



I-10 | LOOP 202 TO SR-387
WILD HORSE PASS CORRIDOR

Design Concept Report Appendices

Interstate 10 Corridor: State Route 202L
to State Route 387

Maricopa and Pinal Counties, Arizona

*ADOT Project Nos. F0252 01L and F0252 02L
Federal Aid No. 010-C(222)S*

October 2023



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Appendices

Appendix A. Recommended Build Alternative Plans

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Appendix C. Transport of Hazardous Materials Letter

Appendix D. Americans with Disabilities Act Report

Appendix E. Traffic Data

Appendix F. Safety Data

Appendix G. Drainage Data

Appendix H. Bridge Inspection Reports

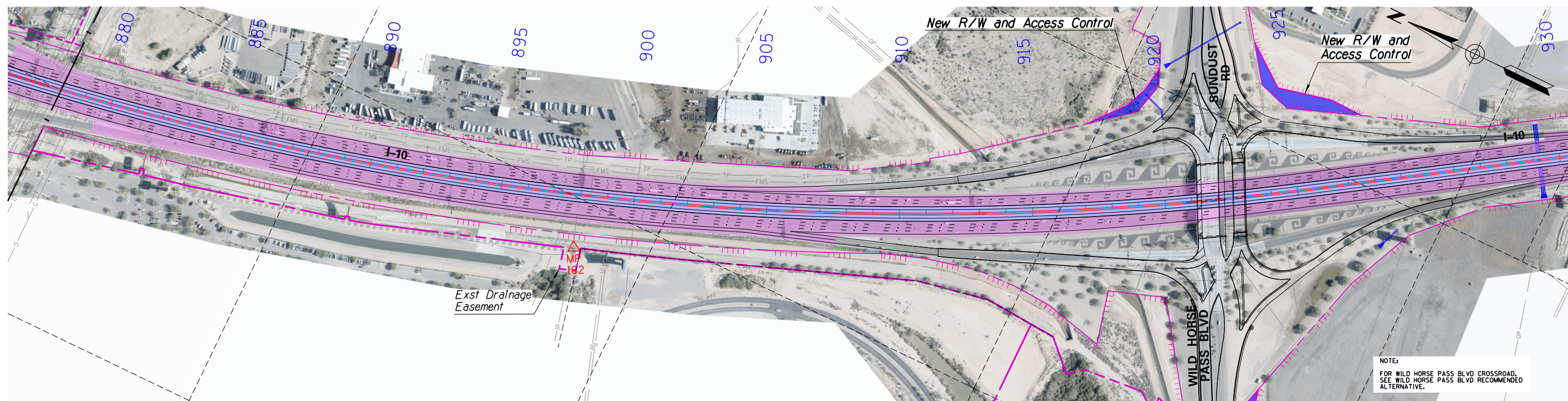
Appendix I. First Flush Water Quality

Appendix J. AASHTO Controlling Design Criteria Report

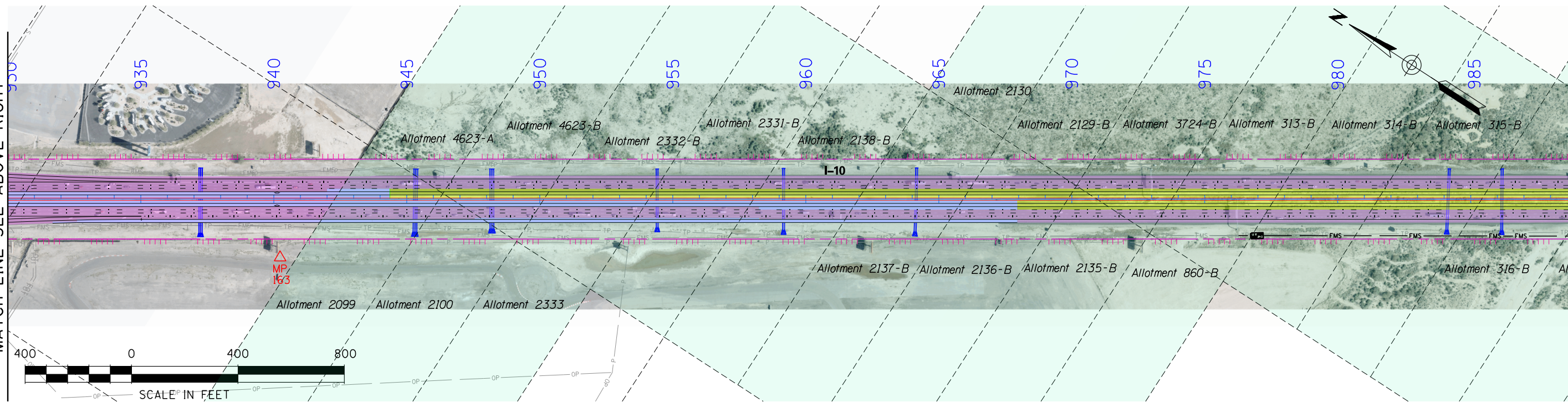
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Appendix A. Recommended Build Alternative Plans

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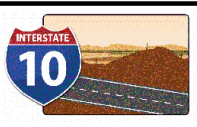


MATCH LINE SEE BELOW LEFT



MATCH LINE SEE ABOVE RIGHT

MATCH LINE SEE SHEET 2



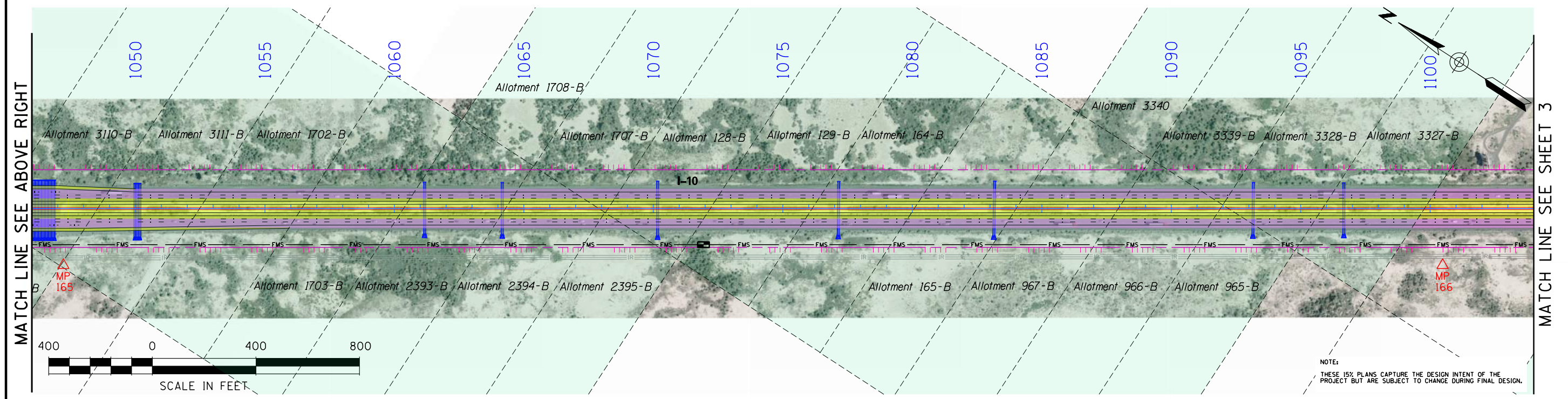
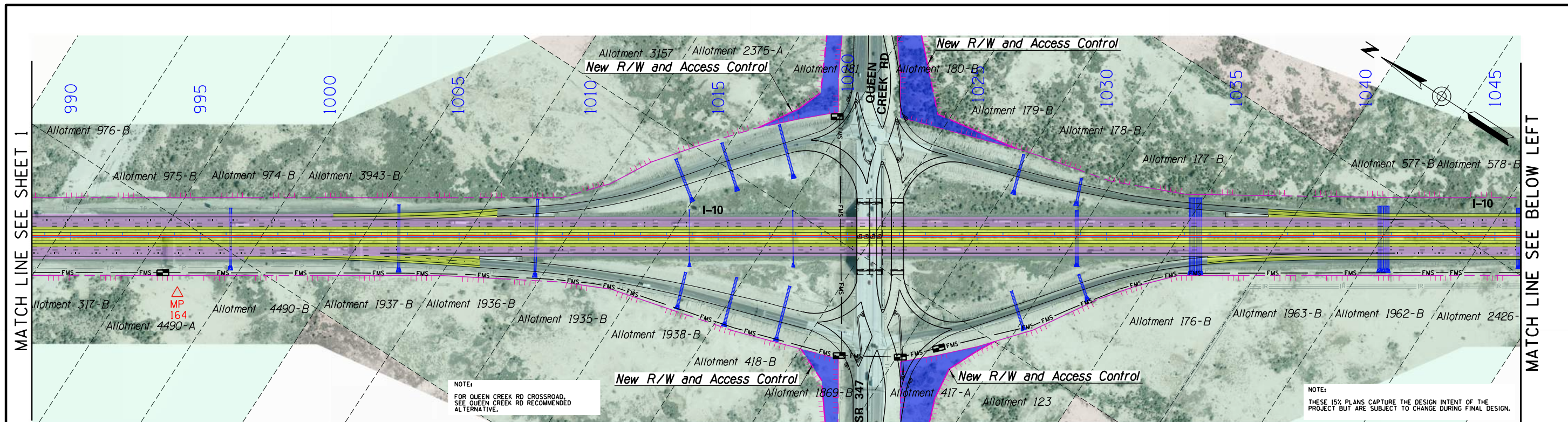
LEGEND

Mill and Overlay	Concrete Barrier
New Pavement	New Pavement (Concrete)
Median Cable Barrier	

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 1 OF 12**

LEGEND

New Temporary Construction Easements	New RW
Exst RW (Line)	Allotment Parcels
Exst Control of Access (Hash Marks)	Land Boundary
MP Milepost	



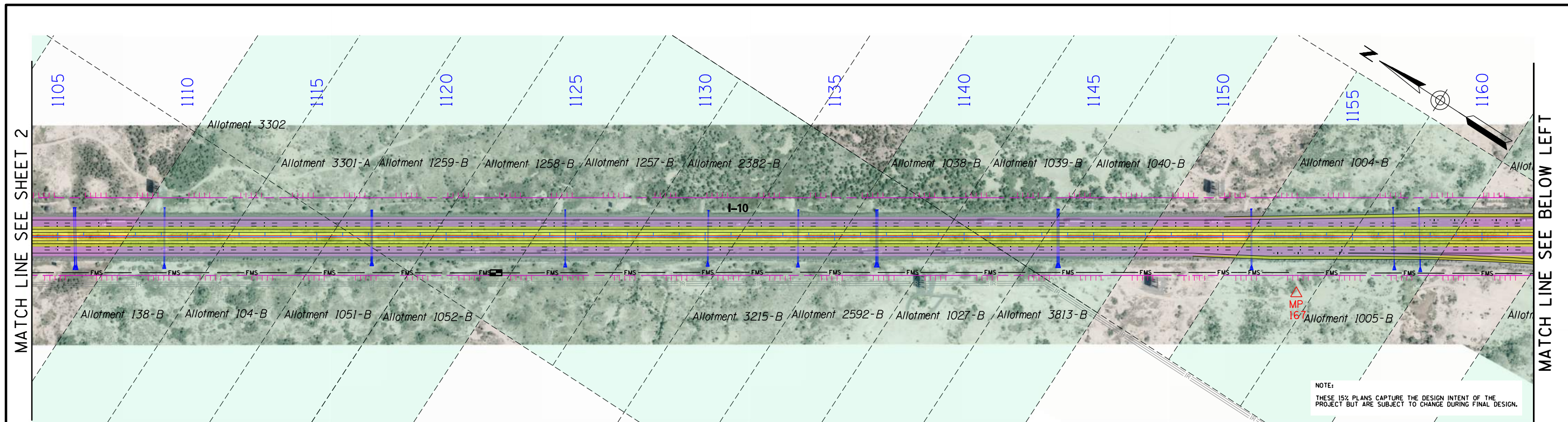
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- Mill and Overlay
- New Pavement
- Concrete Barrier
- Median Cable Barrier

