conclusions..... 2-9
 - Congested Traffic Emissions Scenario** 3-1
 - 3.1 Introduction..... 3-1
 - 3.2 Applicable Standards and Criteria 3-1
 - 3.3 Objective 3-1
 - 3.4 Traffic Emissions..... 3-1
 - 3.5 CFD Model and Methodology 3-2
 - 3.5.1 CFD Geometry 3-2
 - 3.6 Ventilation Scheme 3-4
 - 3.7 Boundary Conditions 3-5
 - 3.8 Results 3-5
 - 3.9 Conclusions..... 3-6
- References 1
- Appendix A1 Visibility Results – 30 MW Fire – 3 Transverse Ducts**.....A1-1
- Appendix A2 Visibility Results – 30 MW Fire – 5 Transverse Ducts**..... A2-1
- Appendix B Congested Traffic Scenario**B-1
- Appendix C Egress Time Calculation**C-1

Tables

Table 1. Calculated values for exhaust velocity through the damper for assumed damper sizes 2-5
Table 2: Summary of 30 MW Fire Simulations Setup 2-7
Table 3: Summary of 30 MW (102.36 MBtu/hr). Fire Simulations Results..... 2-9
Table 4. Maximum Pollutant Levels 3-1
Table 5. Calculated values for exhaust velocity through the damper modules 3-4
Table 6: Summary of Congested Operations Setup 3-5
Table 7: Summary of Congested Operations Setup 3-6

Figures

Figure 1. Medium fire growth is curve shown with a peak heat release rate of 30 MW (102.36 MBtu/hr)... 2-2
Figure 2. The CFD model geometry is shown with the 30 MW fire at west portal and the traffic backed up behind it. 2-3
Figure 3. Plan view of the tunnel showing the 30 MW fire source at west portal, the converging tunnel wall and the girders. 2-3
Figure 4. End view of the tunnel looking west..... 2-4
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]. 2-6
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. 3-3
Figure 7. End view of the tunnel showing the congested traffic in both the tunnels 3-3
Figure 8. Plan view of the tunnel showing the congested traffic, dividing wall and exhaust dampers in the tunnel cover 3-4
Figure A-9. Visibility on a plane 8.2 ft above Tunnel floor (3 Transverse Ducts)6
Figure A-10. Temperature on a plane 8.2 ft above Tunnel floor (3 Transverse Ducts) 12
Figure A-11. Visibility on a plane 8.2 ft above Tunnel floor (5 Transverse Ducts)6
Figure A-12. Temperature on a plane 8.2 ft above Tunnel floor (5 Transverse Ducts) 12
Figure B-1. NO₂ ppm concentration on a plane 8.2 ft above Tunnel floor (350 kcfm exhaust 120 s after start of fire).....8
Figure B-2. NO ppm concentration on a plane 8.2 ft above Tunnel floor (350 kcfm exhaust after 120s from start of fire) 15
Figure B-3. CO ppm concentration on a plane 8.2 ft above Tunnel floor (350 kcfm exhaust after 120s from start of fire) 22
Figure B-4. PM Extinction Coefficient on a plane 8.2 ft above Tunnel floor (350 kcfm exhaust after 120s from start of fire) 29

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

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 NO₂, 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.

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 m³/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).

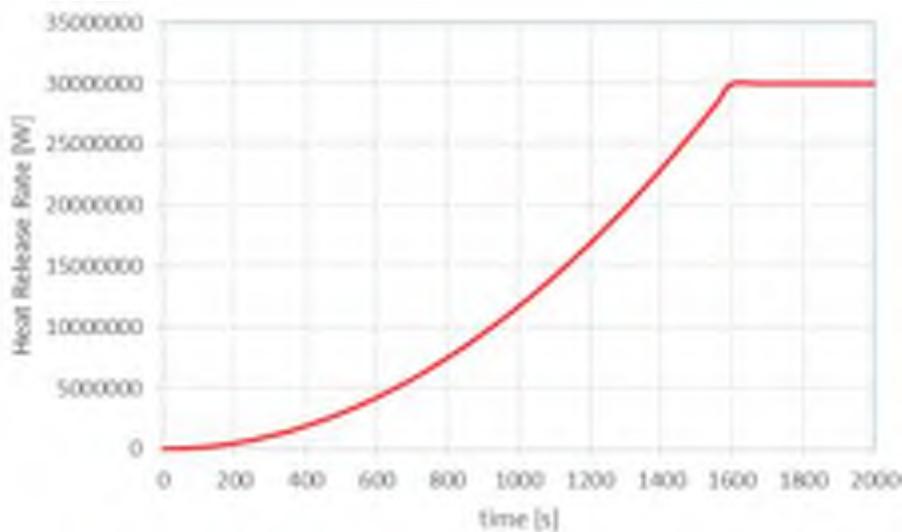


Figure 1. Medium fire growth is curve shown with a peak heat release rate of 30 MW (102.36 MBtu/hr).

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 that 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.

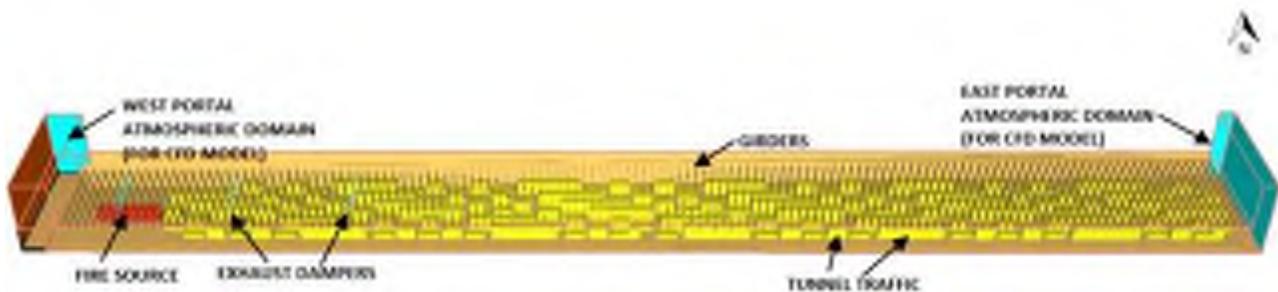


Figure 2. The CFD model geometry is shown with the 30 MW fire at west portal and the traffic backed up behind it.

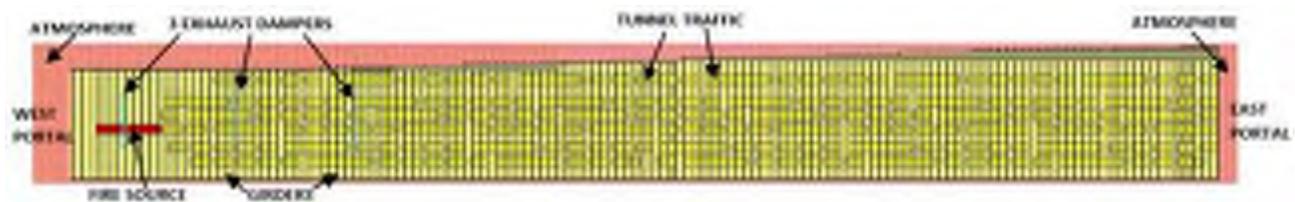


Figure 3. Plan view of the tunnel showing the 30 MW fire source at west portal, the converging tunnel wall and the girders.

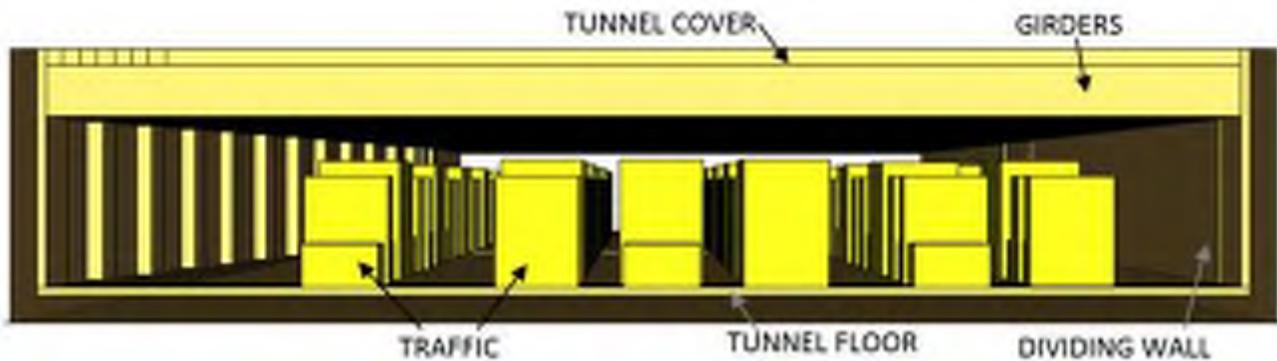


Figure 4. End view of the tunnel looking west

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 ft². 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 ft². 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.

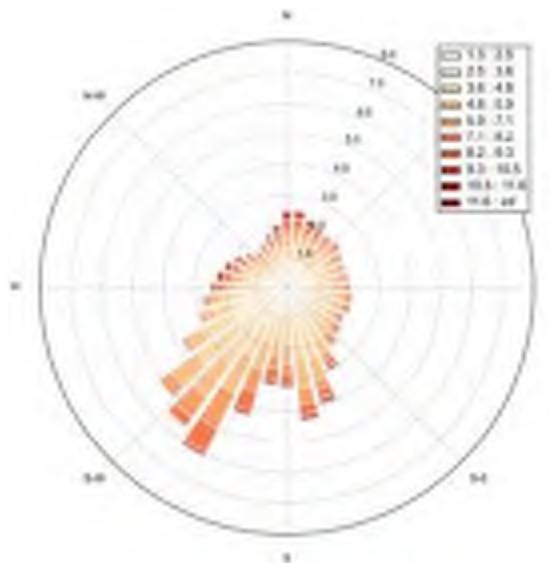


Figure 5. Wind rose data at Denver International Airport between 1997 and 2014 showing the prevailing direction and velocity (m/s) provided by the National Climatic Data Center website[4].

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 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 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 2/3 rd of the tunnel is untenable. The non-incident 1/3 rd 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.

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., NO₂, 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, NO₂ 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 that 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.

