

Oversight / NHS

FHWA REGION VIII OVERSIGHT? NO YES

NATIONAL HIGHWAY SYSTEM? NO YES

DEPARTMENT OF TRANSPORTATION STATE OF COLORADO

HIGHWAY CONSTRUCTION BID PLANS OF PROPOSED
FEDERAL AID PROJECT NO.
INTERSTATE 70
SUMMIT COUNTY
CONSTRUCTION PROJECT CODE NO. 0703-360

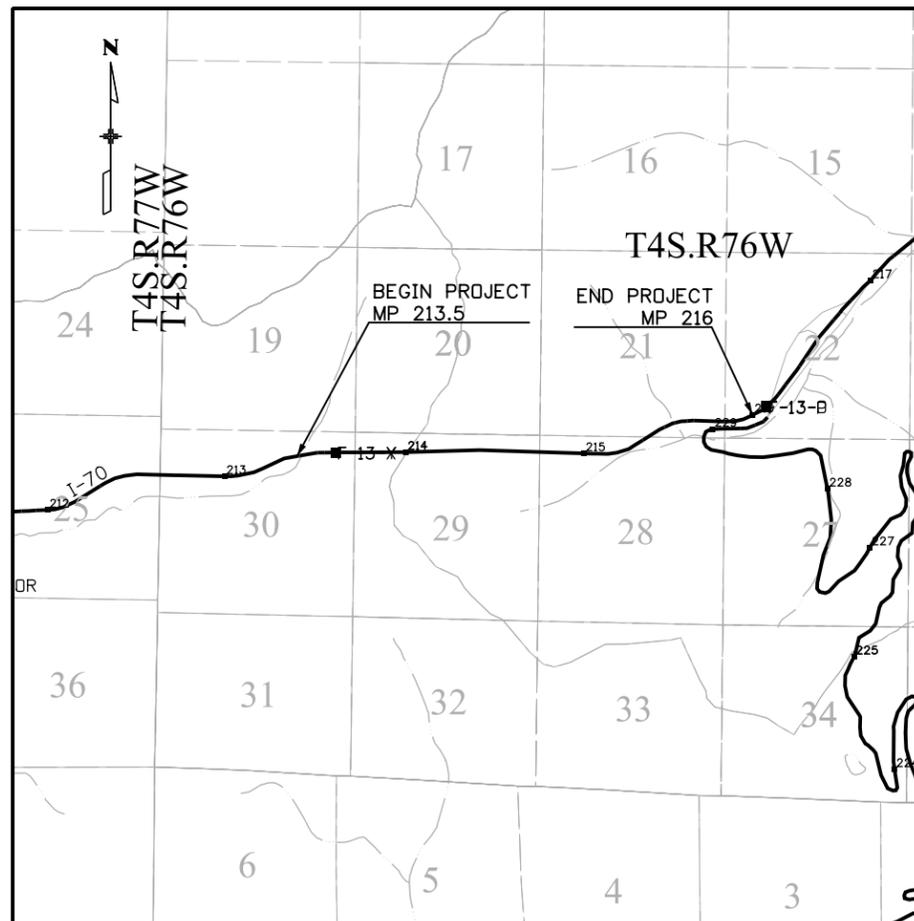
WATER MIST FIXED FIREFIGHTING SYSTEM
IN THE EISENHOWER JOHNSON MEMORIAL TUNNELS

Related Projects:

P. E. UNDER PROJECT: 17810
Project Number
Project Code: C 0703-360

R.O.W. Projects:

R.O.W. Project Description
NA



PROJECT LOCATION MAP



SHEET NO	INDEX OF SHEETS
1	TITLE SHEET
2	GENERAL NOTES
3	SUMMARY OF APPROXIMATE QUANTITIES
4	TUNNEL TYPICAL SECTION
5	DETAIL SHEET
6	TUNNEL PLAN SCHEMATIC
7	PUMP ROOM OPTION
8	WEST PORTAL PLAN
9	EAST PORTAL PLAN

PRELIMINARY PLANS

09/26/12

Print Date: 9/25/2012	
File Name: 647545_DES_TitleSht.dgn	
Horiz. Scale: 1:1	Vert. Scale:
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Sheet Revisions		
Date:	Comments	Init.

Colorado Department of Transportation

Eisenhower Tunnel West Portal, PO Box 399
Dumont, CO 80436
Phone: 303-512-5601 FAX: 303-512-5675

Region 1 GA

As Constructed
No Revisions:
Revised:
Void:

Contract Information
Contractor:
Resident Engineer:
Project Engineer:
PROJECT STARTED: / / ACCEPTED: / /
Comments:

Project No./Code
17760
C 0703-360
Sheet Number 1

GENERAL NOTES

THE CONTRACTOR SHALL NOT PARK ANY VEHICLES OR EQUIPMENT IN, OR DISTURB ANY AREAS NOT APPROVED BY THE ENGINEER.

ANY WORK WITHIN THE EXISTING ROADWAY SHALL BE DONE BETWEEN 8:00 PM AND 6:00 AM MONDAY-FRIDAY. TRAFFIC CONTROL WILL BE PROVIDED BY TUNNEL MAINTENANCE STAFF.

IT IS ESTIMATED THAT 1 SANITARY FACILITY WILL BE REQUIRED ON THIS PROJECT.

ALL SURVEYING NECESSARY TO COMPLETE THE PROJECT WILL BE PAID FOR AS CONSTRUCTION SURVEYING. INFORMATION SHOWN IN DRAWINGS IS SCHEMATIC. FIELD SURVEY IS REQUIRED TO LOCATE EXISTING INFRASTRUCTURE.