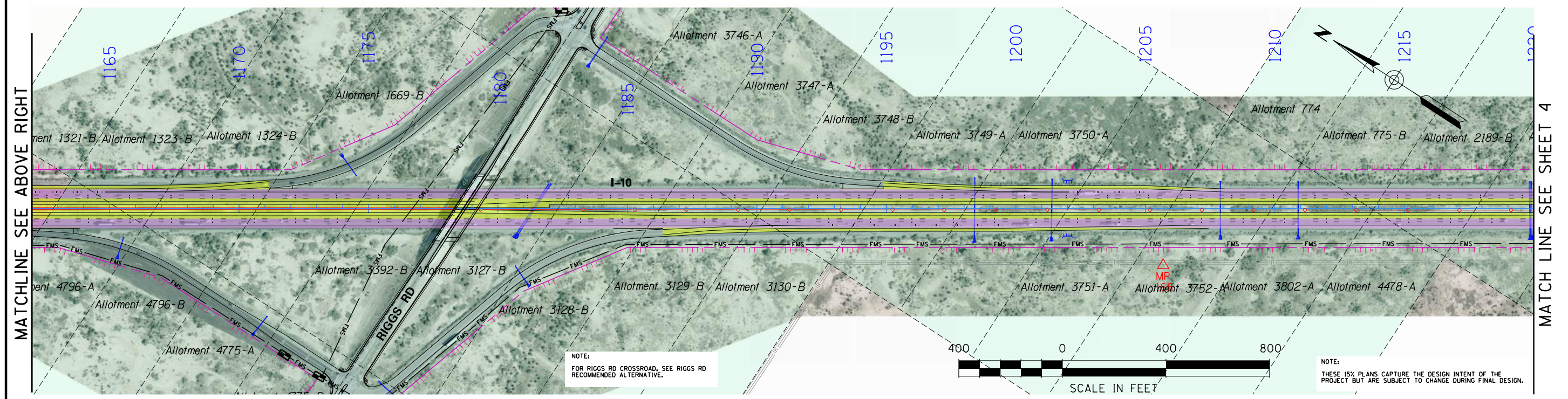
**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 2 OF 12**

LEGEND

- New Temporary Construction Easements
- Exist RW (Line)
- Exist Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary



NOTE:
THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



NOTE:
FOR RIGGS RD CROSSROAD, SEE RIGGS RD RECOMMENDED ALTERNATIVE.

NOTE:
THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.

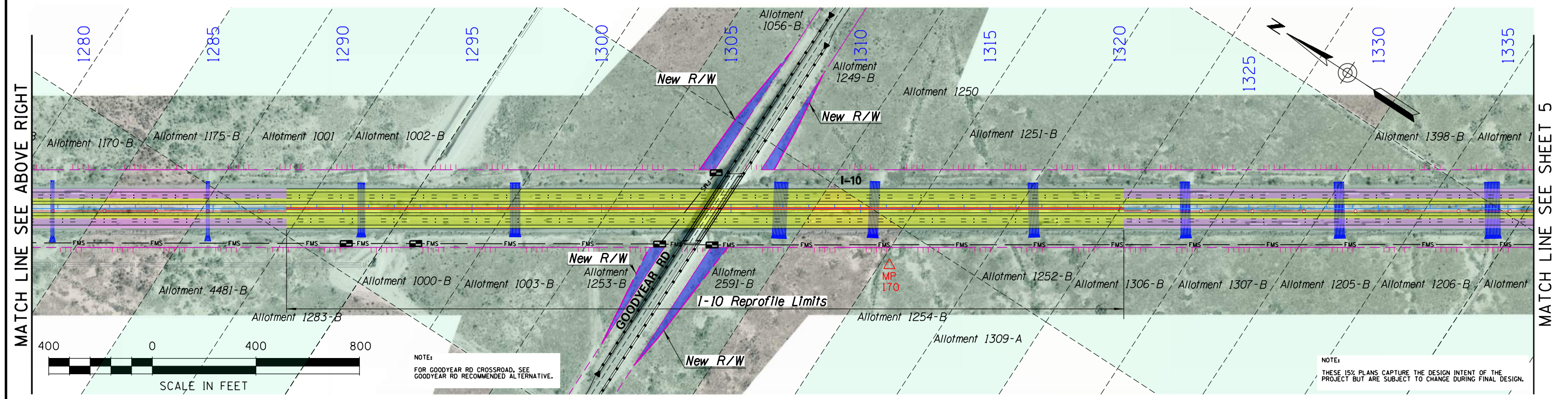
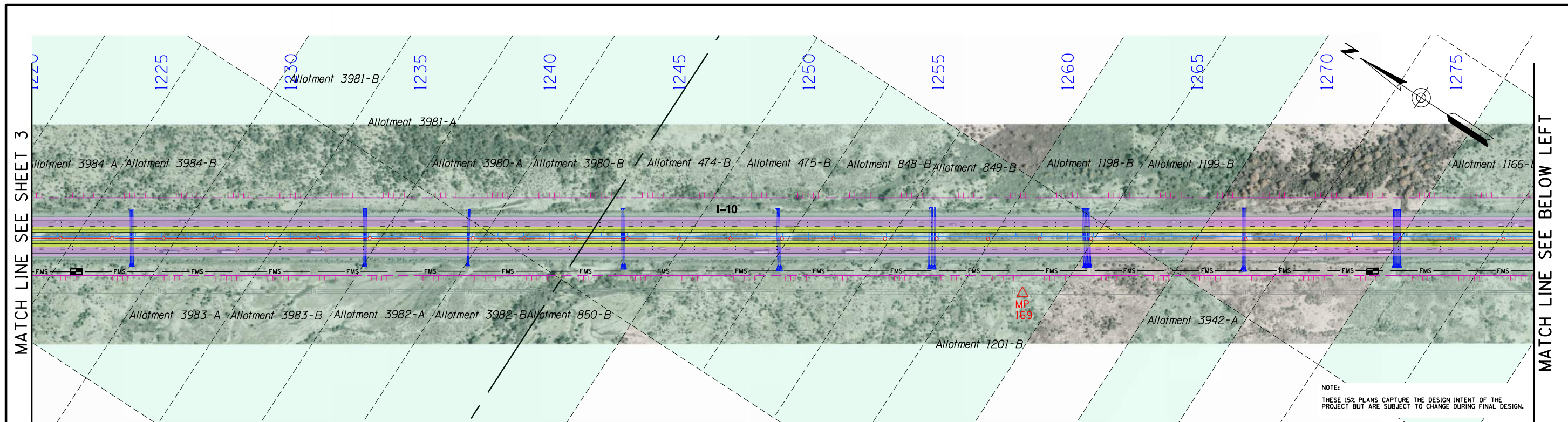
LEGEND

- Mill and Overlay
- New Pavement
- Concrete Barrier
- Median Cable Barrier

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 3 OF 12**

LEGEND

- New Temporary Construction Easements
- Exist RW (Line)
- Exist Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary



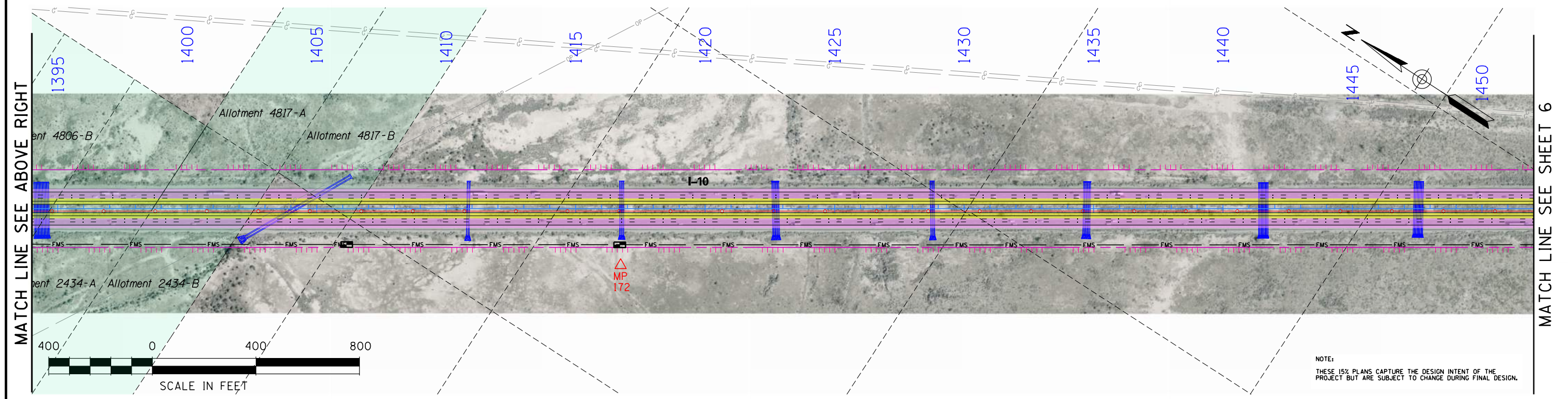
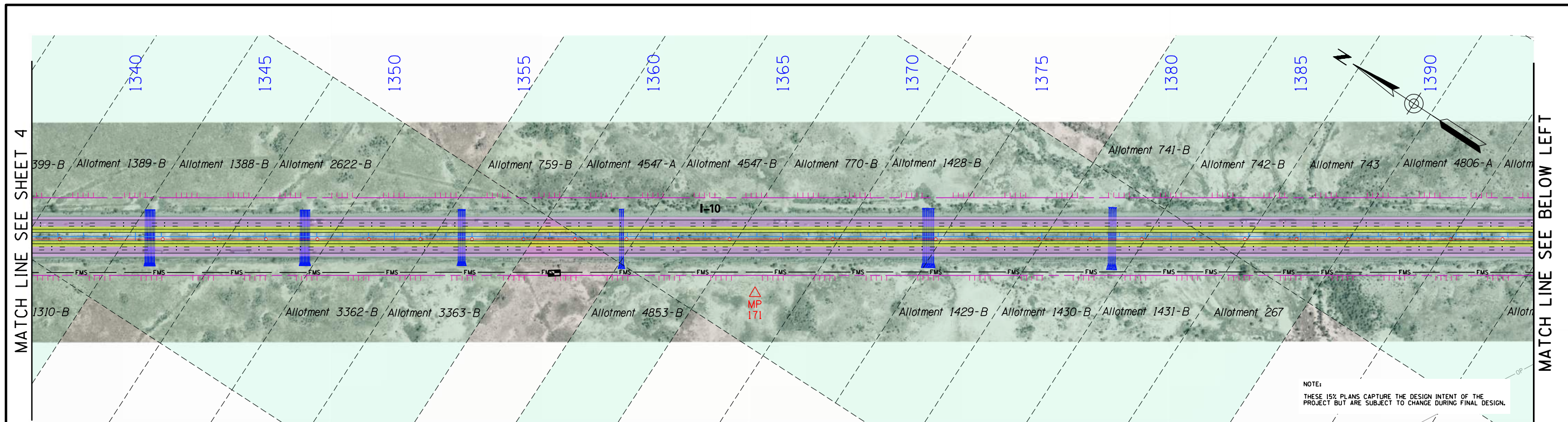
LEGEND

- Mill and Overlay
- New Pavement
- Concrete Barrier
- Median Cable Barrier

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 4 OF 12**

LEGEND

- New Temporary Construction Easements
- Exist R/W (Line)
- Exist Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary