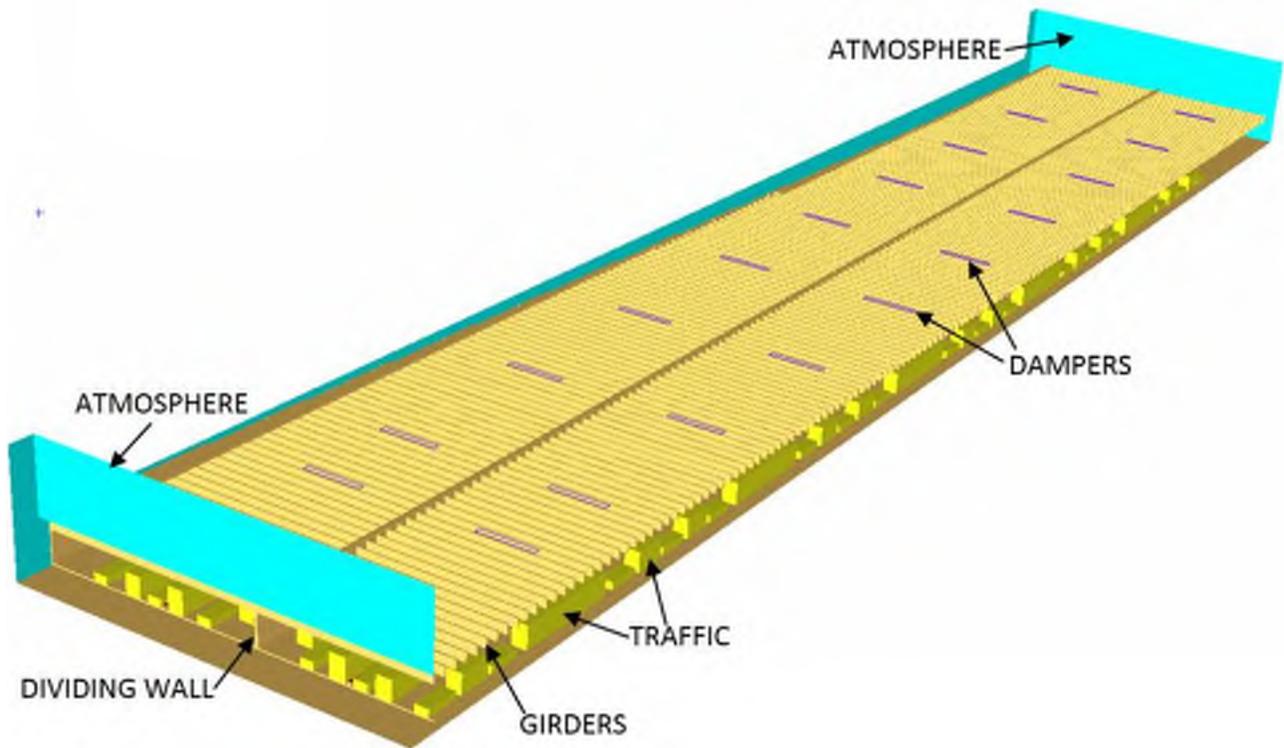


Figure 6. Isometric view of the CFD model showing the two tunnels with the dividing wall, congested traffic, girders and the dampers connected to the transverse ducts at the tunnel cover.

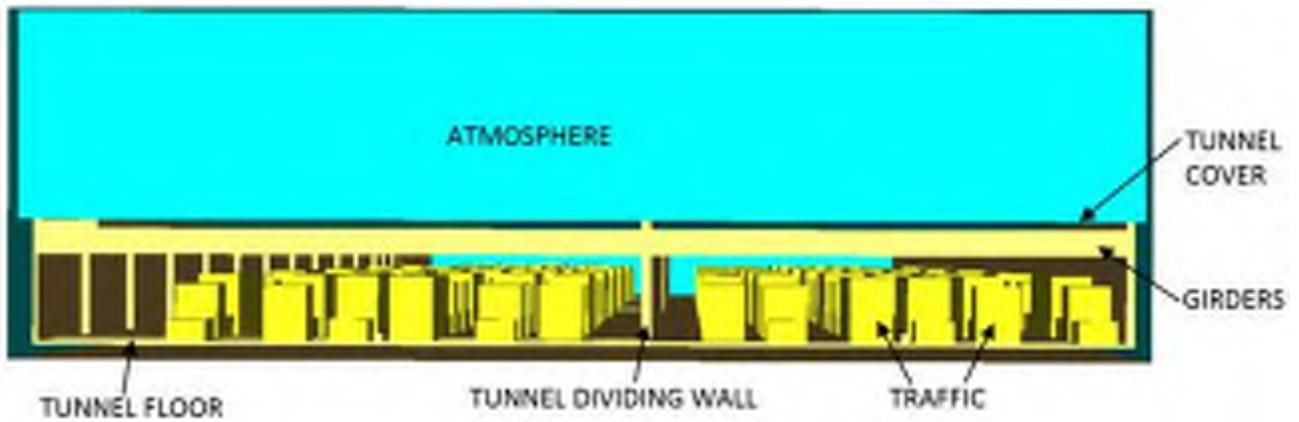


Figure 7. End view of the tunnel showing the congested traffic in both the tunnels

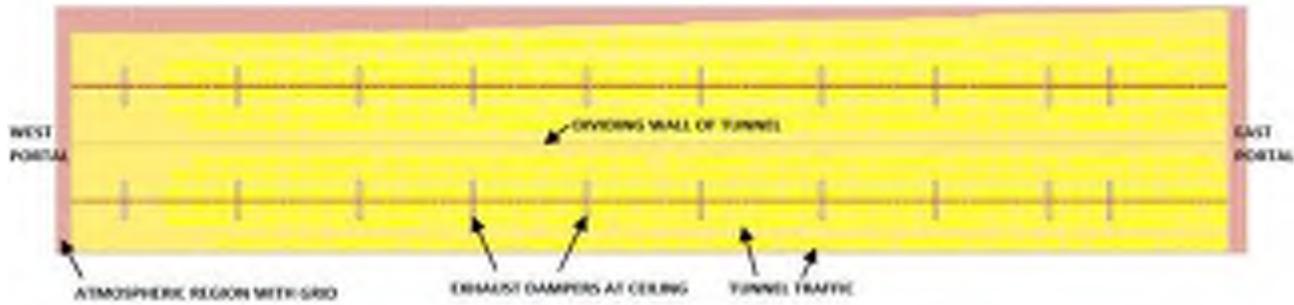


Figure 8. Plan view of the tunnel showing the congested traffic, dividing wall and exhaust dampers in the tunnel cover

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 PM_{2.5} 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 PM_{2.5} 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 NO₂, 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.

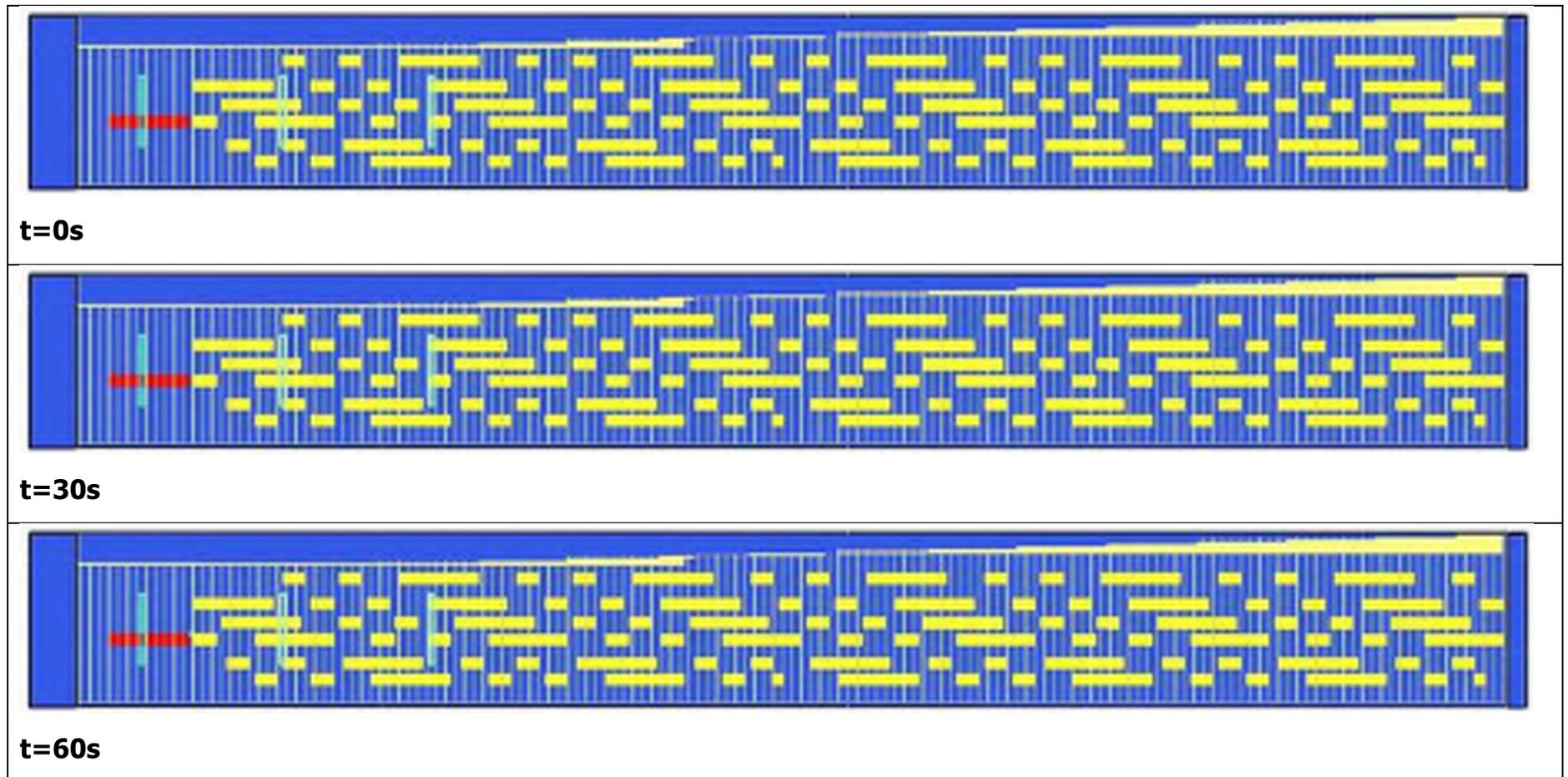
4 References

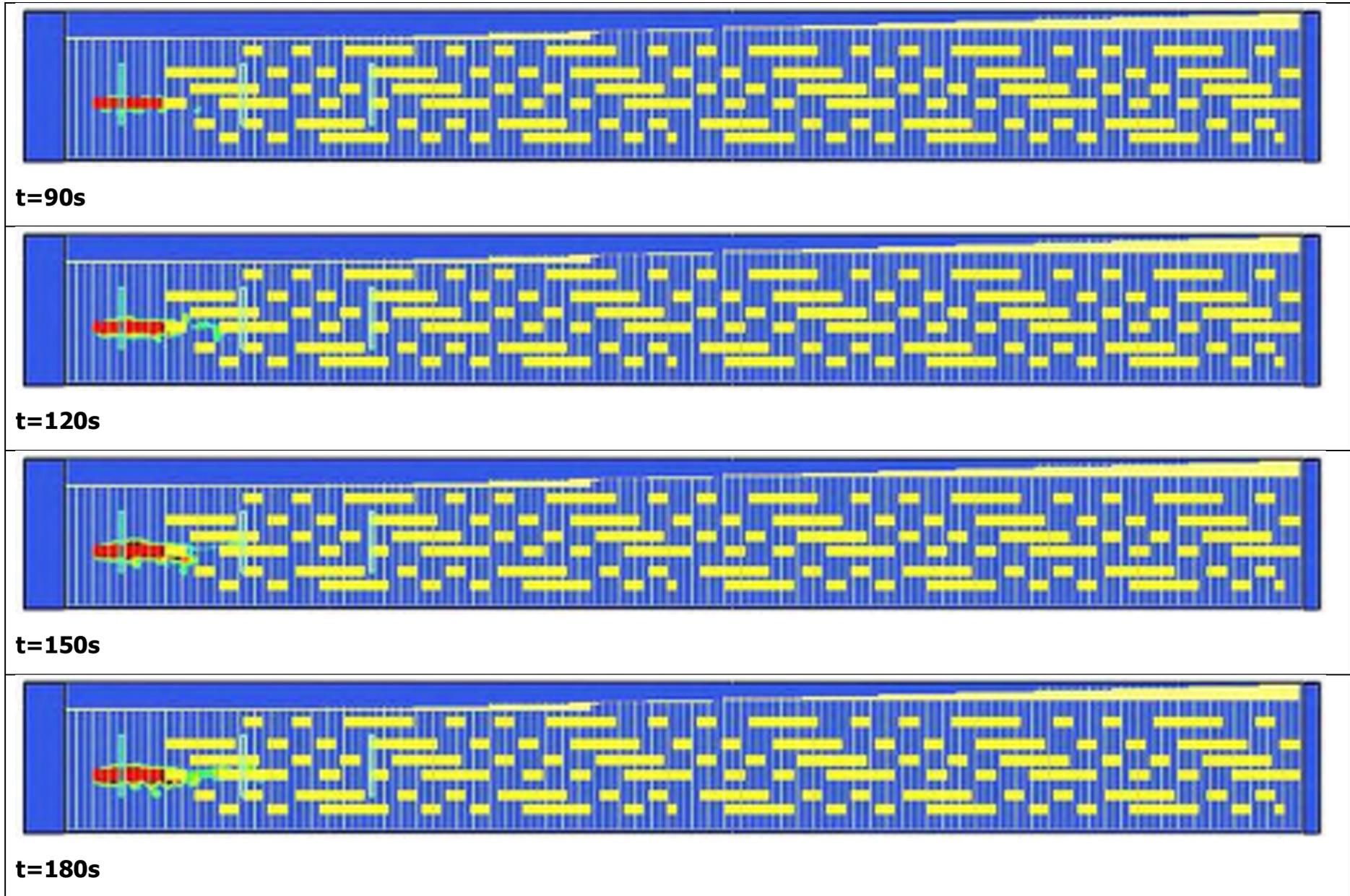
- [1] Central 70 Project: Project Agreement, Schedule 10, Section 12, Addendum No. 3, June, 2016.
- [2] NFPA 502, Standard for Road Tunnels, Bridges and Other Limited Access Highways, National Fire Protection Association, 2014.
- [3] Fire Dynamics Simulator, National Institute of Standards and Technology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