THE WATER MIST SYSTEM TO BE DESIGNED IN ACCORDANCE WITH UPTUN WP2 D251, NFPA 750, AND NFPA 502: UPTUN "ENGINEERING GUIDANCE FOR WATER BASED FIRE FIGHTING SYSTEMS FOR THE PROTECTION OF TUNNELS AND SUB SURFACE FACILITIES" WORK PACKAGE 2 OF FIRE DEVELOPMENT AND MITIGATION MEASURES, RESEARCH PROJECT UPTUN OF THE EUROPEAN COMMISSION, DOCUMENT 251 BY TOBY MCCORY, DIRK SPRAKEL, ERIK CHRISTENSEN, 2008.
NFPA 750 "STANDARD ON WATER MIST FIRE PROTECTION SYSTEMS", 2010 EDITION
NFPA 502 "STANDARD FOR ROAD TUNNELS, BRIDGES, AND OTHER LIMITED ACCESS HIGHWAYS" 2011 EDITION

THE WATER MIST SYSTEM TO BE DESIGNED FOR A FIRE LOAD WITH A POTENTIAL HRR UP TO APPROX 200 MW FOR BOTH POOL AND SOLID FUEL FIRES.

THE WATER MIST SYSTEM TO BE DESIGNED SO A FIRE FROM AN INCIDENT VEHICLE WILL NOT SPREAD TO OTHER VEHICLES WITHIN A 16 FT DISTANCE DOWNSTREAM.

THE WATER MIST SYSTEM TO BE DESIGNED SO FIRE FIGHTERS ARE ABLE TO BE WITHIN 16 FT OF A FIRE UPSTREAM AND ACCESS THE TUNNEL 66 FT DOWNSTREAM OF A FIRE.

THE WATER MIST SYSTEM TO BE DESIGNED TO PROVIDE AT LEAST 15% OXYGEN WITH A MAXIMUM OF 5% CARBON DIOXIDE 40 FT DOWNSTREAM OF THE FIRE.

THE OPERATIONAL TIME OF THE WATER MIST SYSTEM WILL BE 60 MINUTES.

THE MINIMUM PRESSURE (AS DETERMINED BY SUPPLIER TO MEET REQUIREMENTS) IS TO BE ACHIEVED AT ALL NOZZLES IN THE ACTIVATED SYSTEM IN ANY PART OF THE TUNNEL. THE MAXIMUM ALLOWABLE PRESSURE LOSS SHALL BE WITHIN THE LIMITS GIVEN BY MAXIMUM AND MINIMUM TESTED PRESSURE.

SUPPLIER SYSTEM TO BE BASED ON REQUIRED OPERATIONAL PARAMETERS. THE FOLLOWING ASSUMPTIONS WERE MADE IN DEVELOPING THIS PLAN SET:

- LONGITUDINAL SPACING BETWEEN NOZZLES IS BETWEEN 6 FT AND 14 FT.
- DISTANCE BETWEEN ROWS IS BETWEEN 11 FT AND 14 FT.
- NOZZLES TO BE PLACED ABOVE THE FLOOR BETWEEN 13 FT AND 15.4 FT (TUNNEL CEILING). CEILING IS PREFERRED.
- ZONE LENGTH IS BETWEEN 82 FT AND 98 FT.
- OPERATING PRESSURE (MIN) AT NOZZLES IS BETWEEN 500 PSI AND 1160 PSI.
- THE MAIN PIPE DIAMETER IS BETWEEN 4 IN AND 8 IN.
- THE SECTION PIPE DIAMETER IS BETWEEN 1 IN AND 1.5 IN.
- THE DISTRIBUTION PIPE DIAMETER IS BETWEEN 1.5 IN AND 2.5 IN.
- THE NUMBER OF FIRE ZONES IS BETWEEN 90 AND 110.
- THE NUMBER OF NOZZLES FOR EACH ZONE IS BETWEEN 21 AND 45.
- THE TOTAL WATER DISCHARGE RATE FOR OPERATION OF THREE ZONES IS BETWEEN 475 GPM AND 936 GPM.
- THE WATER STORAGE REQUIREMENT FOR 60 MIN OF OPERATION TIME IS BETWEEN 33,285 GAL AND 61,816 GAL.

THE MAIN PIPE IS TO BE WATER FILLED IN A STAND-BY CONDITION PRESSURIZED TO APPROX 145 PSI BY MEANS OF A SMALL (JOCKEY) PUMP. THE PUMP SHALL HAVE A SELF CLEANING FILTER.

ALL PIPES, FITTINGS AND FLANGES TO BE CORROSION RESISTANT MEETING THE MINIMUM REQUIREMENTS OF AISI316TI. TO AVOID RISK OF GALVANIC CORROSION, THE USE OF STAINLESS STEEL AND CARBON STEEL MATERIALS IN THE SAME PIPING CONNECTOR IS NOT PERMITTED, EVEN IF THE CARBON STEEL IS PLATED.

SECTION VALVES TO BE REMOTELY CONTROLLED BALL VALVES THAT ARE FULLY LEAKAGE FREE AND EQUIPPED WITH AN ADEQUATE DRIVE. VALVES SHALL NOT BE ACTIVATED BY THERMAL ELEMENTS. SECTION VALVES SHALL ALLOW FOR MONTHLY TEST OPERATIONS WITHOUT ALLOWING WATER TO FLOW FROM THE MAIN PIPE. VALVES SHALL BE PROTECTED BY ENCLOSURES WITH SUITABLE FIRE RATING AS NEEDED. SECTION VALVES SHOULD BE EQUIPPED WITH SHUTOFF MEANS TO ALLOW FOR REPLACEMENT WITHOUT DRAINING THE MAIN PIPE.

WATER MAIN TO BE PROTECTED FROM FREEZING WHERE APPLICABLE.

EVERY NOZZLE HEAD SHALL BE EQUIPPED WITH A STRAINER.