NOTE:
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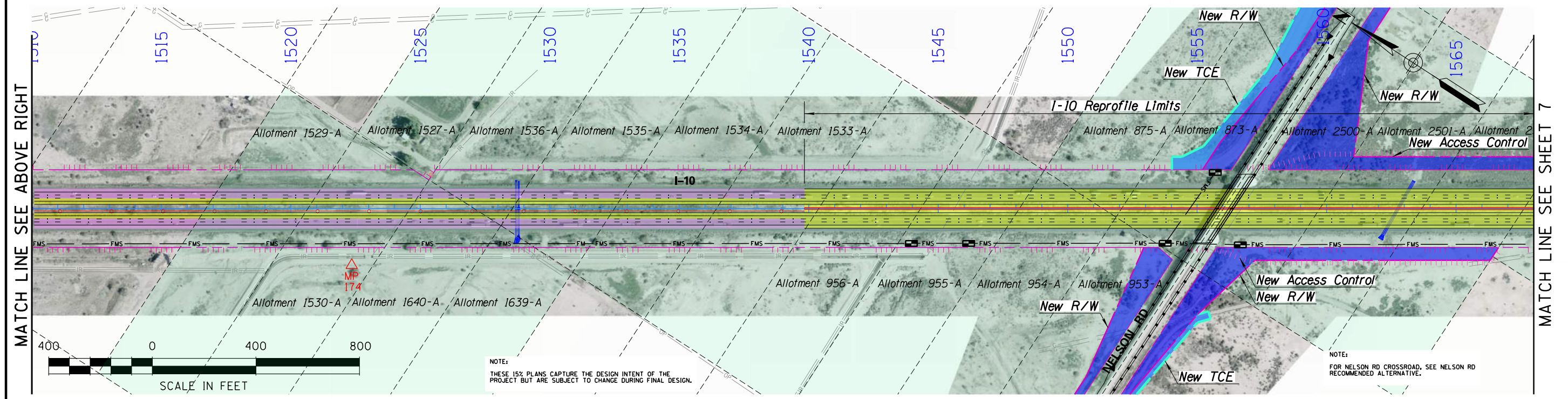
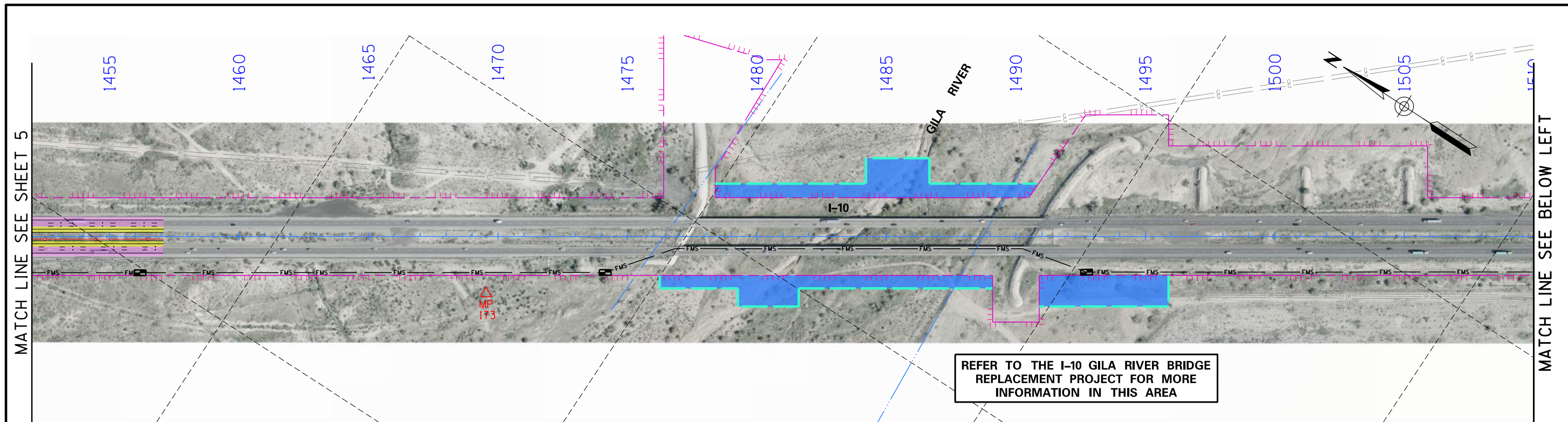
LEGEND

- Mill and Overlay
- New Pavement
- Median Cable Barrier
- Concrete Barrier

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 5 OF 12**

LEGEND

- New Temporary Construction Easements
- Exist RW (Line)
- Exist Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary





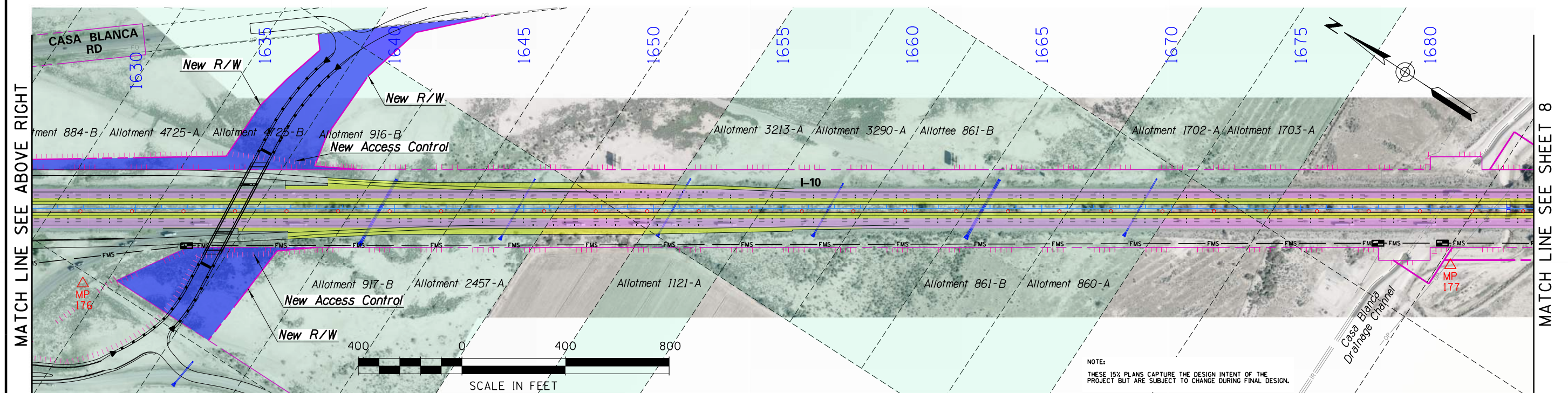
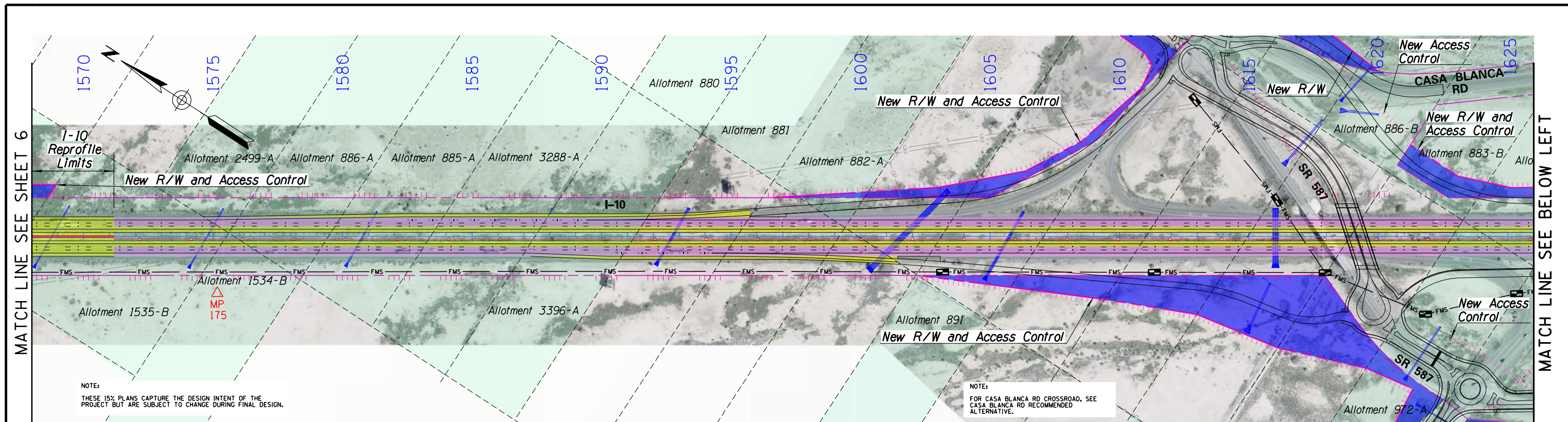
LEGEND

- Mill and Overlay
- New Pavement
- Concrete Barrier
- Median Cable Barrier

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 6 OF 12**

LEGEND

- New Temporary Construction Easements
- Exist R/W (Line)
- Exist Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary



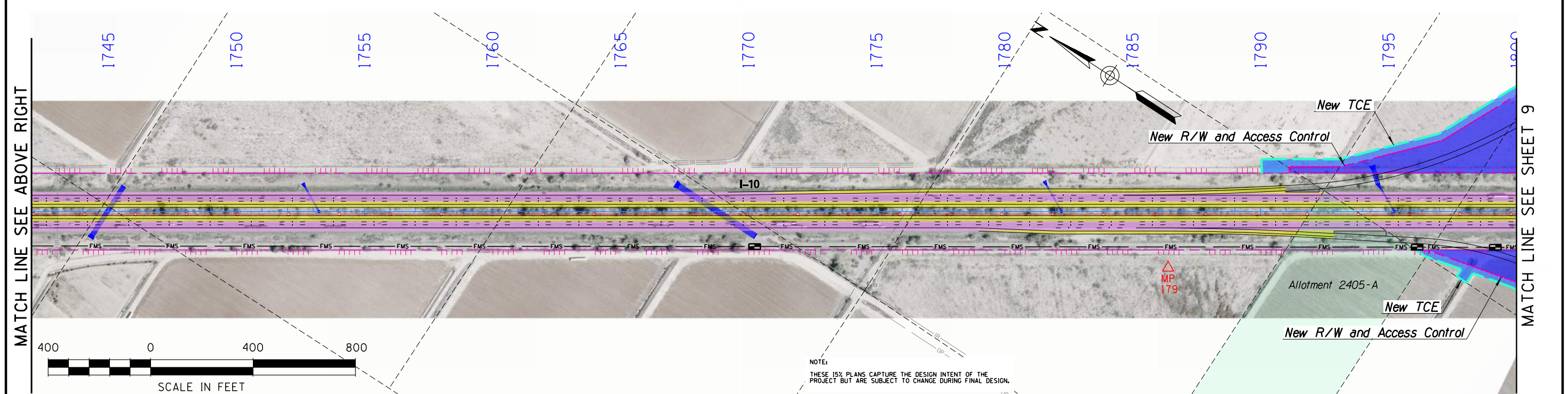
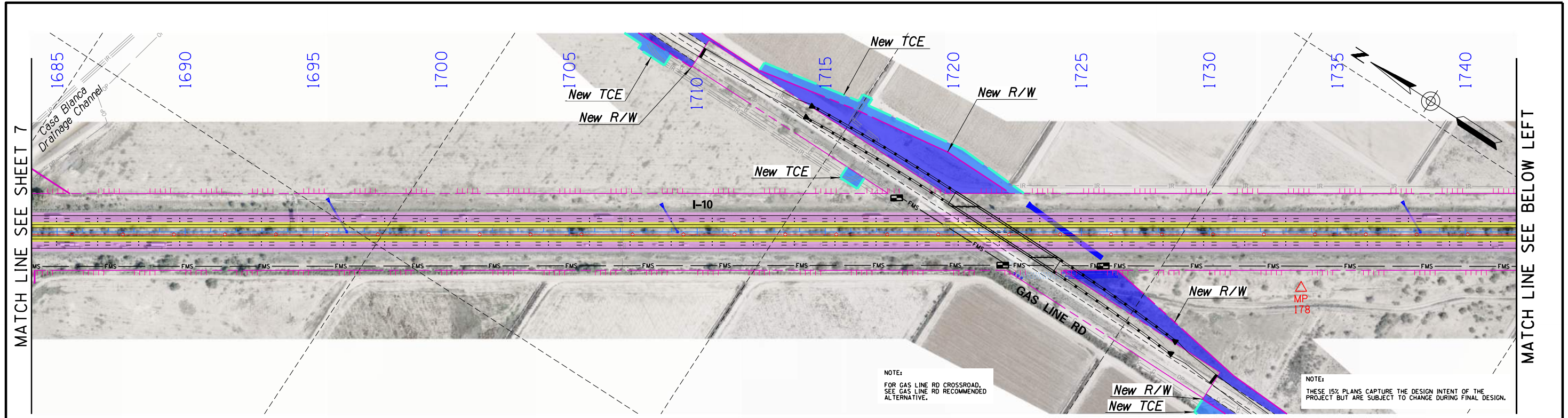
LEGEND