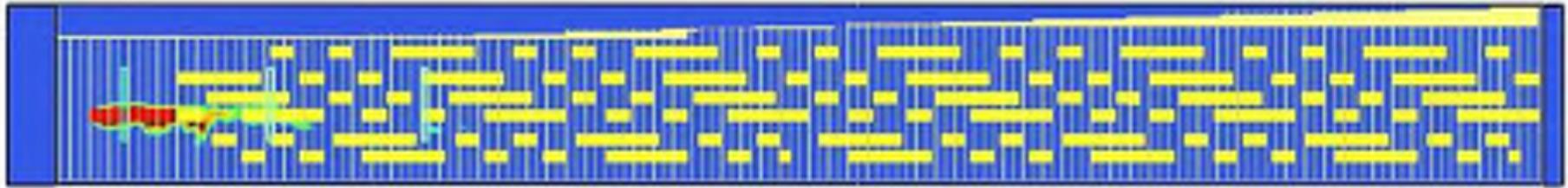
Appendix A1 - Figures 30 MW Fire – 3 Transverse Ducts

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.

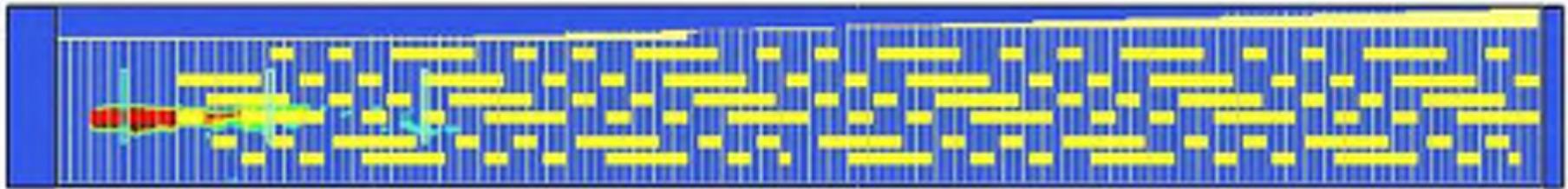
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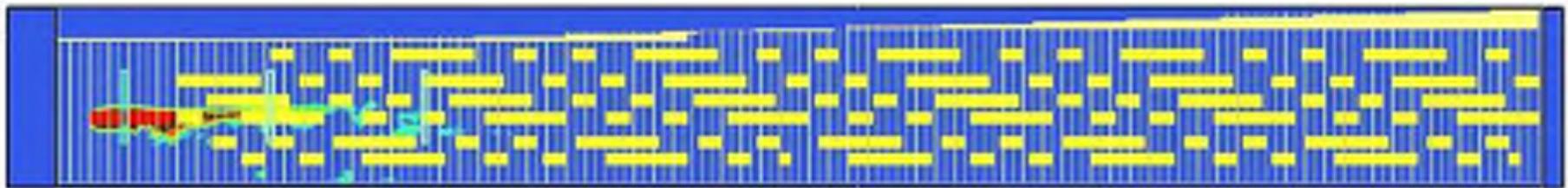