PUMP STATION UNIT SHALL PROVIDE 110% OF THE WATER REQUIRED TO SUPPLY THE PROTECTION AREA AT THE MINIMUM PRESSURE SPECIFIC TO THE SYSTEM.

IN ADDITION TO THE PUMP(S) REQUIRED FOR THE SYSTEM, A MINIMUM OF ONE PUMP IS REQUIRED AS A STAND-BY. A SEPARATE SMALL (JOCKEY) PUMP IS ALSO REQUIRED TO PRE-PRESSURIZE THE WATER MAIN IN THE STAND-BY CONDITION. ALL PUMPS TO BE INCLUDED IN COST OF WATER MIST SYSTEM.

THE EXISTING 120,000 GAL WATER STORAGE TANK IS INTENDED TO BE USED FOR THE SYSTEM. PRIOR TO OPERATION, THE TANK AND ALL ASSOCIATED PIPING IS REQUIRED TO BE CLEANED. THE TANK SHALL HAVE A NEW CONCRETE COATING APPLIED TO AVOID CONTAMINATION OF THE WATER.

IF AN ADDITIONAL WATER RESERVOIR IS NEEDED FOR THE SYSTEM, IT SHALL BE STAINLESS STEEL, COATED CARBON STEEL, PLASTIC OR COATED CONCRETE TO AVOID CONTAMINATION OF THE WATER WITH RUST OR PARTICLES FROM THE TANK STRUCTURE. WATER RESERVOIR(S) SHALL BE PROVIDED WITH A DRAIN VALVE AND OVERFLOW OUTLET. A MANUAL BALL VALVE IS REQUIRED IN THE OUTLET FOR MAINTENANCE PURPOSES.

WATER RESERVOIR(S) SHALL BE PROVIDED WITH VENTING TO ATMOSPHERE. THE VENTING SHALL BE PROTECTED BY A BREATHER FILTER TO PREVENT INFILTRATION OF PARTICLES.

WATER RESERVOIR(S) SHALL PRETREAT THE INCOMING WATER WITH A FILTRATION SYSTEM WITH A GRADE OF 150 MICRONS OR LOWER AT THE TANK INLET.

A SUITABLE FILTER SYSTEM BETWEEN THE WATER RESERVOIR AND THE PUMP SHALL BE PROVIDED. THE FILTER WILL BE 100% REDUNDANT OR SELF CLEANING, PROVIDE A BY-PASS IN CASE OF BLOCKAGE, HAVE A MONITORING SYSTEM, AND HAVE A SUFFICIENTLY LARGE FILTER SURFACE.

THE WATER SUPPLY SYSTEM IS TO CONTAIN CLEAN FILTERED WATER AND BE PROTECTED FROM FROST.

PUMP SYSTEM MUST BE INSTALLED IN A FROST FREE AREA AND PROTECTED FROM FREEZING.

A DRAINAGE COLLECTION SYSTEM IS REQUIRED TO SUPPLEMENT THE EXISTING DRAINAGE. ADDITIONAL INLETS ARE REQUIRED AT THE EAST PORTAL TO COLLECT ANY FLOWS IN THE FIRST ZONES OF THE TUNNEL. (NUMBER AND SIZE IS DEPENDENT ON THE OVERALL FLOW RATES OF THE SYSTEM.) A SURGE TANK IS REQUIRED TO HANDLE THE FLOW FROM A 60 MIN EVENT. (ASSUMED TO BE 60,000 GAL.) VAULT AND VALVE ASSEMBLY SHALL BE PROVIDED TO CONTROL FLOW TO THE SURGE TANK OR TO DISCHARGE TO CLEAR CREEK.

A LINEAR HEAT DETECTION SYSTEM IN BOTH TUNNELS IS REQUIRED. ALL CONDUITS, WIRING AND CONTROL ROOM INFRASTRUCTURE TO BE INCLUDED IN THE COST OF THE SYSTEM. AN EMERGENCY RESPONSE PLAN INCLUDING SECTIONS OF THE WM-FFFS TO BE TRIGGERED AND VENTILATION STRATEGIES DURING AN EMERGENCY ALSO TO BE INCLUDED IN THE COST OF THE SYSTEM. ACTIVATION OF THE SYSTEM MAY BE EITHER MANUAL OR AUTOMATIC, TO BE DETERMINED AS PART OF THE RESPONSE PLAN. IT IS ASSUMED THREE SECTIONS OF THE WM-FFFS WILL BE ACTIVATED DURING AN EMERGENCY.

THE EXISTING CAMERA NETWORK IN THE TUNNELS SHALL BE UPGRADED TO CAMERAS WITH INFRARED CAPABILITY.

THE WM-FFFS SHALL BE TESTED AFTER CONSTRUCTION TO VERIFY ALL DESIGN PARAMETERS ARE MET PRIOR TO FINAL ACCEPTANCE. TESTING SHALL BE INCLUDED IN COST OF WATER MIST SYSTEM.