- Mill and Overlay
- New Pavement
- Concrete Barrier
- Median Cable Barrier

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 7 OF 12**

LEGEND

- New Temporary Construction Easements
- Exist R/W (Line)
- Exist Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary





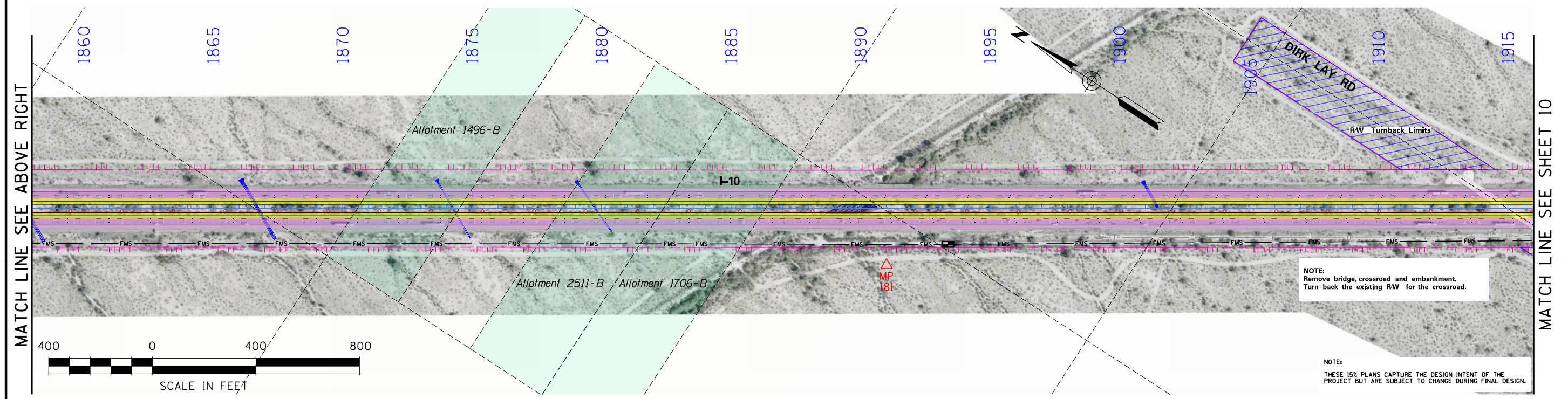
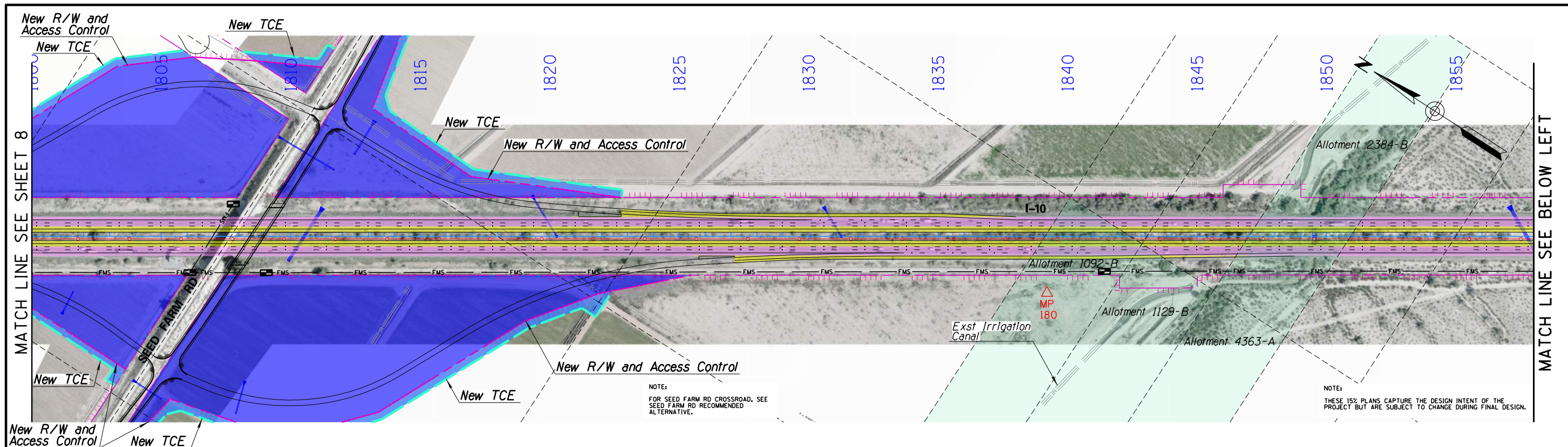
LEGEND

- Mill and Overlay
- New Pavement
- Concrete Barrier
- Median Cable Barrier

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 8 OF 12**

LEGEND

- New Temporary Construction Easements
- Exist R/W (Line)
- Exist Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary





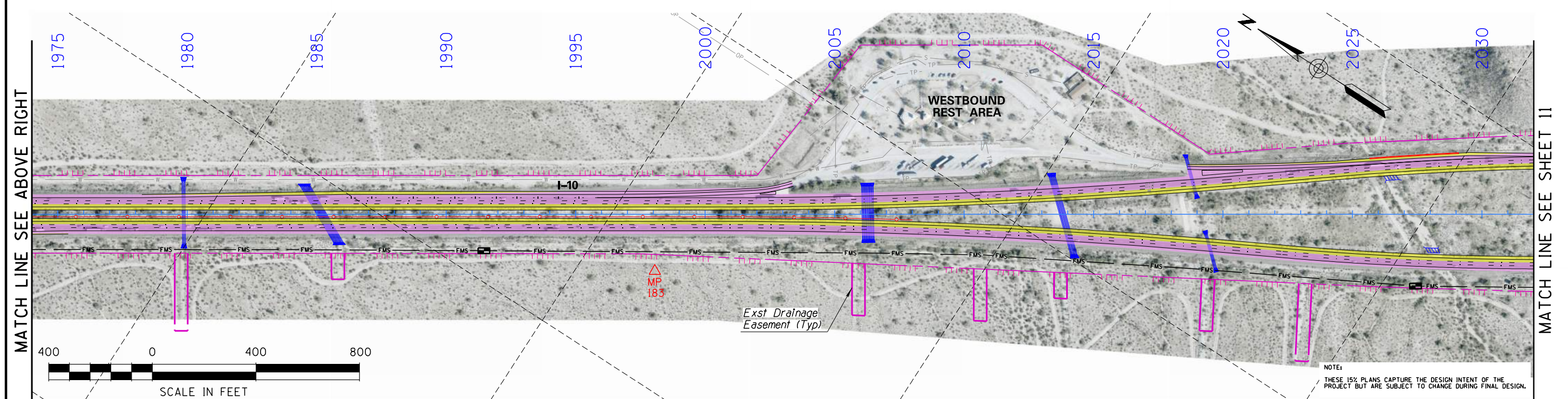
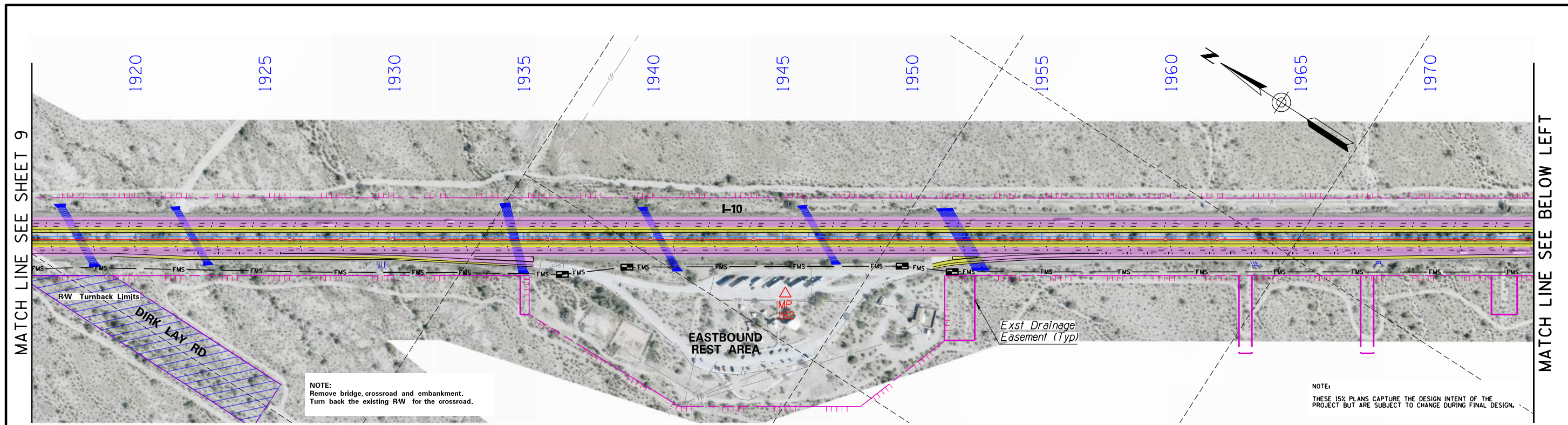
LEGEND

- Mill and Overlay
- New Pavement
- Median Cable Barrier
- Concrete Barrier
- New RW
- Allotment Parcels
- Land Boundary

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 9 OF 12**

LEGEND

- New Temporary Construction Easements
- Exst RW (Line)
- Exst Control of Access (Hash Marks)
- Milepost