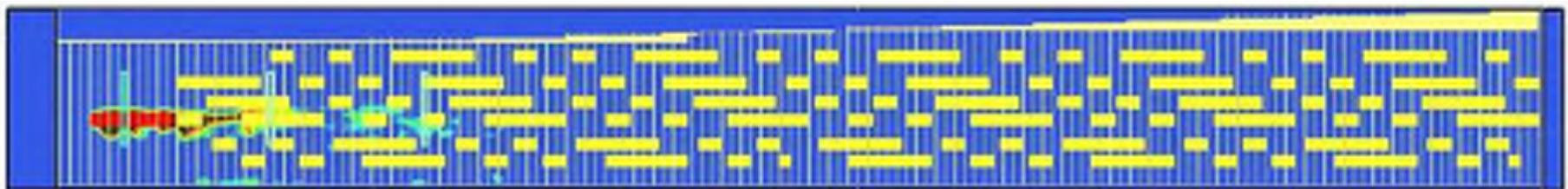
t=210s



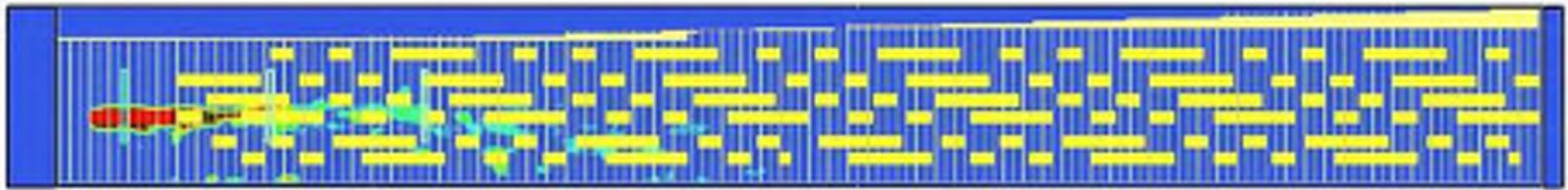
t=240s



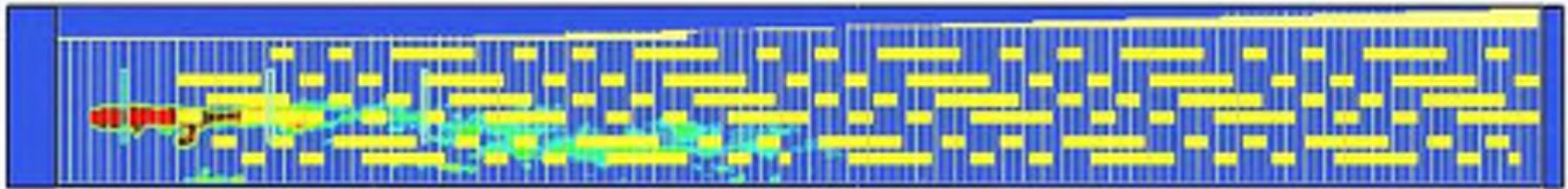
t=270s



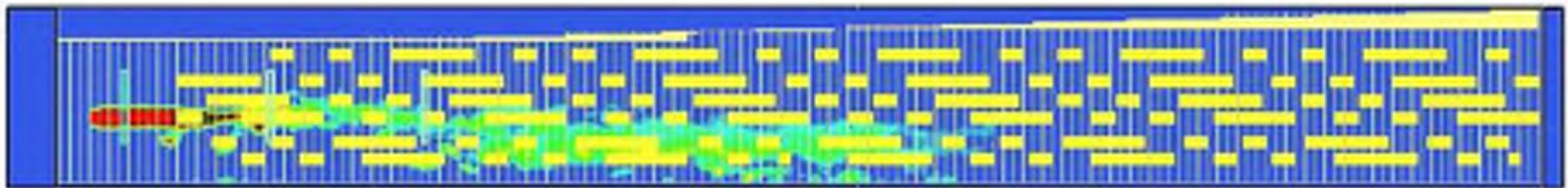
t=300s



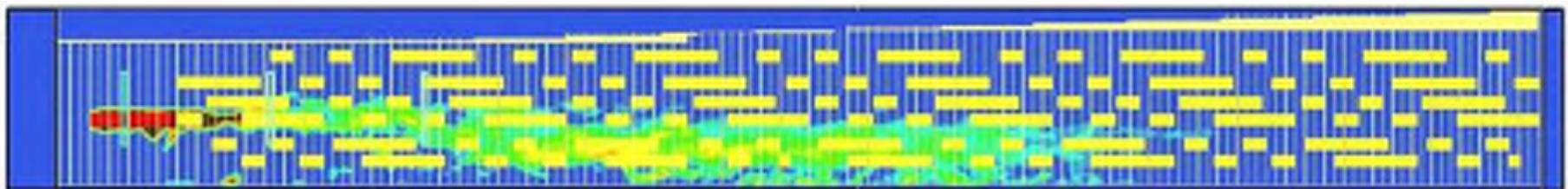
t=330s



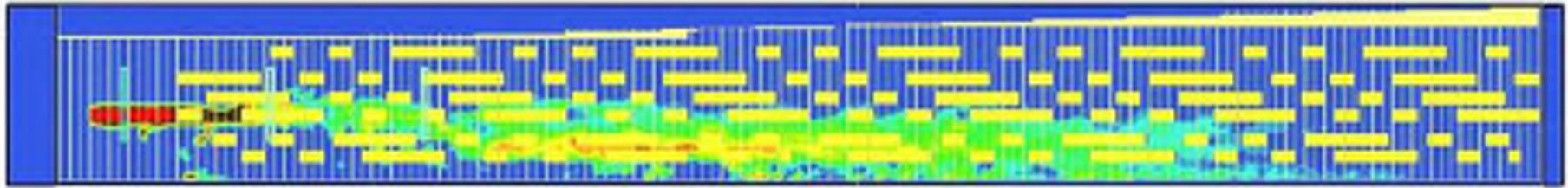
t=360s



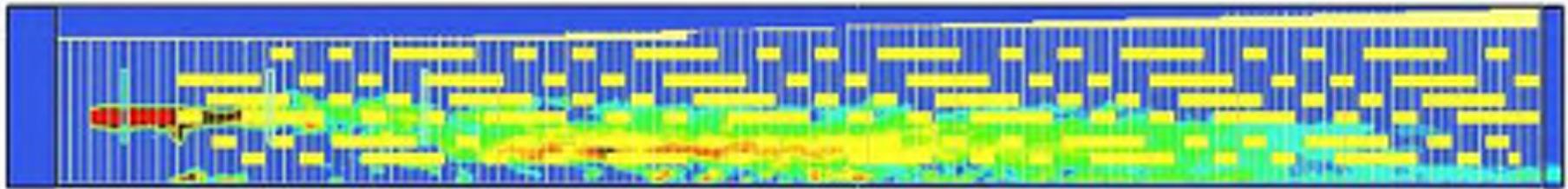
t=390s



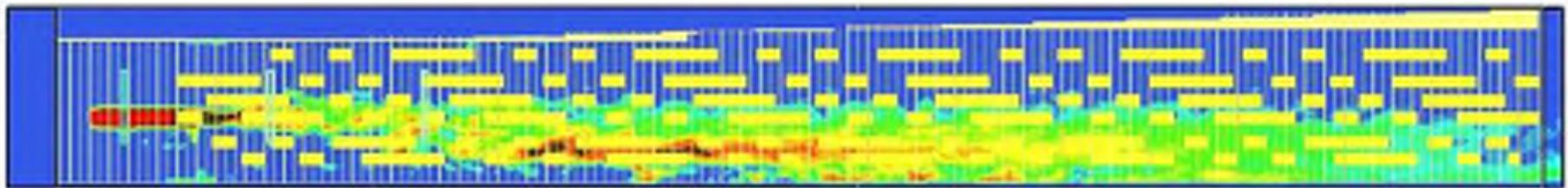
t=420s



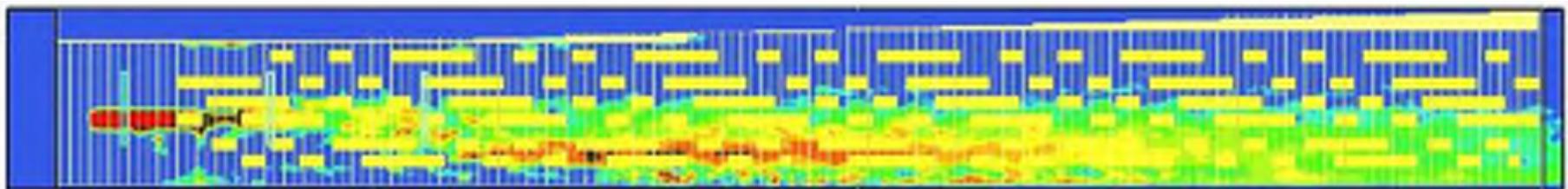
t=450s



t=480s



t=510s



t=540s

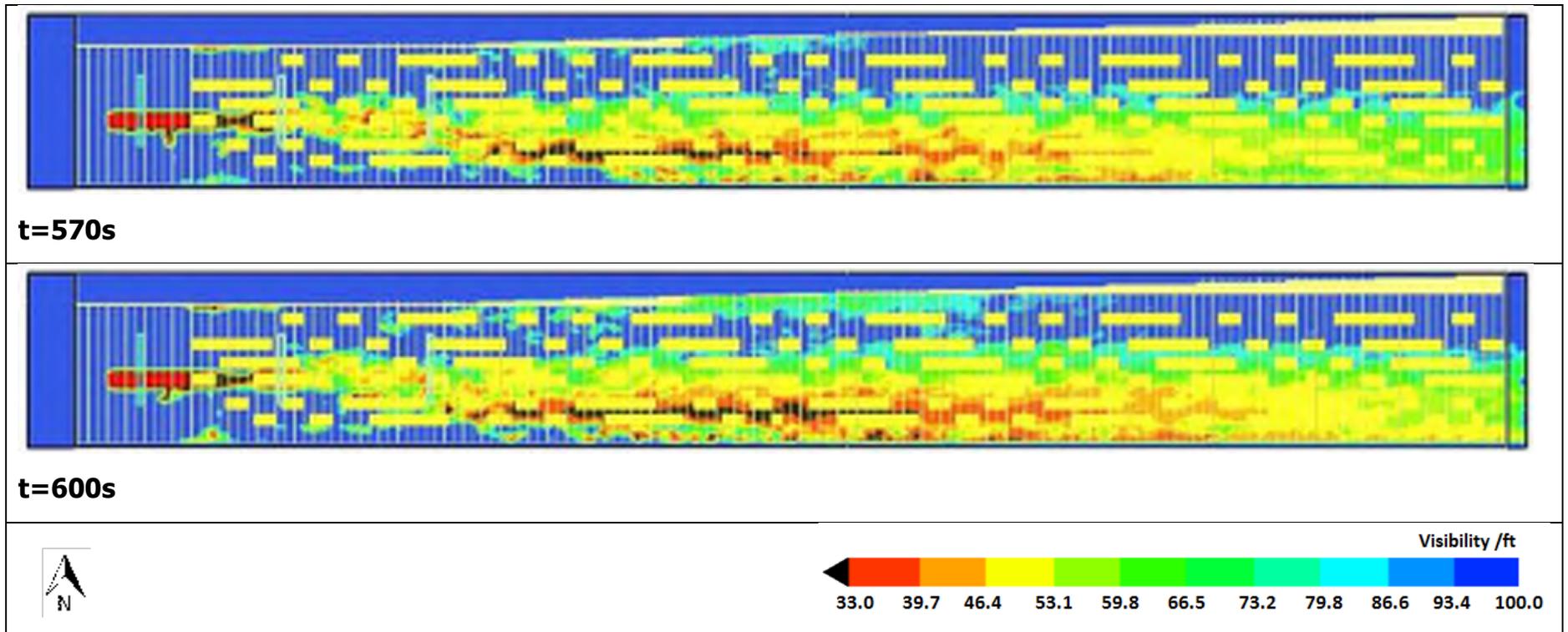
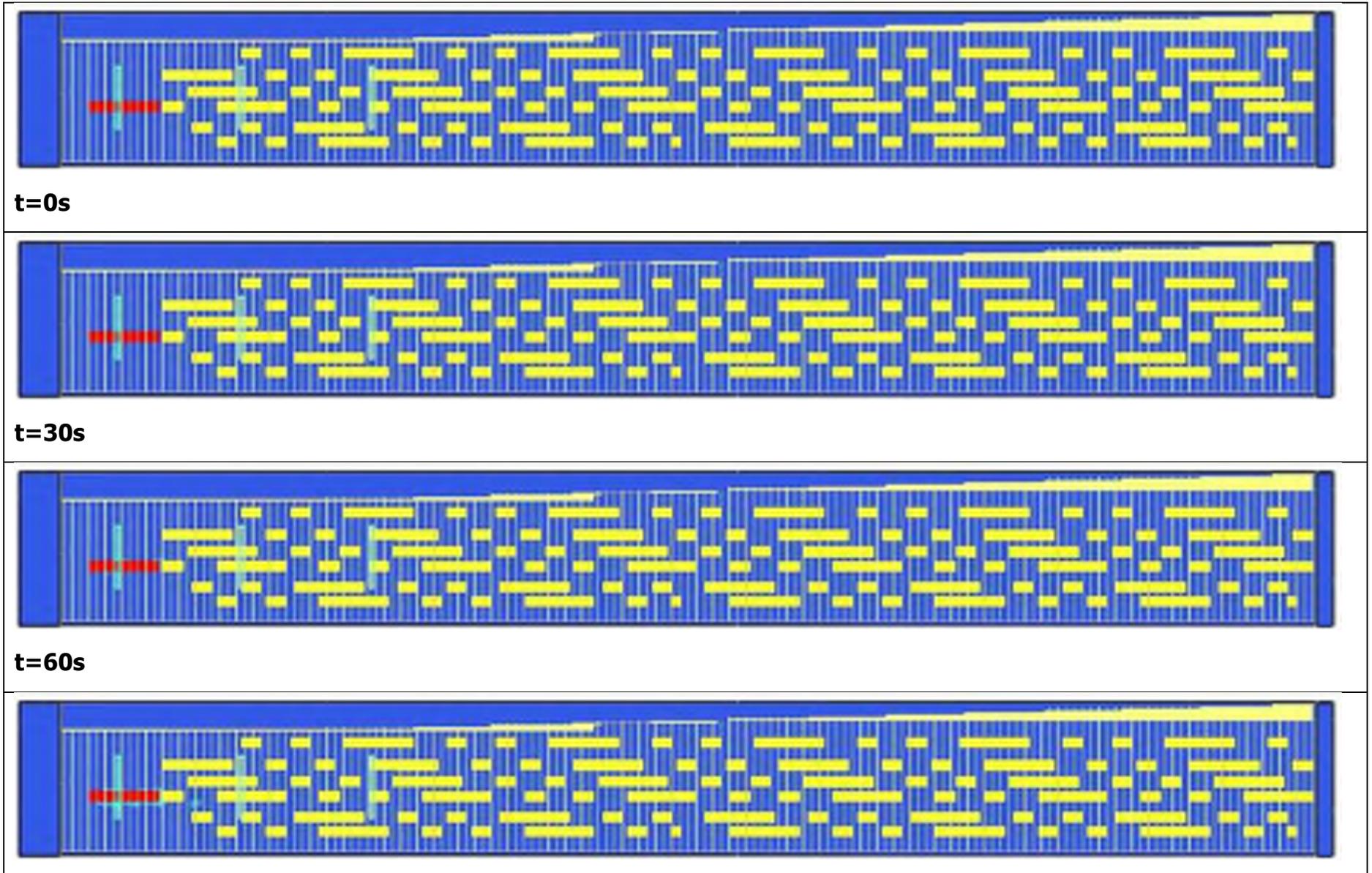
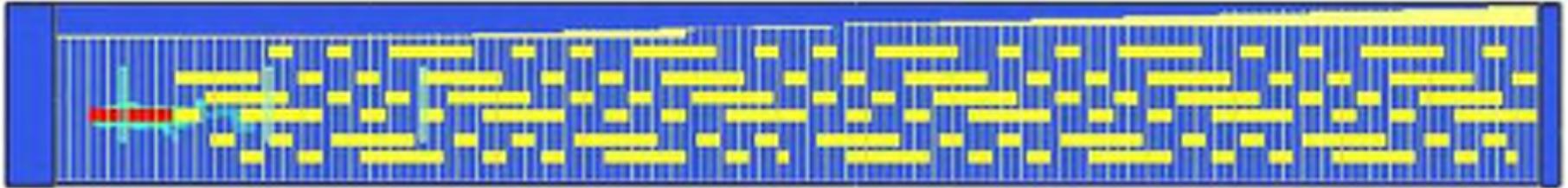


Figure A-1. Visibility on a plane 8.2 ft above Tunnel floor (3 Transverse Ducts)

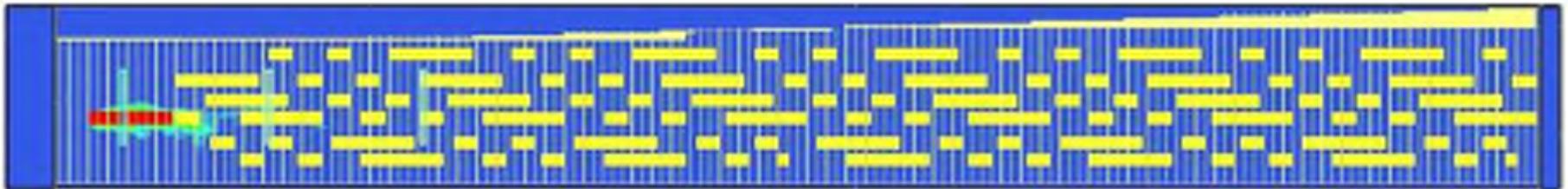
Temperature:



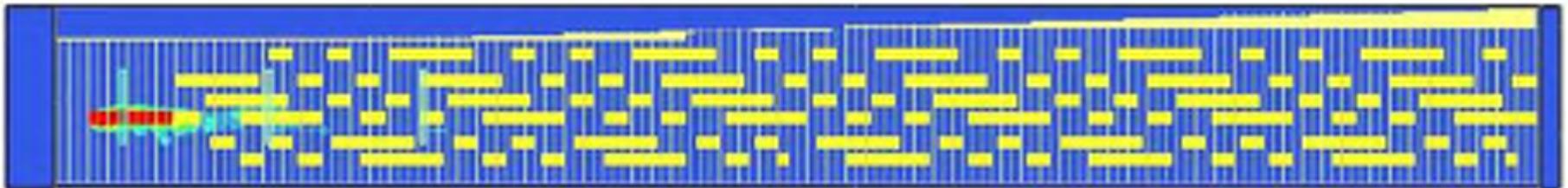
t=90s



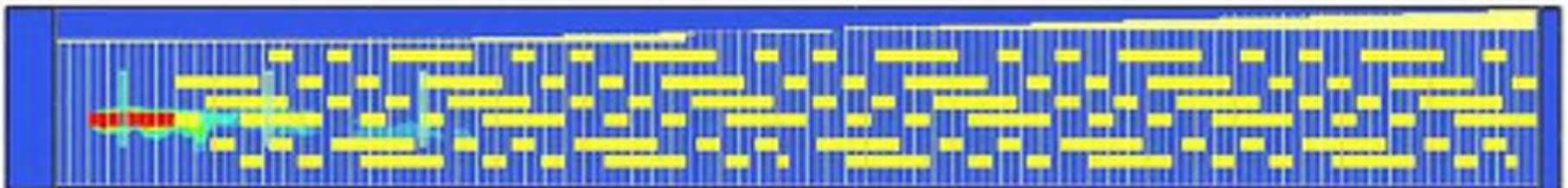
t=120s



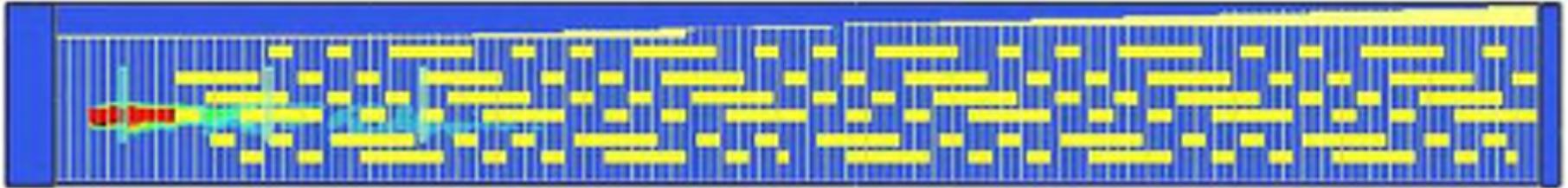
t=150s



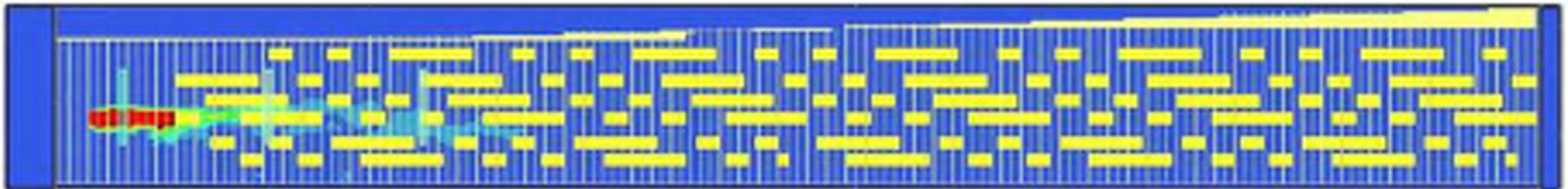
t=180s



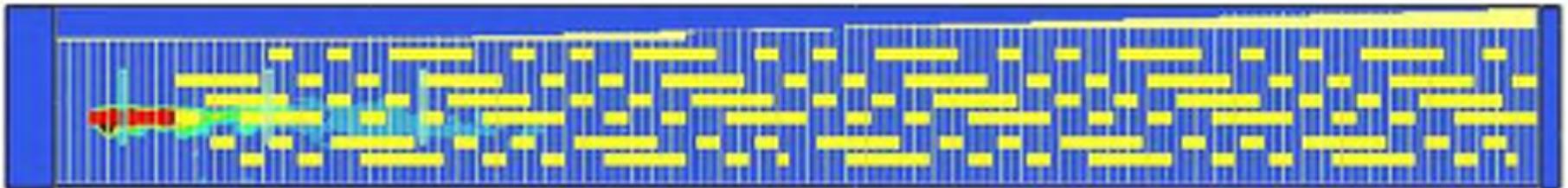
t=210s



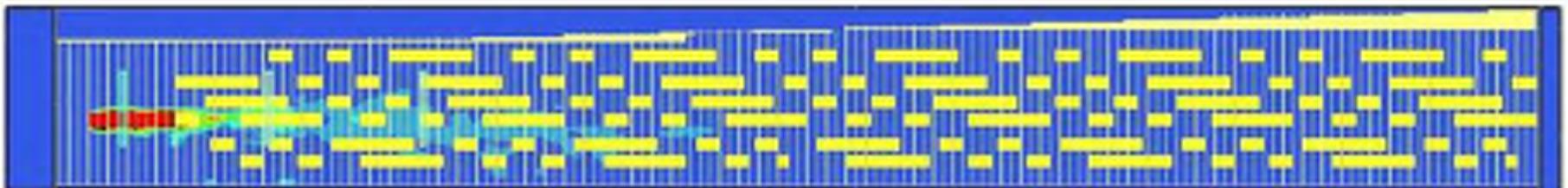
t=240s



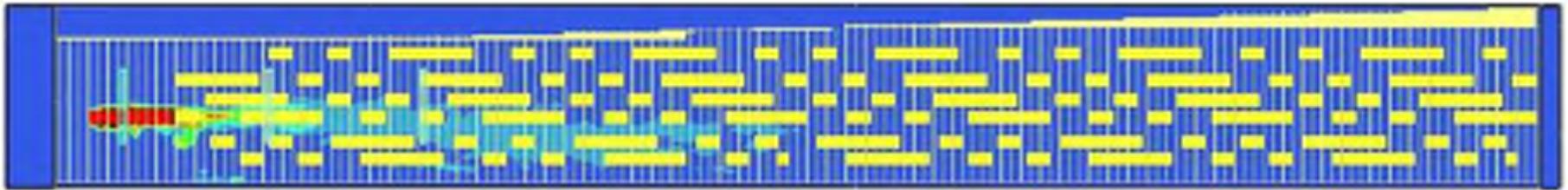
t=270s



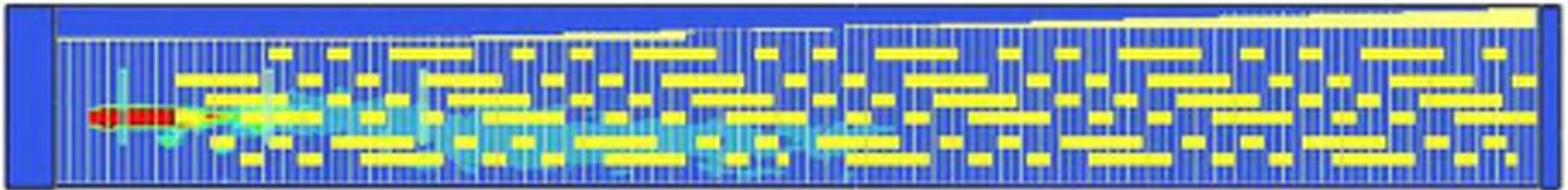
t=300s



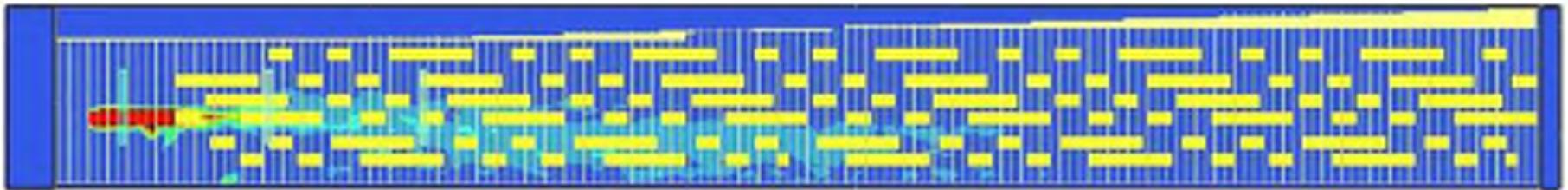
t=330s



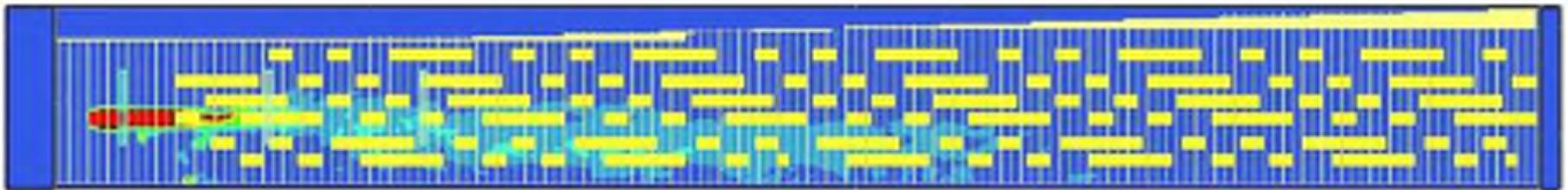
t=360s



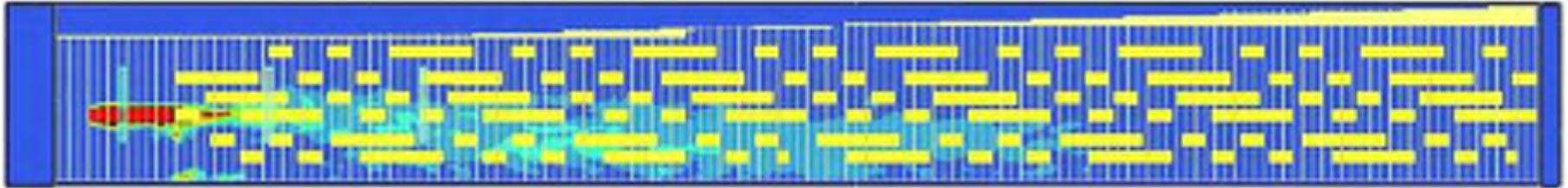
t=390s



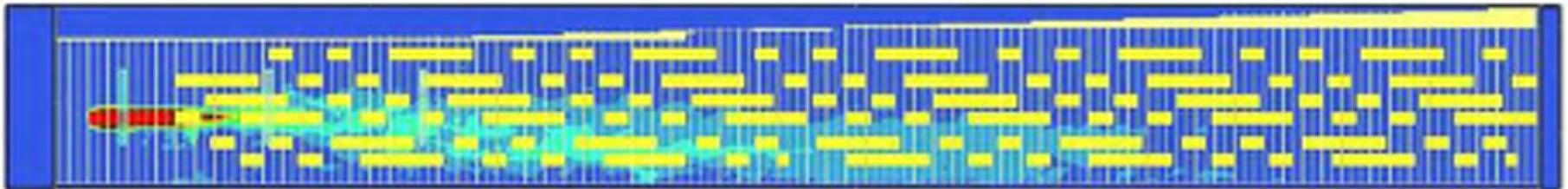
t=420s



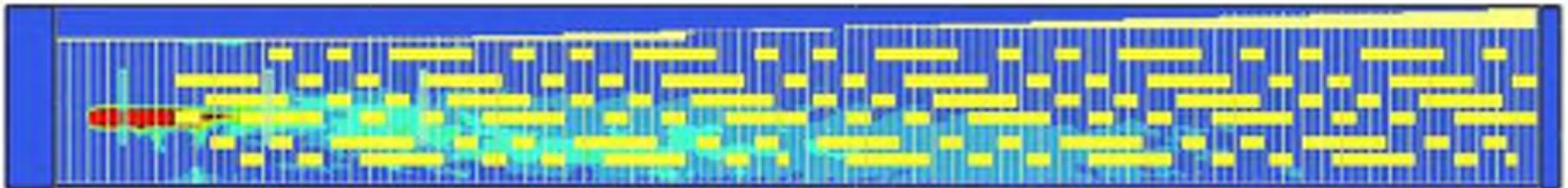
t=450s



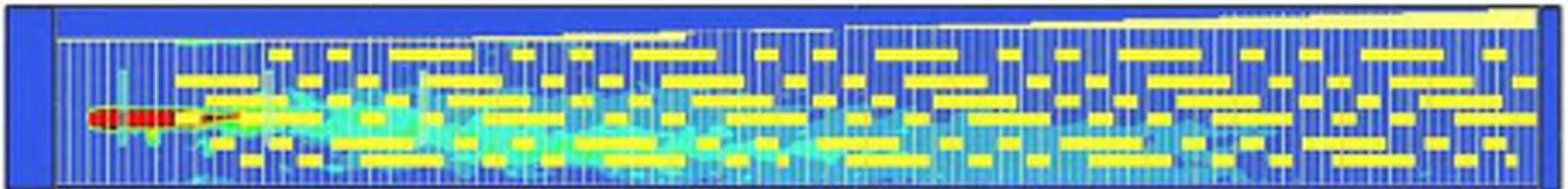
t=480s