ABBREVIATIONS

- NFPA NATIONAL FIRE PROTECTION ASSOCIATION
- AISI AMERICAN IRON AND STEEL INSTITUTE
- WM WATER MIST
- FFFS FIXED FIRE FIGHTING SYSTEM
- EJMT EISENHOWER JOHNSON MEMORIAL TUNNEL
- HRR HEAT RELEASE RATE
- MW MEGAWATT
- GAL GALLON
- GPM GALLONS PER MINUTE
- IN INCH
- FT FEET

**PRELIMINARY
PLANS**
09/26/12



**Know what's below.
Call before you dig.**

User: p0087721 Date: 10/3/2012 Pen Table: CDDT-PenTable Plot Config: CDDT-PDFHighQuality_V8ip1ctfg

Print Date: 10/3/2012	0000	Sheet Revisions			Colorado Department of Transportation  Eisenhower Tunnel West Portal, PO Box 399 Dumont, CO 80436 Phone: 303-512-5601 FAX: 303-512-5675 Region 1 GA	As Constructed		EJMT WM-FFFS GENERAL NOTES		Project No./Code	
File Name: 647545_DES_GeneralNotes		Date:	Comments	Init.		No Revisions:			17760		
Horiz. Scale: 1:1 Vert. Scale:						Revised:	Designer: S Richardson	Structure Numbers	C 0703-360		
PARSONS 1776 Lincoln Suite 600 Denver, CO 80203 (303) 863-7900						Void:	Detailer: M Hartmann	Subset Sheets: of	Sheet Number 2		

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INDEX			CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	PROJECT TOTALS		NOTES
BOOK	PAGE	SHEET				PLAN	AS CONST	
			200-00000	Structure Excavation	CY	678		East Portal Storage Tank
			206-00100	Structural Backfill (Class 1)	CY	214		East Portal Storage Tank
			515-00300	Waterproof Coating	SY	545		East Portal Storage Tank
			601-03000	Concrete Class D	CY	165		East Portal Storage Tank
			602-00000	Reinforcing Steel	LB	39,200		East Portal Storage Tank
			603-01245	24 Inch RCP (CIP)	LF	1190		East Portal Drainage
			604-26005	Vane Gate Inlet (Double)(5 foot)	EA	6		East Portal Drainage
			620-00020	Sanitary Facility	EA	1		
			622-03015	Clean Ex Tank & Pipes	LS	1		West Portal
			625-00000	Construction Surveying	LS	1		
			900-00100	Water Mist System	LS	1		
			900-00110	Filtration Equipment	LS	1		
			900-00120	Linear Heat Detection System	LS	1		
			900-00130	Generators (Permanent)	LS	1		
			900-00140	Tank Concrete Coating	LS	1		West Portal
			900-00150	Infrared Cameras	LS	1		
			900-00160	East Portal Piping & Pump System	LS	1		