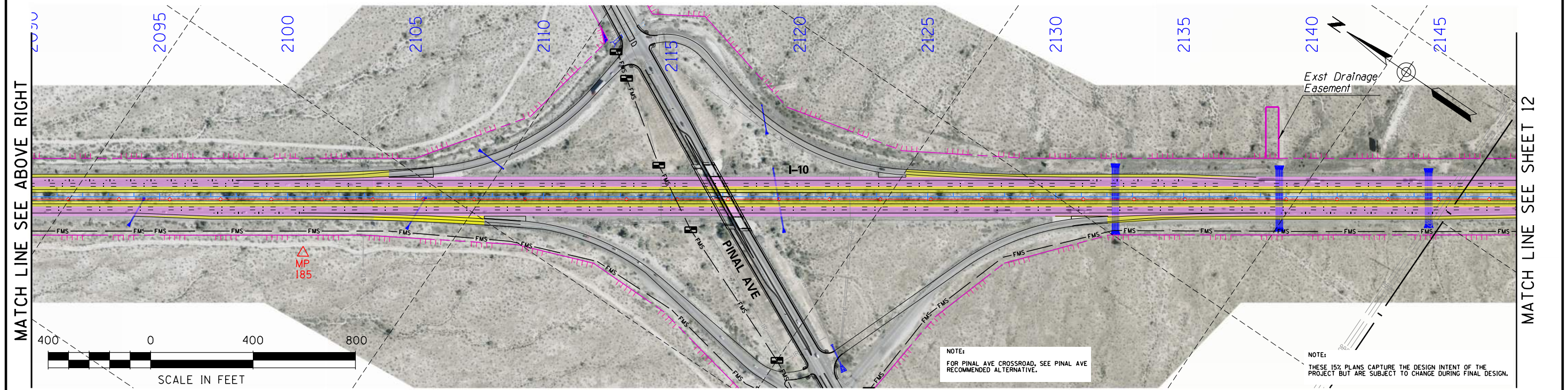
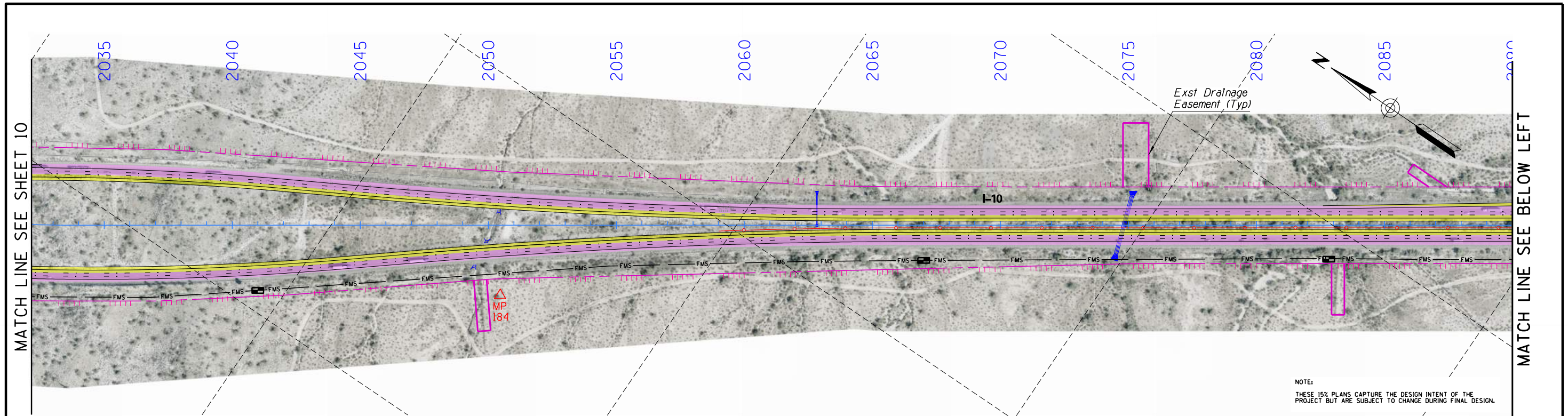
LEGEND

- Mill and Overlay
- New Pavement
- Median Cable Barrier
- Concrete Barrier

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 10 OF 12**

LEGEND

- New Temporary Construction Easements
- Exst RW (Line)
- Exst Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary





LEGEND

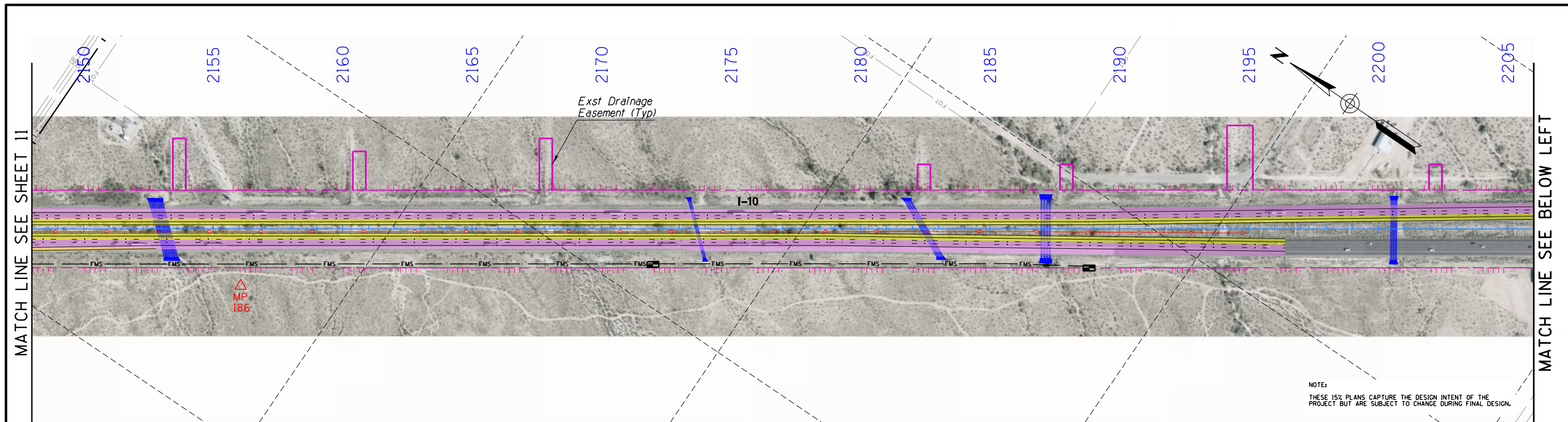
- Mill and Overlay
- Concrete Barrier
- New Pavement
- Median Cable Barrier

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 11 OF 12**

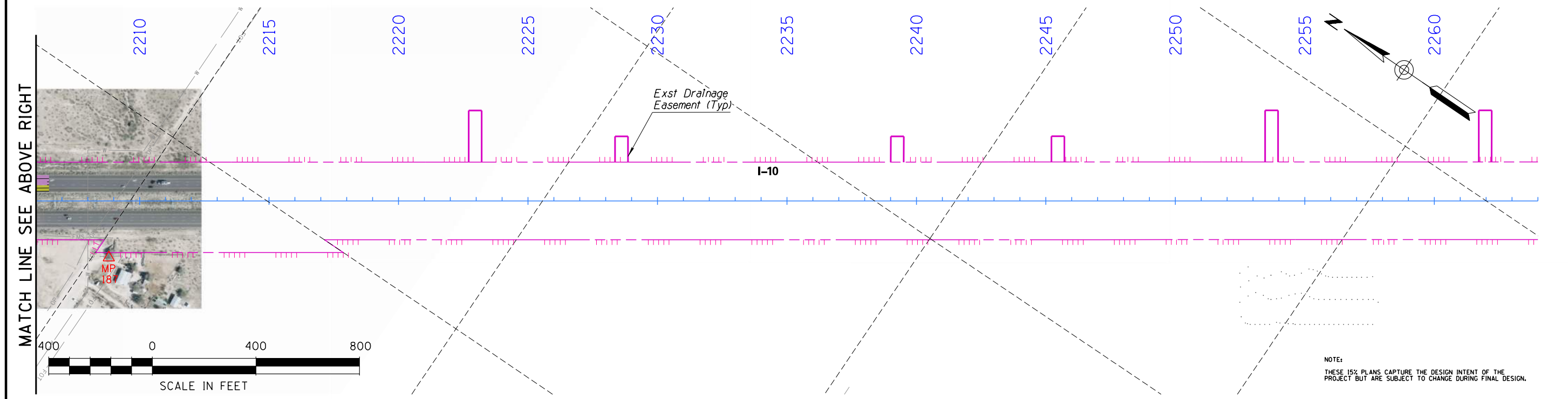
LEGEND

- New Temporary Construction Easements
- Exst RW (Line)
- Exst Control of Access (Hash Marks)
- Milepost
- New RW
- Allotment Parcels
- Land Boundary

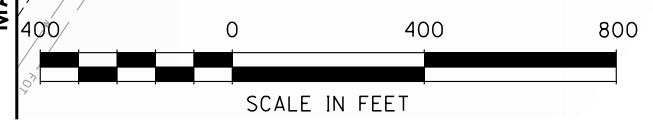
11/11/2023



NOTE:
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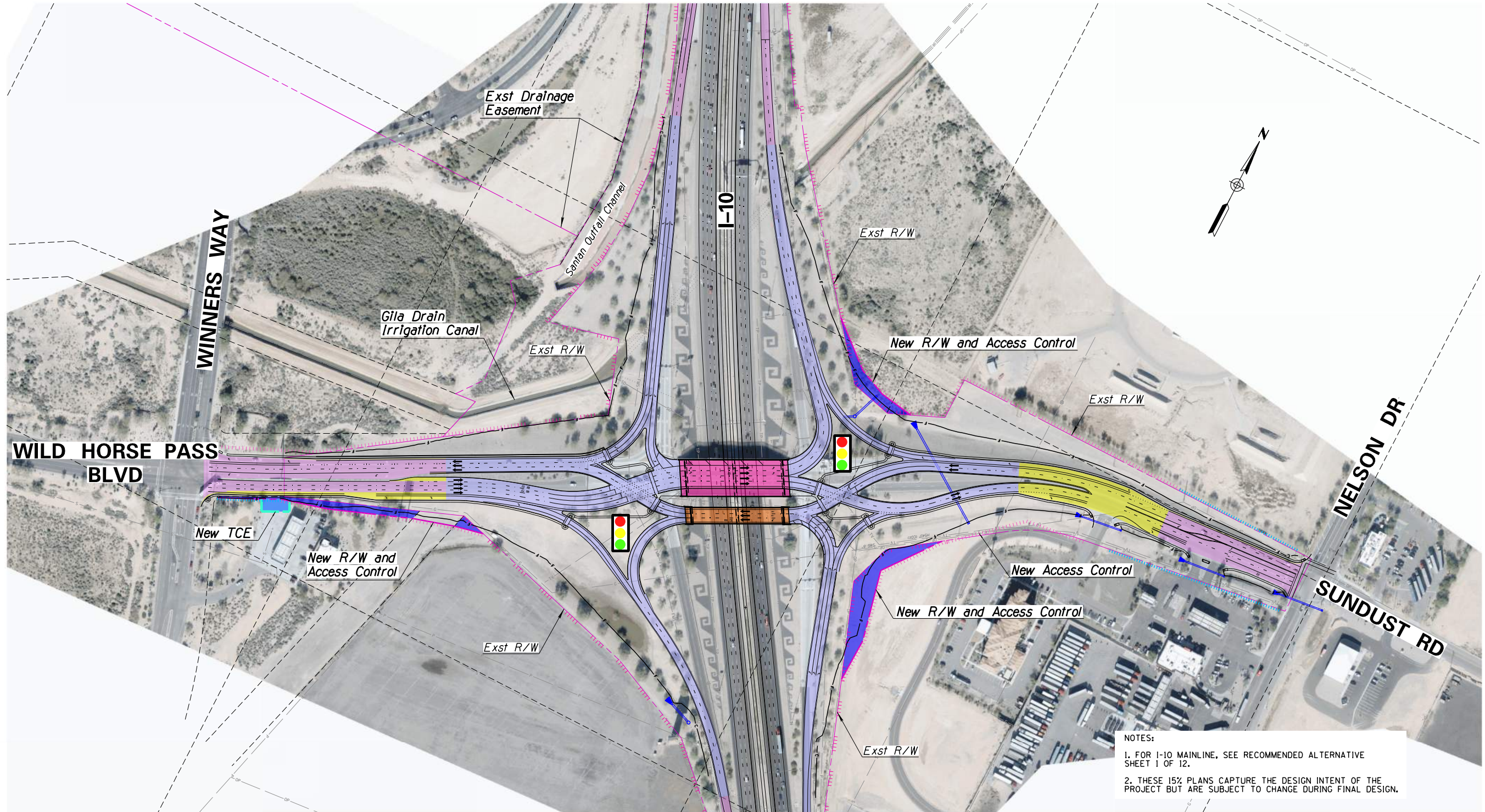
LEGEND

 Mill and Overlay	 Concrete Barrier
 New Pavement	
 Median Cable Barrier	

**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
RECOMMENDED ALTERNATIVE - SHEET 12 OF 12**

LEGEND

 New Temporary Construction Easements	 New RW
 Exst R/W (Line)	 Allotment Parcels
 Exst Control of Access (Hash Marks)	 Land Boundary
 Milepost	