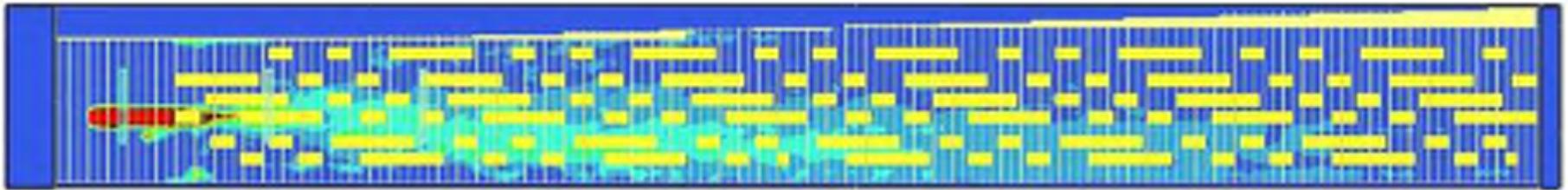
t=510s



t=540s



t=570s



t=600s

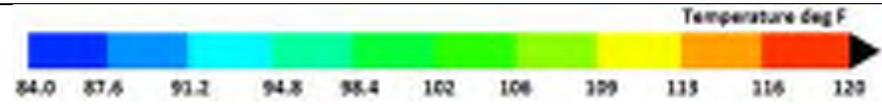
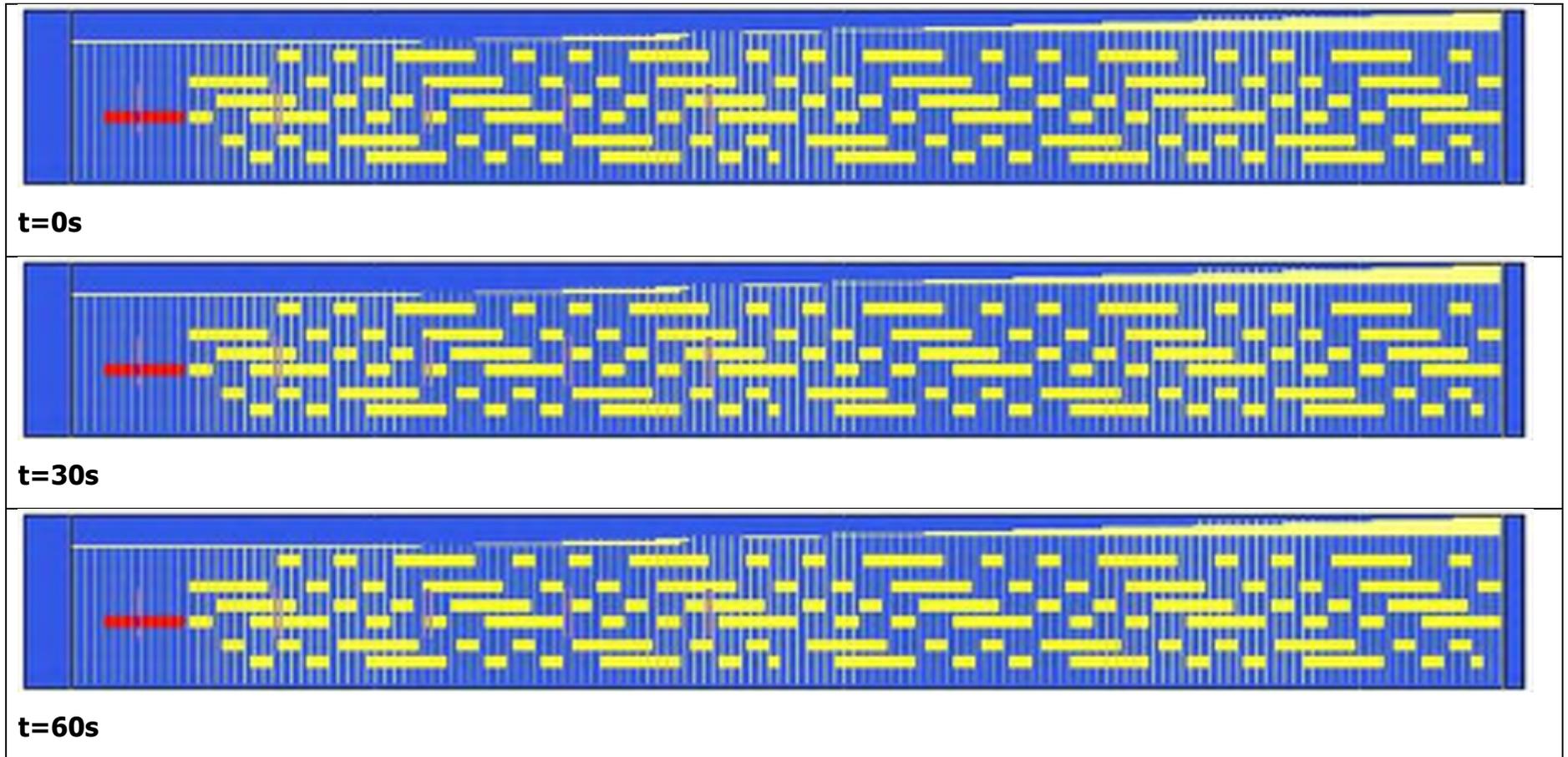


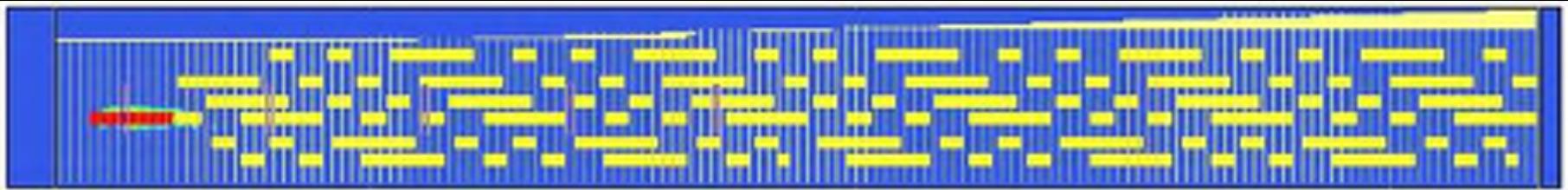
Figure A-2. Temperature on a plane 8.2 ft above Tunnel floor (3 Transverse Ducts)

Appendix A2 - Figures 30 MW Fire - 5 Transverse Ducts

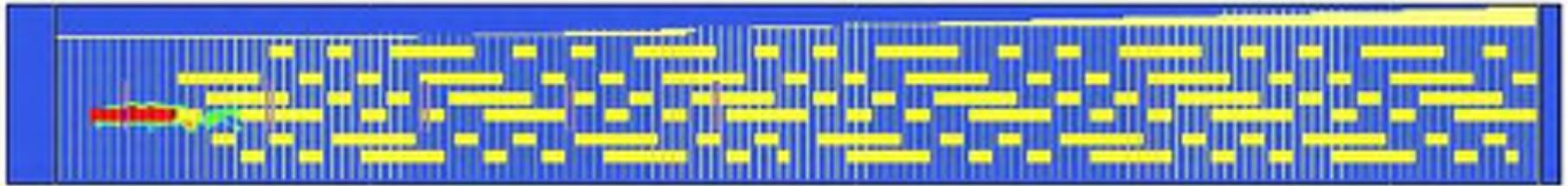
The results for the case with 30 MW fire located at the west portal are presented in Appendix A1 and Appendix A2 on a plane 8.2 ft above the tunnel floor. In particular, in Appendix A2 the results corresponding to the case where 5 transverse ducts are used in the semi-transverse ventilation system are 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:

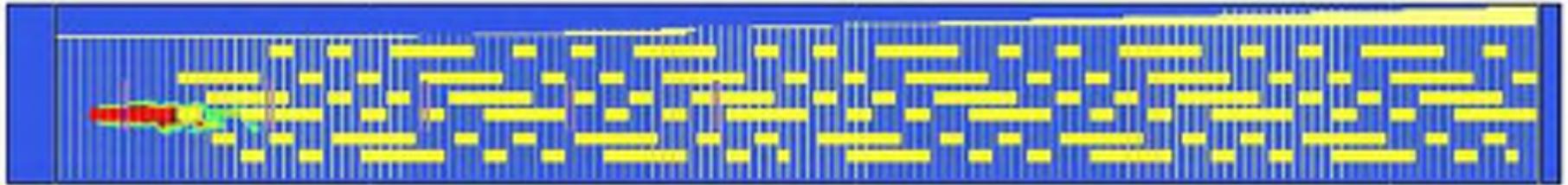




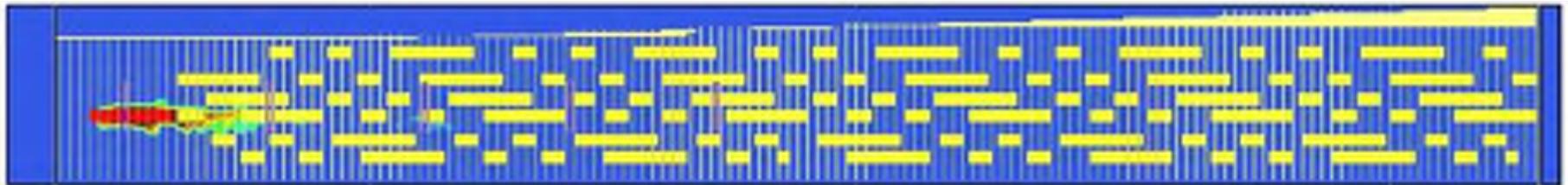
t=90s



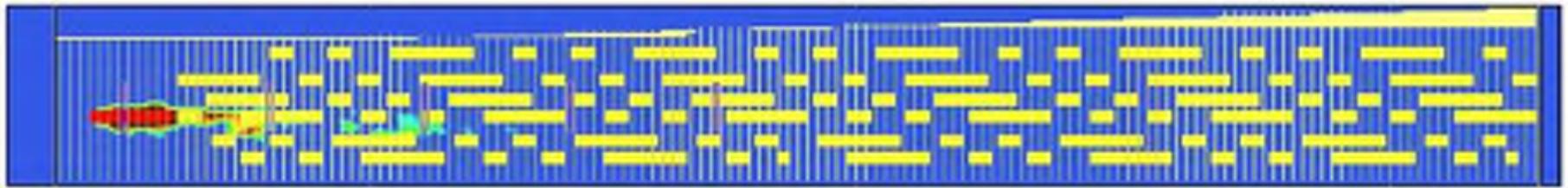
t=120s



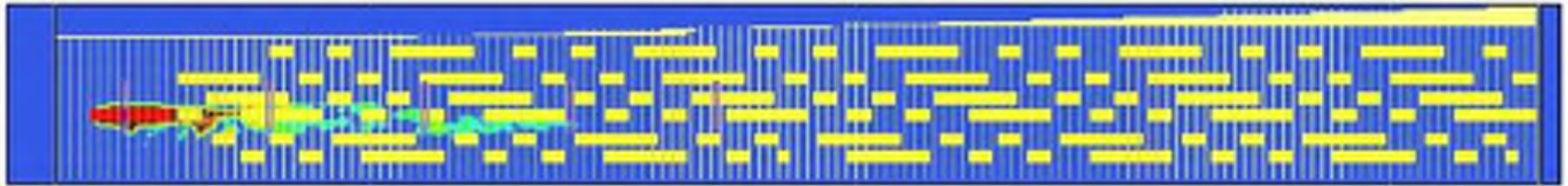
t=150s



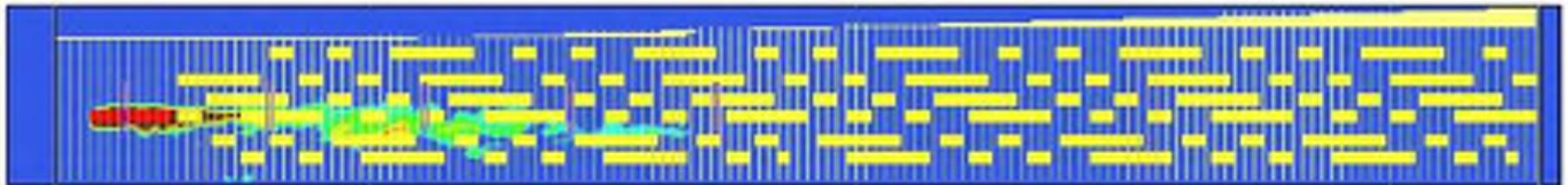
t=180s



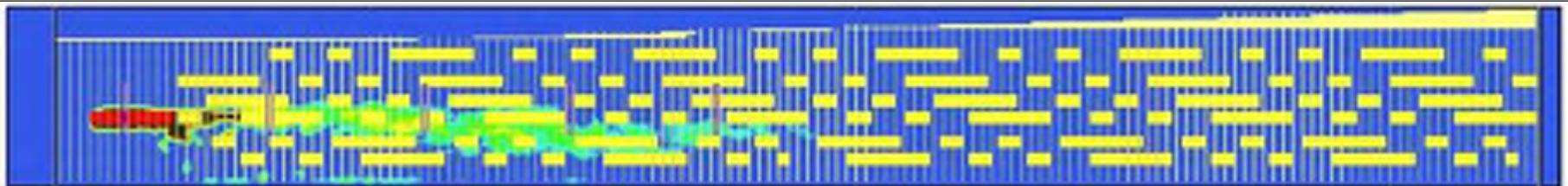
t=210s



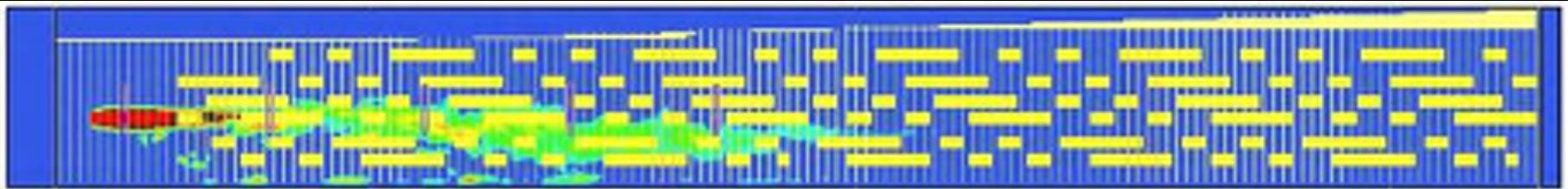
t=240s



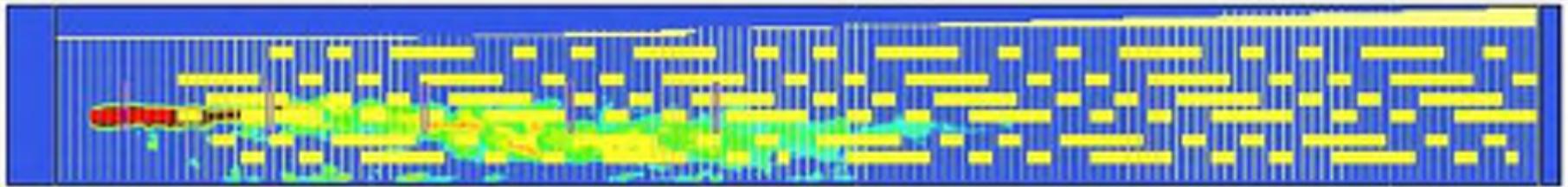
t=270s



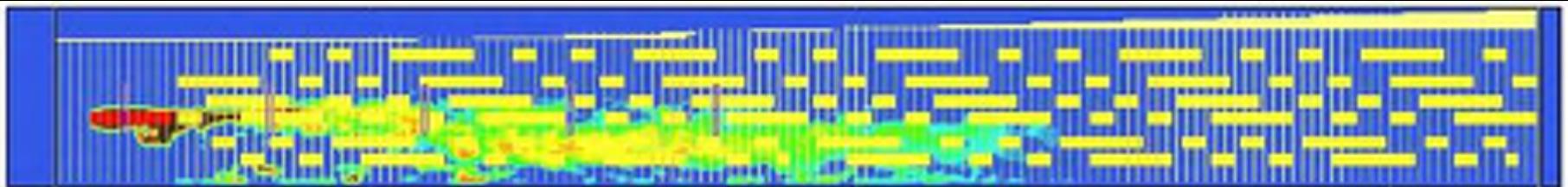
t=300s



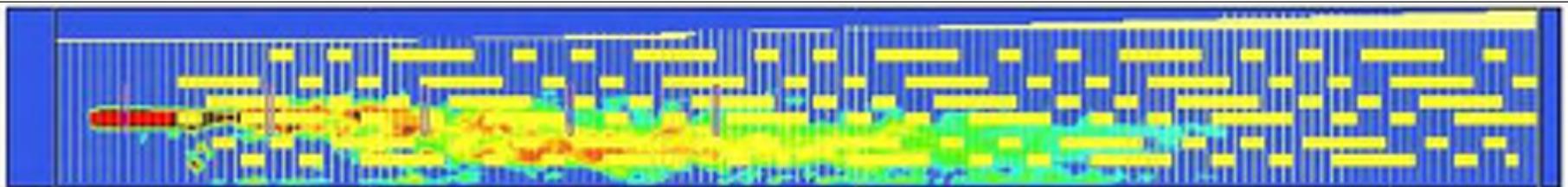
t=330s



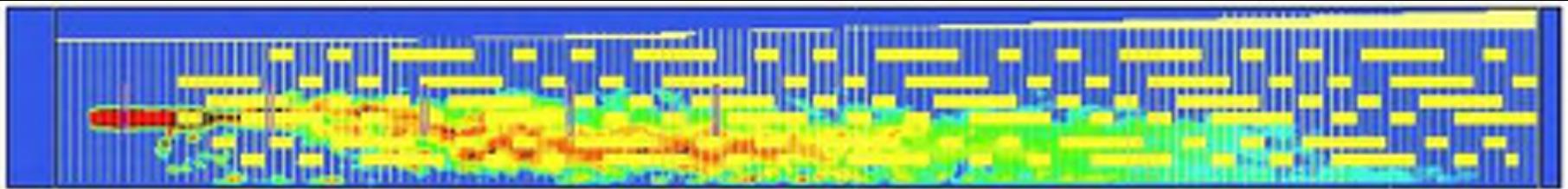
t=360s