PRELIMINARY PLANS

09/26/12

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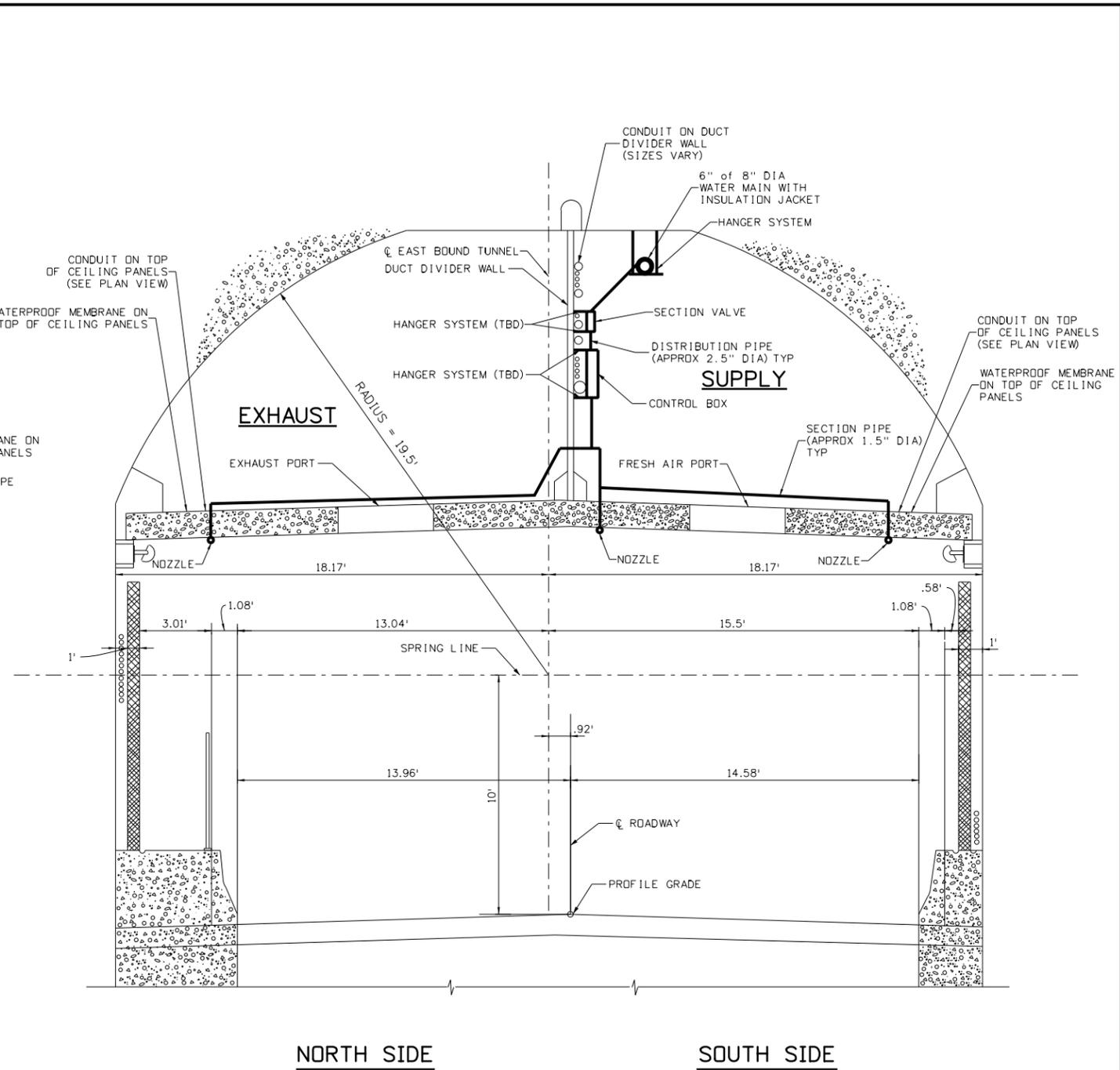
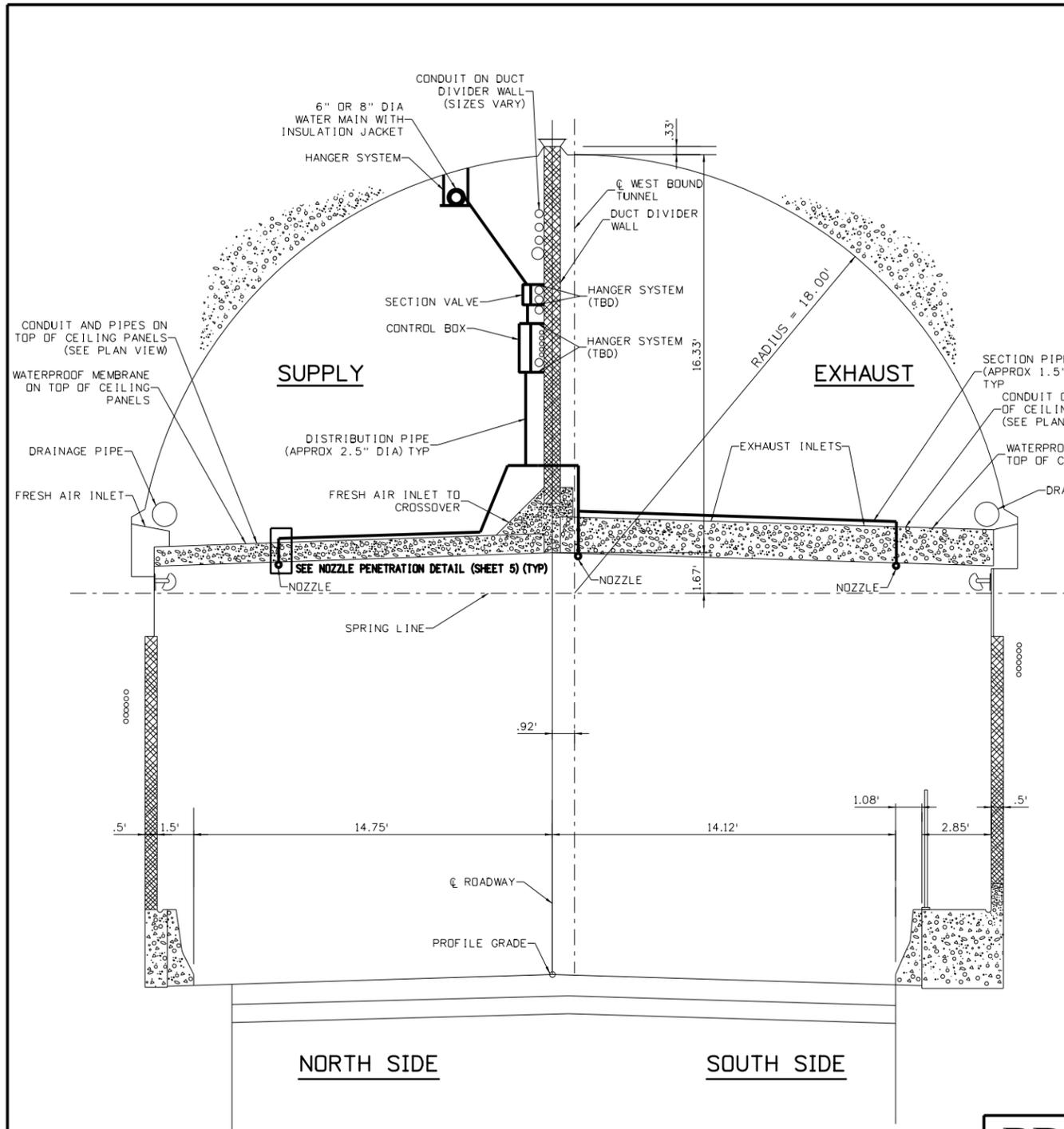
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Region 1 **GA**

As Constructed
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 Revised:
 Void:

**EJMT WM-FFFS
 SUMMARY OF
 APPROXIMATE QUANTITIES**

Designer: S Richardson	Structure Numbers
Detailer: M Hartmann	
Subset:	Subset Sheets: of

Project No./Code
 17760
 C 0703-360
 Sheet Number **3**



**PRELIMINARY
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09/26/12

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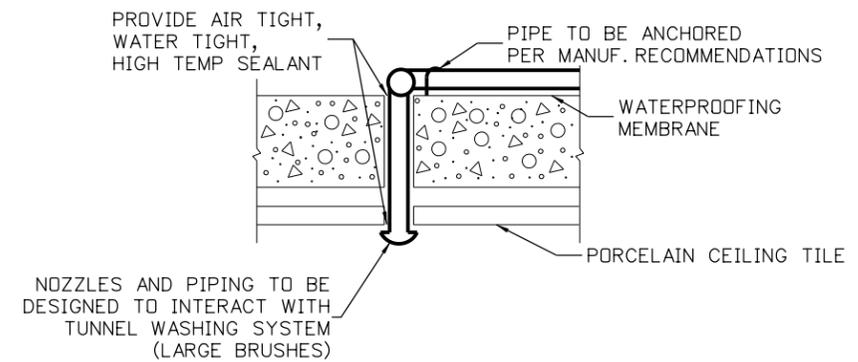
EJMT WM-FFFS
 North and South Tunnel
 Typical Section
 Designer: S Richardson
 Detailer: M Hartmann
 Subnet: Structure Numbers
 Subnet Sheets: of