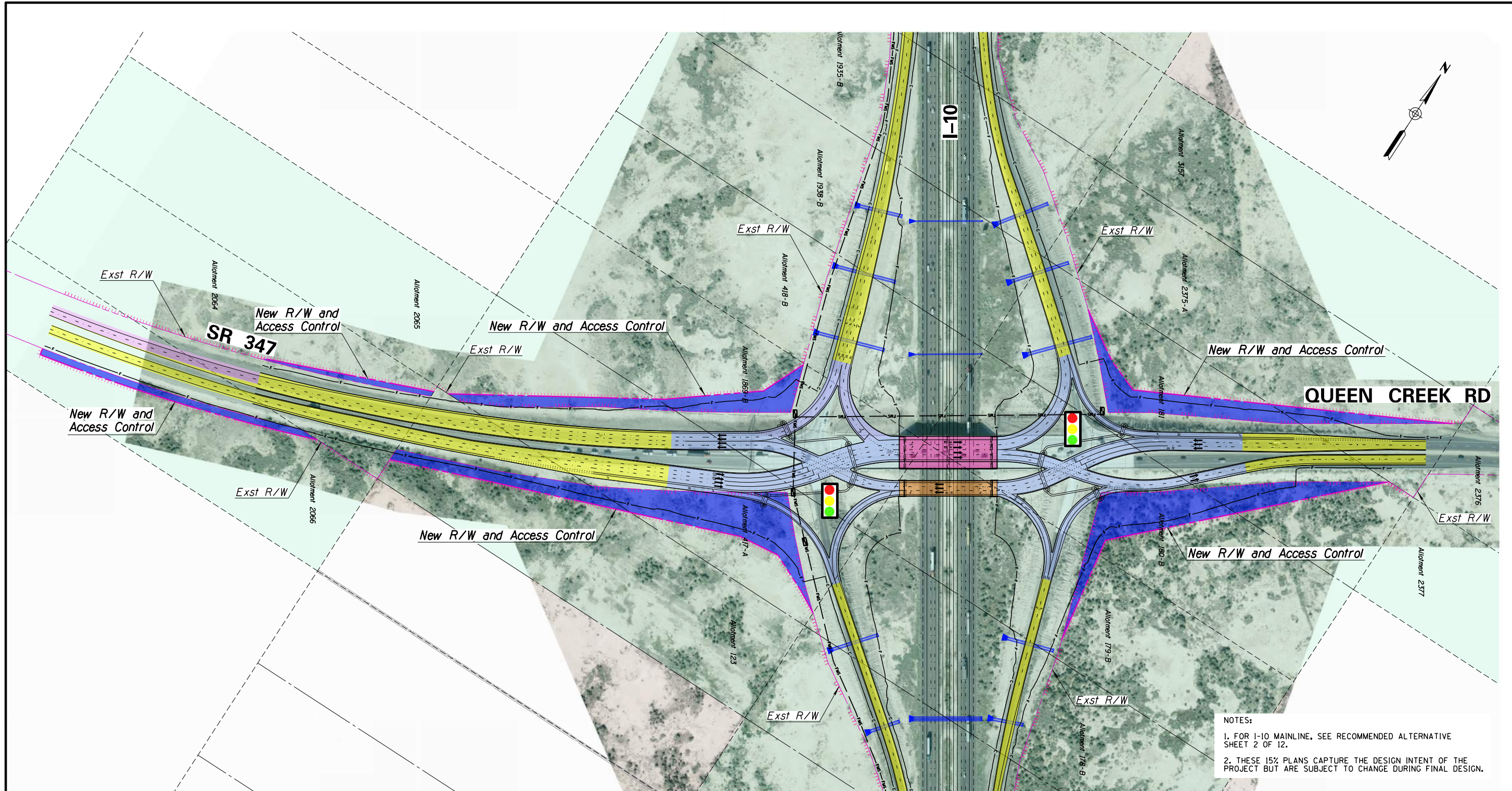
NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 1 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



LEGEND	
	Allotment Parcels
	New Pavement (Asphalt)
	Rehabilitated Bridge
	New Pavement (Concrete)
	New Bridge
	Mill & Overlay
	Median Cable Barrier
	Concrete Barrier

**I-10 / LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 WILD HORSE PASS BLVD RECOMMENDED ALTERNATIVE**

LEGEND	
	Full Access Control
	Restricted Access Control
	New R/W
	Temporary Construction Easements
	Exist R/W (Line)
	MP Milepost
	New Permanent Easements
	New TCE
	Land Boundary



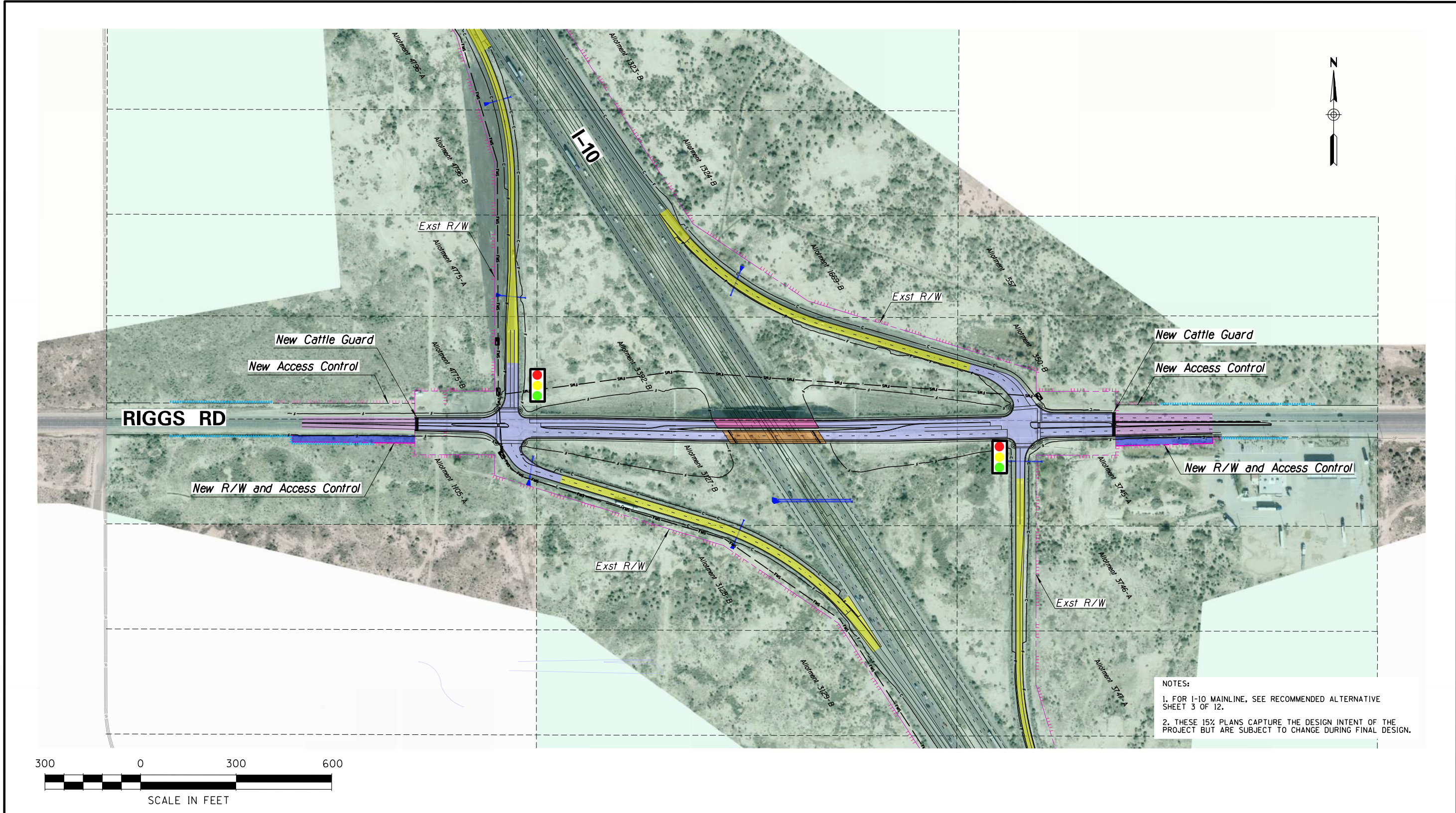
NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 2 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



Allotment Parcels	New Pavement (Concrete)	Median Cable Barrier
New Pavement (Asphalt)	New Bridge	Concrete Barrier
Rehabilitated Bridge	Mill & Overlay	

**I-10 / LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 SR 347 / QUEEN CREEK ROAD RECOMMENDED ALTERNATIVE**

Full Access Control	Temporary Construction Easements	New Permanent Easements
Restricted Access Control	Exist R/W (Line)	New TCE
New R/W	Exist Control of Access (Hash Marks)	Land Boundary
	MP Milepost	

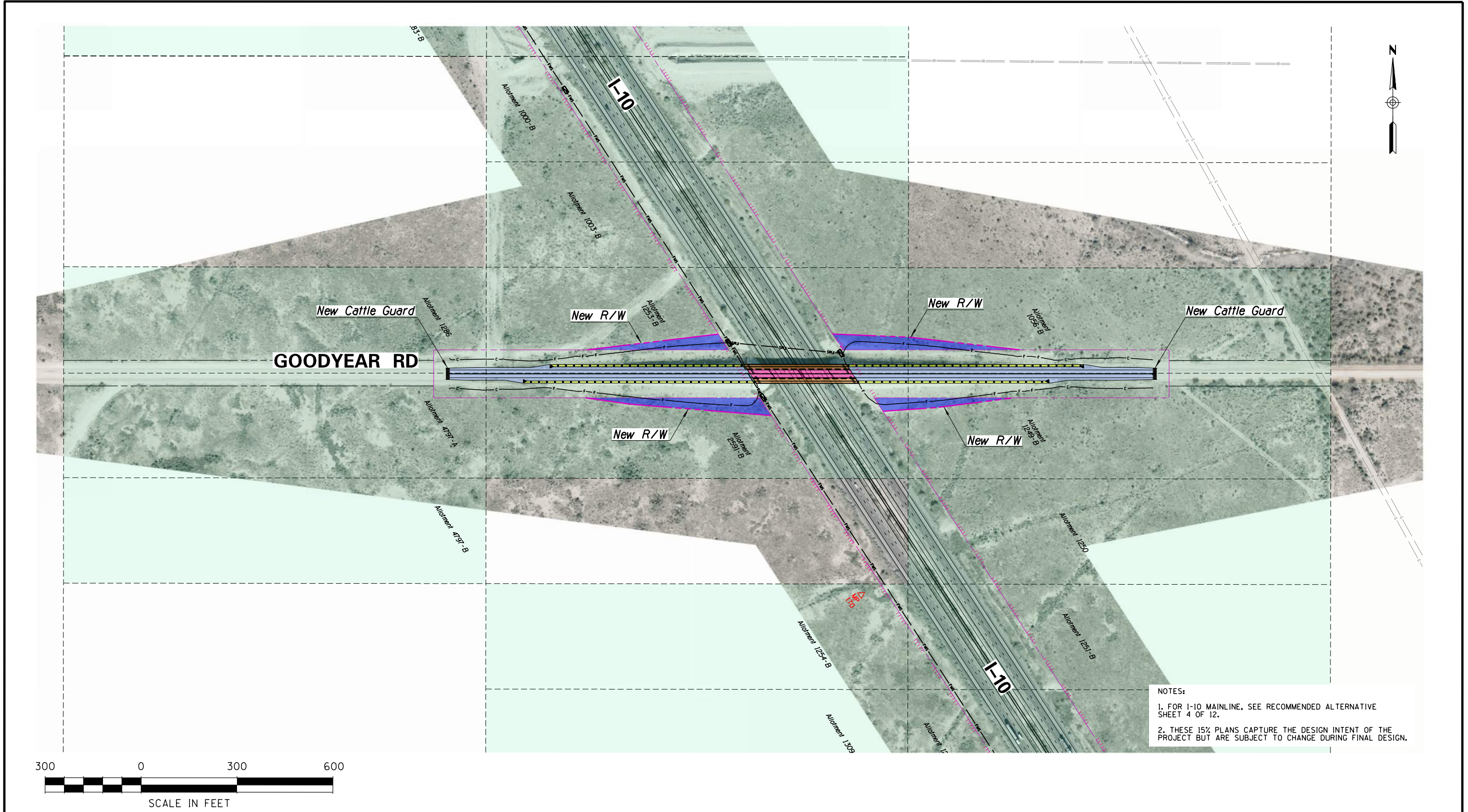


NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 3 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.