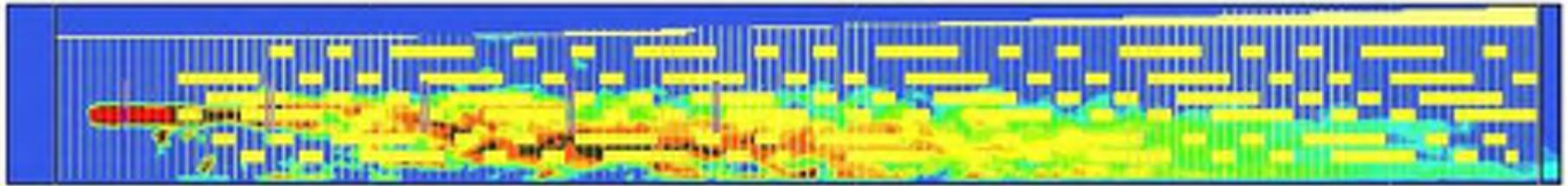
t=390s



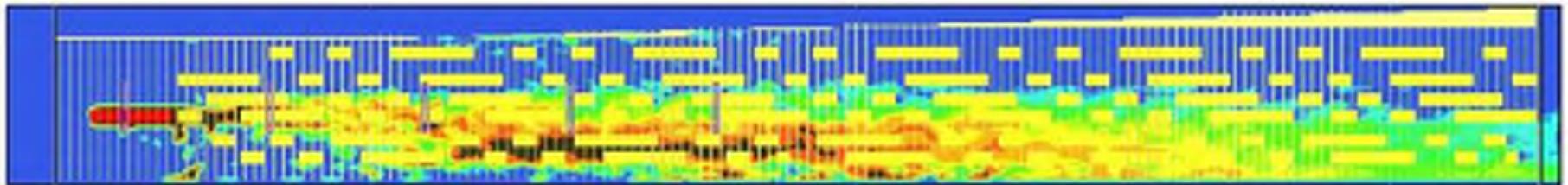
t=420s



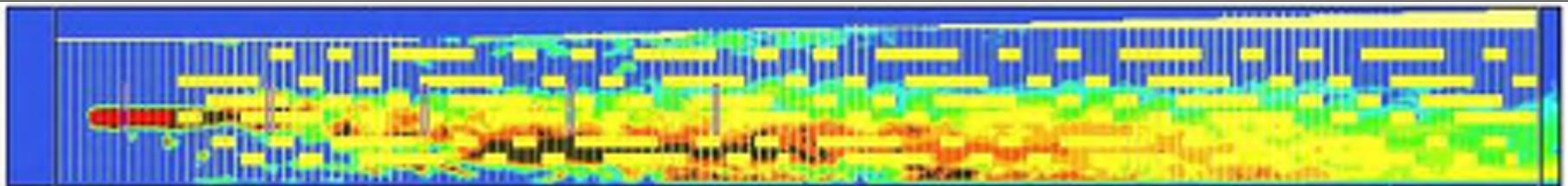
t=450s



t=480s



t=510s



t=540s

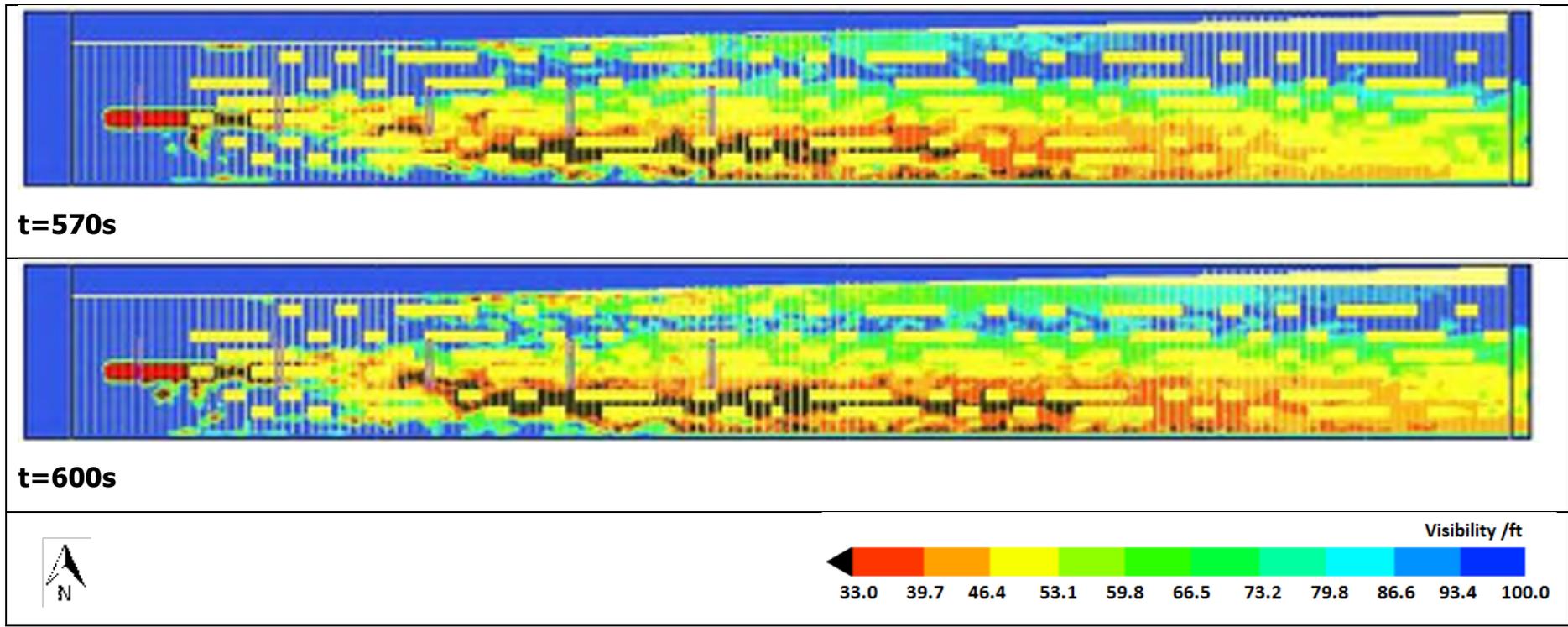
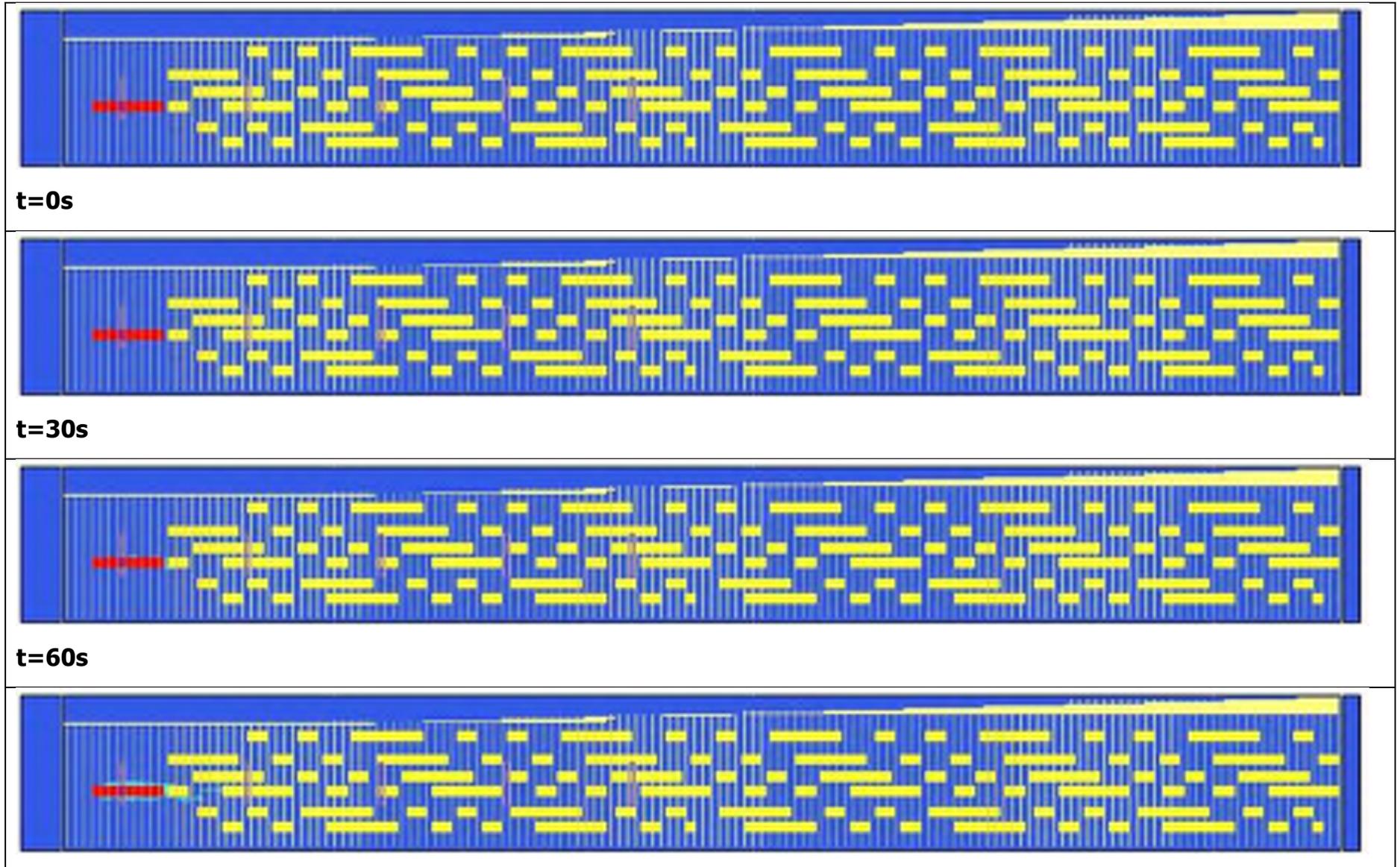
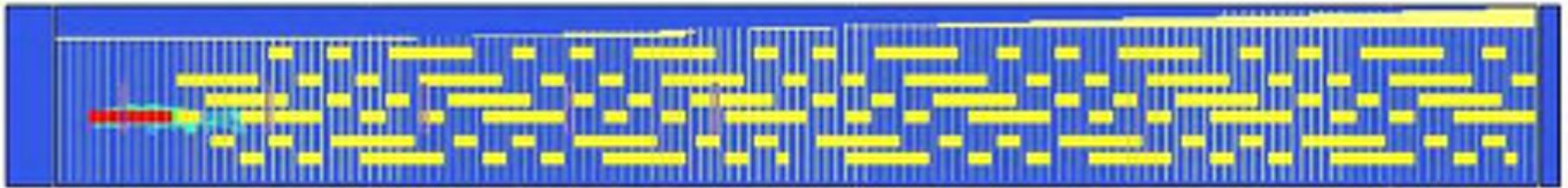
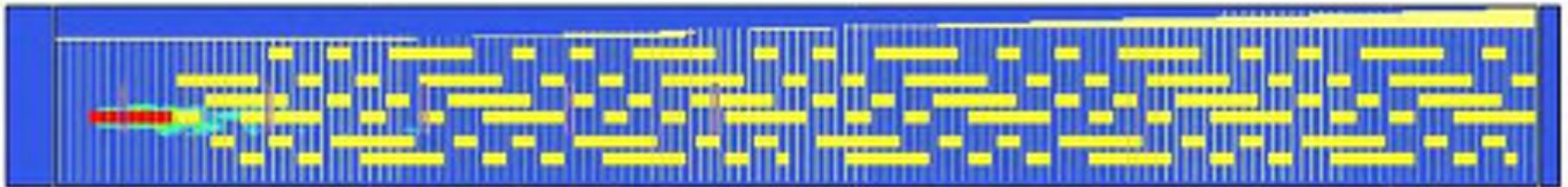
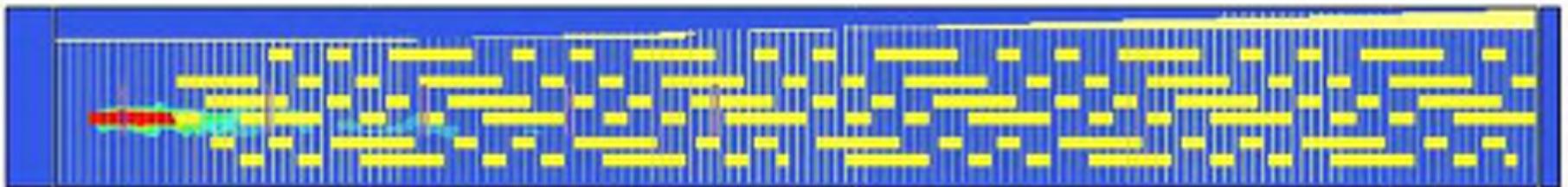
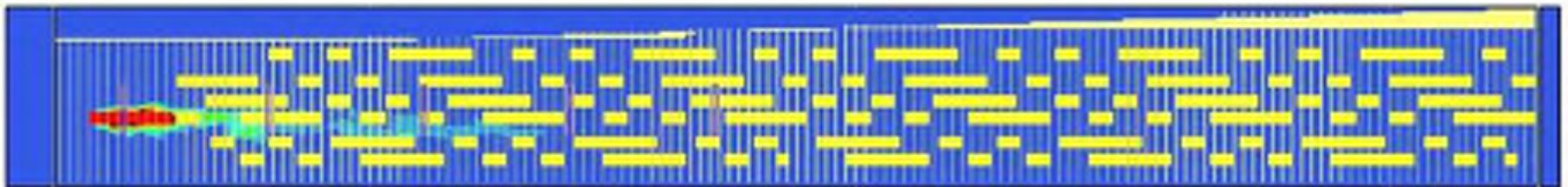


Figure A-3. Visibility on a plane 8.2 ft above Tunnel floor (5 Transverse Ducts)

Temperature:

t=90s**t=120s****t=150s****t=180s****t=210s**