Project No./Code
 17760
 C 0703-360
 Sheet Number 4

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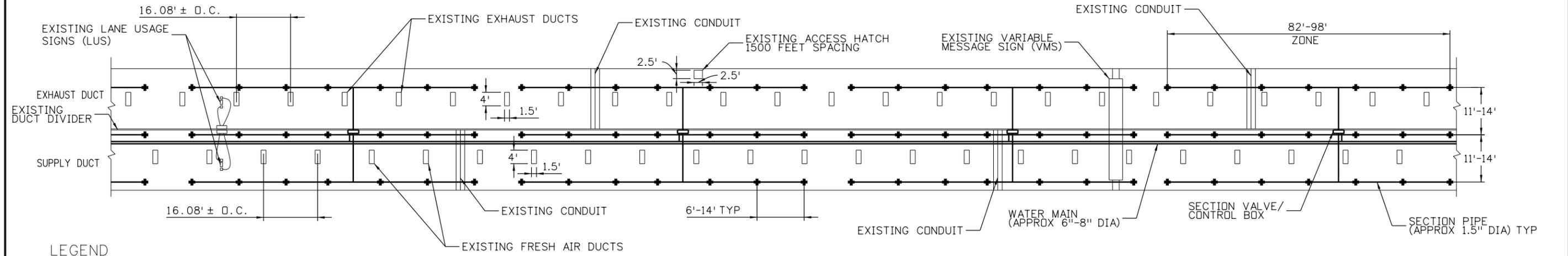
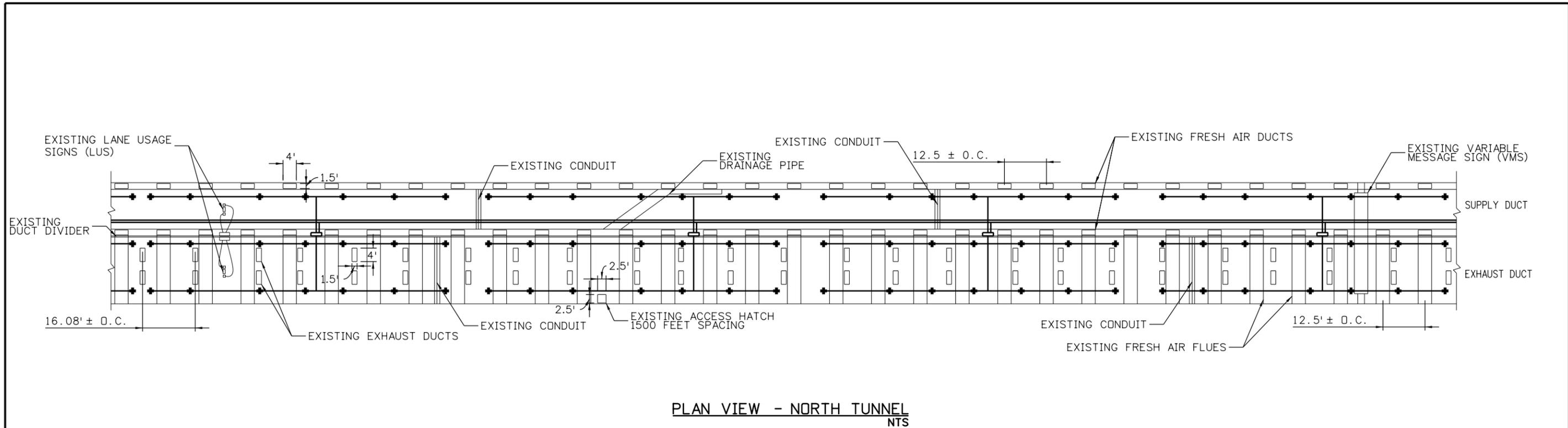
NORTH SUPPLY DUCT (TYP)



NOZZEL PENETRATION DETAIL
NTS

**PRELIMINARY
PLANS**
09/26/12

Print Date: 9/25/2012 File Name: 647545_DES_Detail Sheet.dgn Horiz. Scale: 1:10 Vert. Scale: PARSONS 1776 Lincoln Suite 600 Denver, CO 80203 (303) 863-7900	0000 0000 0000	Sheet Revisions <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Date:</th> <th style="width: 55%;">Comments</th> <th style="width: 30%;">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> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	Date:	Comments	Init.													Colorado Department of Transportation Eisenhower Tunnel West portal, PD 399 Dumont, CO 80436 Phone: 303-512-5601 FAX: 303-512-5675 Region 1	As Constructed No Revisions: Revised: Void:	EJMT WM-FFFS DETAIL SHEET Designer: S Richardson Detailer: M Hartmann Subset:	Structure Numbers Subset Sheets: of	Project No./Code 17760 C 0703-360 Sheet Number 5
Date:	Comments	Init.																				



- LEGEND**
- ◆ WATER MIST NOZZLE
 - SECTION PIPE
 - == WATER MAIN PIPE
 - SECTION VALVE/CONTROL BOX

PRELIMINARY PLANS
09/26/12

NOTE:
1. ALL EXISTING CONDITIONS SUBJECT TO CHANGE, VERIFY WITH FIELD SURVEY

User: p04023a Date: 9/25/2012 Pen Table: CDDT-PenTable.tbl Plot Config: CDDT-PDFHighQuality_V8i.plt.ctb