LEGEND		
Allotment Parcels	New Pavement (Concrete)	Median Cable Barrier
New Pavement (Asphalt)	New Bridge	Concrete Barrier
Rehabilitated Bridge	Mill & Overlay	

**I-10 / LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 RIGGS RD RECOMMENDED ALTERNATIVE**

LEGEND		
Full Access Control	Temporary Construction Easements	New Permanent Easements
Restricted Access Control	Exist RW (Line)	New TCE
New R/W	Exist Control of Access (Hash Marks)	Land Boundary
	Milepost	



NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 4 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



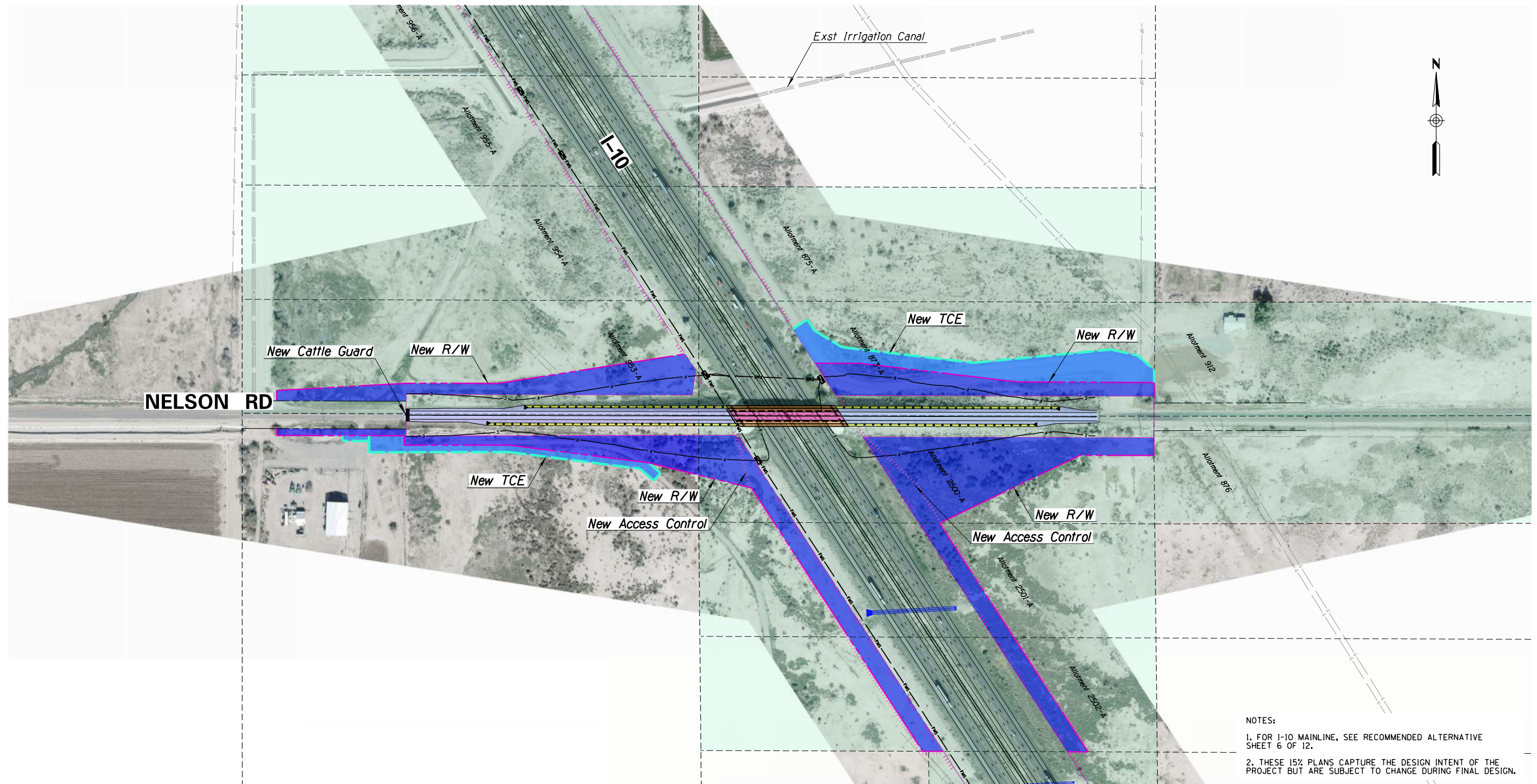
LEGEND

Allotment Parcels	New Pavement (Concrete)	Median Cable Barrier
New Pavement (Asphalt)	New Bridge	Concrete Barrier
Rehabilitated Bridge	Mill & Overlay	

**I-10 / LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 GOODYEAR ROAD RECOMMENDED ALTERNATIVE**

LEGEND

Full Access Control	Temporary Construction Easements	New Permanent Easements
Restricted Access Control	Exist RW (Line)	New TCE
New R/W	Exist Control of Access (Hash Marks)	Land Boundary
	MP Milepost	



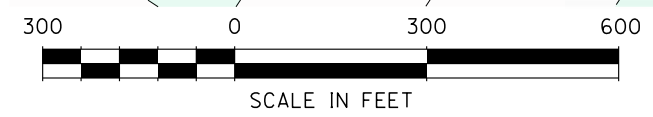
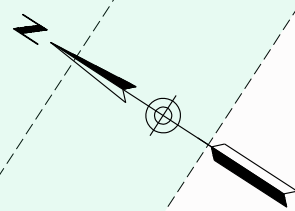
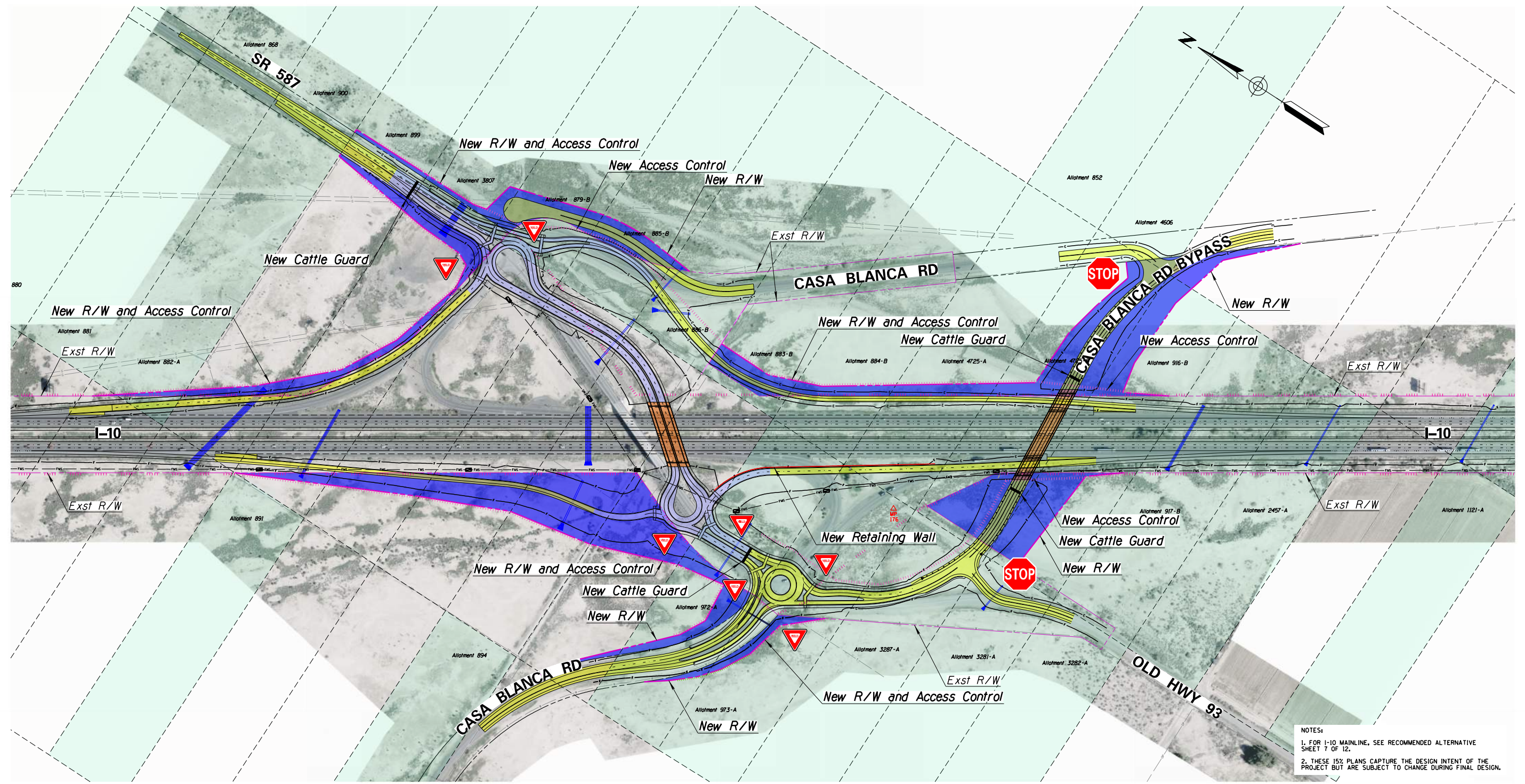
NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 6 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



LEGEND	
Allotment Parcels	New Pavement (Concrete)
New Pavement (Asphalt)	New Bridge
Rehabilitated Bridge	Mill & Overlay
Median Cable Barrier	Concrete Barrier

**I-10 / LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 NELSON ROAD RECOMMENDED ALTERNATIVE**

LEGEND	
Full Access Control	Temporary Construction Easements
Restricted Access Control	Exist RW (Line)
New R/W	Exist Control of Access (Hash Marks)
Milepost	New Permanent Easements
	New TCE
	Land Boundary