Print Date: 9/25/2012
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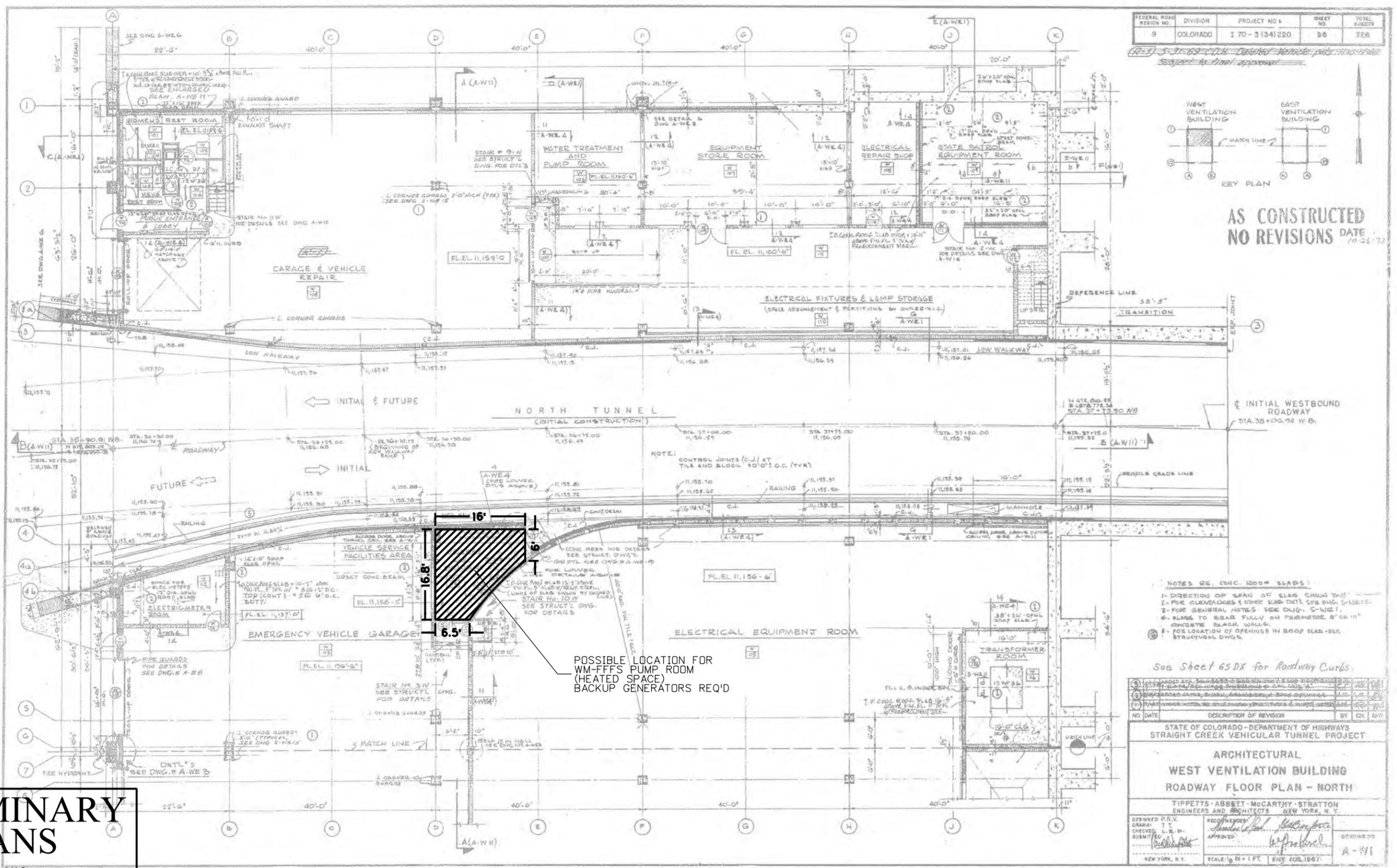
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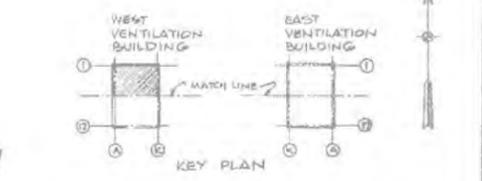
EJMT WM-FFFS Tunnel Layout Schematic	
Designer: S Richardson	Structure Numbers
Detailer: M Hartmann	
Subset:	Subset Sheets: of

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17760
C 0703-360
Sheet Number 6



FEDERAL ROAD DISTRICT NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	I 70-3 (34) 220	98	328

AS CONSTRUCTED
NO REVISIONS DATE 10-26-12



AS CONSTRUCTED
NO REVISIONS DATE 10-26-12

- NOTES RE CONC. ROOM SLABS:
- DIRECTION OF SPAN OF SLAB SHOWN THIS WAY.
 - PURE CLASSIFICATION & COVER SLAB DETAIL SEE DWG. S-1011.
 - FOR GENERAL NOTES SEE DWG. S-1011.
 - SLABS TO BEAR FULLY ON PERIMETER & CENTER CONCRETE BEAM WALLS.
 - FOR LOCATION OF OPENINGS IN ROOF SLAB-SEE STRUCTURAL DWG.

See Sheet 65 DX for Roadway Curbs

NO.	DATE	DESCRIPTION OF REVISION	BY	CHK

STATE OF COLORADO - DEPARTMENT OF HIGHWAYS
STRAIGHT CREEK VEHICULAR TUNNEL PROJECT

ARCHITECTURAL
WEST VENTILATION BUILDING
ROADWAY FLOOR PLAN - NORTH

TIPPETTS - ABBETT - MCCARTHY - STRATTON
ENGINEERS AND ARCHITECTS NEW YORK, N.Y.

DESIGNED BY: T.T. TIPPETTS
DRAWN BY: T.T. TIPPETTS
CHECKED BY: L.E.D. STRATTON
SUBMITTED BY: T.T. TIPPETTS
APPROVED BY: T.T. TIPPETTS

SCALE: 1/8" = 1'-0" DATE: AUG. 1987

PRELIMINARY PLANS
09/26/12

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EJMT WM-FFFS
PUMP ROOM OPTION
Designer: S Richardson
Detailer: M Hartmann
Subst: Structure Numbers
Subset Sheets: of

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17760
C 0703-360
Sheet Number 7



POTENTIAL PUMP ROOM LOCATION
(SEE SHEET 7)

NEW CONNECTION TO EXISTING WATER LINE AND PUMP STATION FOR WM-FFFS SYSTEM CONTAINED WITHIN PORTAL BUILDING OR NEW STRUCTURE AS REQUIRED (PREFERENCE IS TO LOCATE PUMP AS SHOWN ON SHEET 6, DEPENDING ON FINAL PUMP SIZE REQUIREMENTS.)

CLEAN EXISTING PIPELINE

1159' APPROXIMATE

MECHANICAL FILTRATION SYSTEM REQUIRED BETWEEN TANK AND PUMPS, LOCATION TO BE DETERMINED

445' APPROXIMATE

NEW FILTRATION SYSTEM UPSTREAM OF EXISTING STORAGE TANK INCLUDES NEW SHED OR VAULT TO BE DETERMINED WITH COOPERATION BY FOREST SERVICE

CLEAN AND COAT EXISTING 120,000 GAL TANK

WATER RIGHTS AT POND = .03 CFS

EXISTING PONDS AND COLLECTION SYSTEM

PRELIMINARY PLANS

09/26/12

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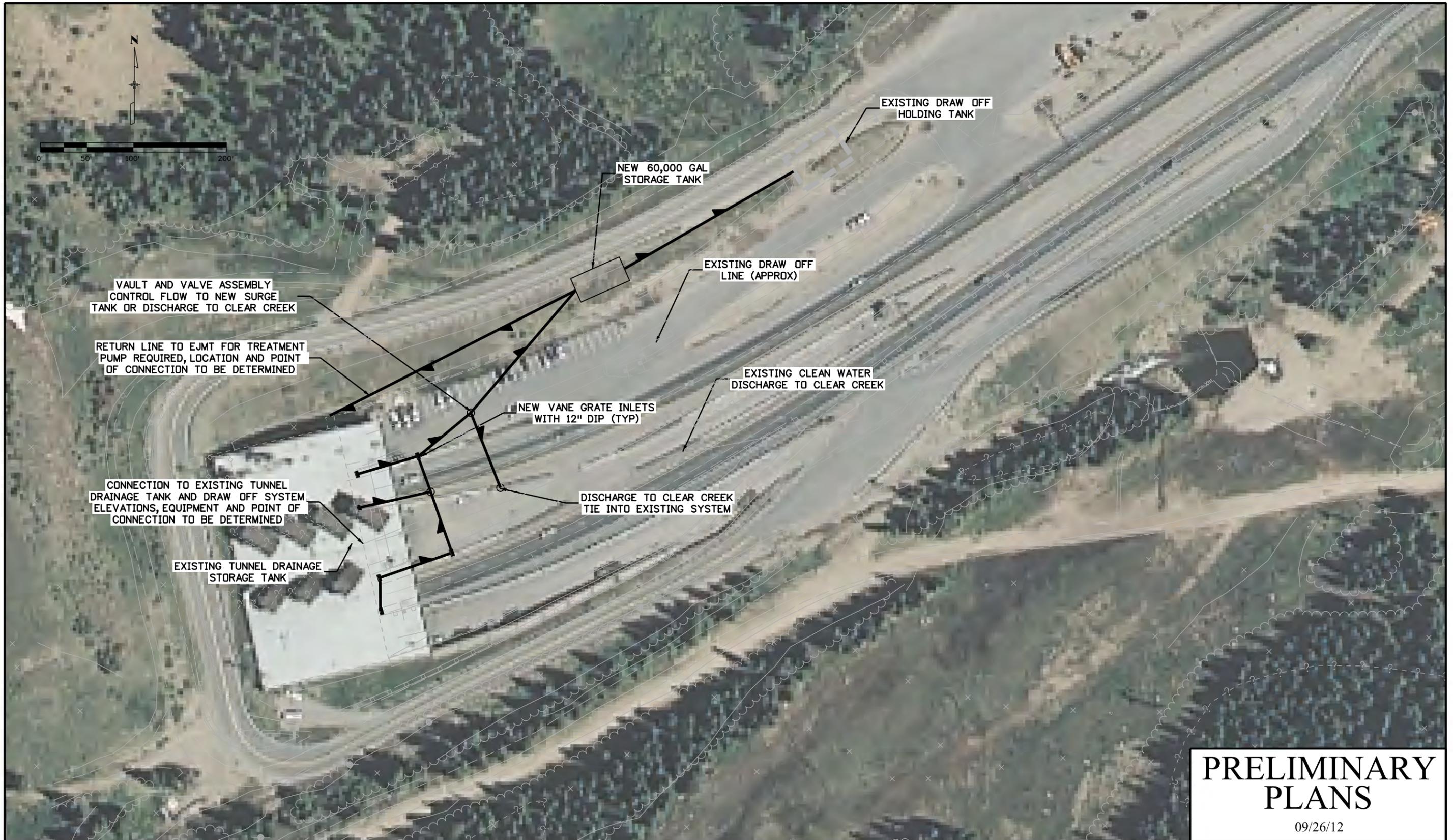
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EJMT WM-FFFS West Portal Plan Schematic Water Supply System			
Designer:	S Richardson	Structure Numbers	
Detailer:	M Hartmann	Subset Sheets:	of
Subset:			

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17760	
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**PRELIMINARY
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**EJMT WM-FFFS
 East Portal Plan
 Schematic Drainage System**
 Designer: S Richardson Structure Numbers
 Detailer: M Hartmann
 Subset: Subset Sheets: of

Project No./Code
 17760
 C 0703-360
 Sheet Number **9**