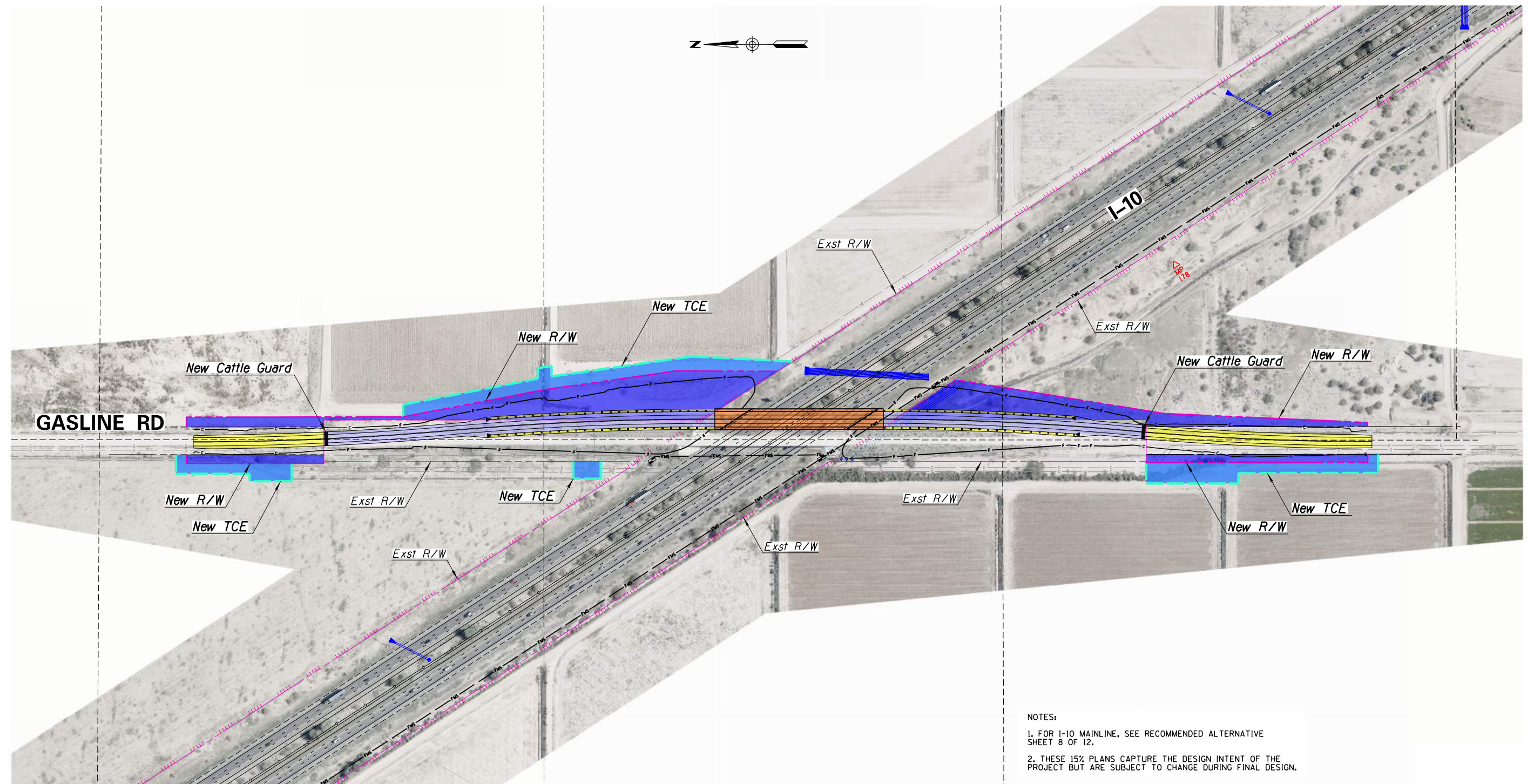
NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 7 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



LEGEND	
Allotment Parcels	New Pavement (Concrete)
New Pavement (Asphalt)	New Bridge
Rehabilitated Bridge	Mill & Overlay
Median Cable Barrier	Concrete Barrier

**I-10 / LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 SR 587 / CASA BLANCA ROAD RECOMMENDED ALTERNATIVE**

LEGEND	
Full Access Control	Temporary Construction Easements
Restricted Access Control	Exist R/W (Line)
New R/W	Exist Control of Access (Hash Marks)
Milepost	New Permanent Easements
	New TCE
	Land Boundary



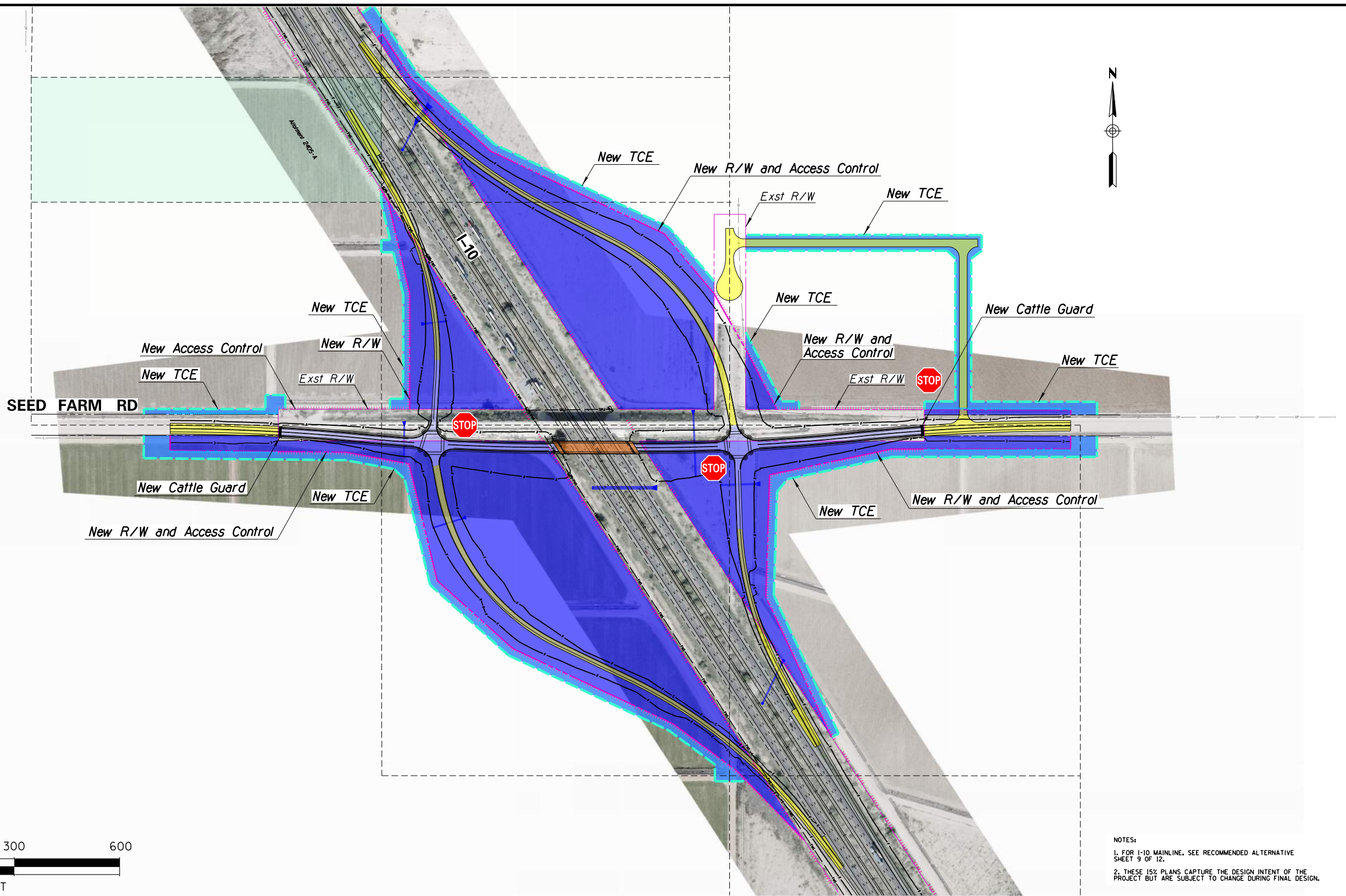
NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 8 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



LEGEND	
	Allotment Parcels
	New Pavement (Asphalt)
	Rehabilitated Bridge
	New Pavement (Concrete)
	New Bridge
	Mill & Overlay
	Median Cable Barrier
	Concrete Barrier

**I-10 /LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 GASLINE ROAD RECOMMENDED ALTERNATIVE**

LEGEND	
	Full Access Control
	Restricted Access Control
	New R/W
	Temporary Construction Easements
	Exist R/W (Line)
	Exist Control of Access (Hash Marks)
	Milepost
	New Permanent Easements
	New TCE
	Land Boundary



NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 9 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



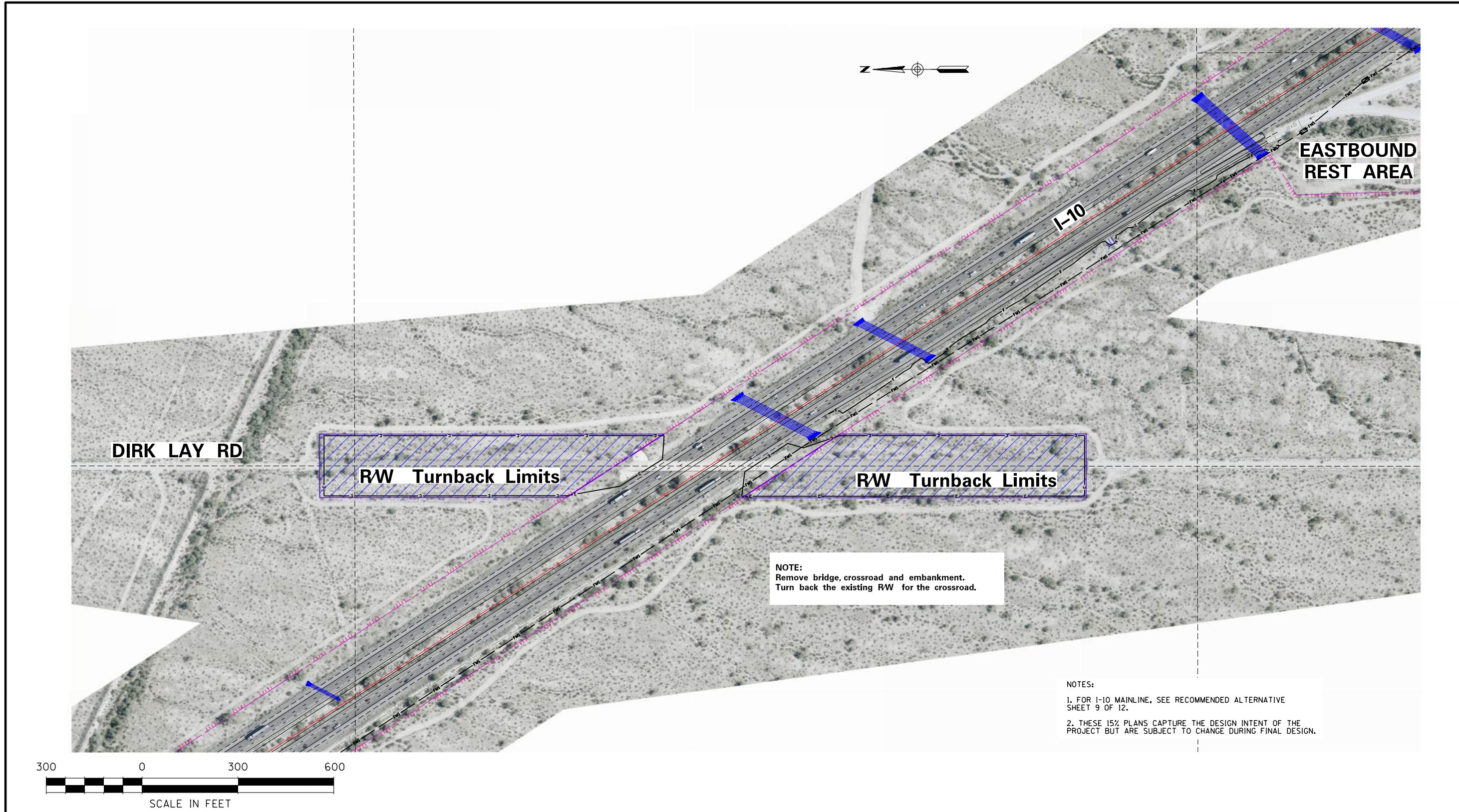
LEGEND

Allotment Parcels	New Pavement (Concrete)	Median Cable Barrier
New Pavement (Asphalt)	New Bridge	Concrete Barrier
Rehabilitated Bridge	Mill & Overlay	

**I-10 / LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 SEED FARM ROAD RECOMMENDED ALTERNATIVE**

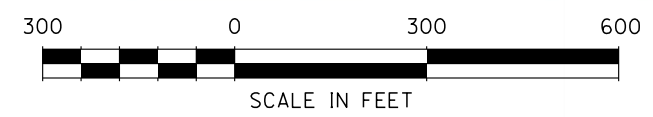
LEGEND

Full Access Control	Temporary Construction Easements	New Permanent Easements
Restricted Access Control	Exist R/W (Line)	New TCE
New R/W	Exist Control of Access (Hash Marks)	Land Boundary
	MP Milepost	



NOTE:
Remove bridge, crossroad and embankment.
Turn back the existing RW for the crossroad.

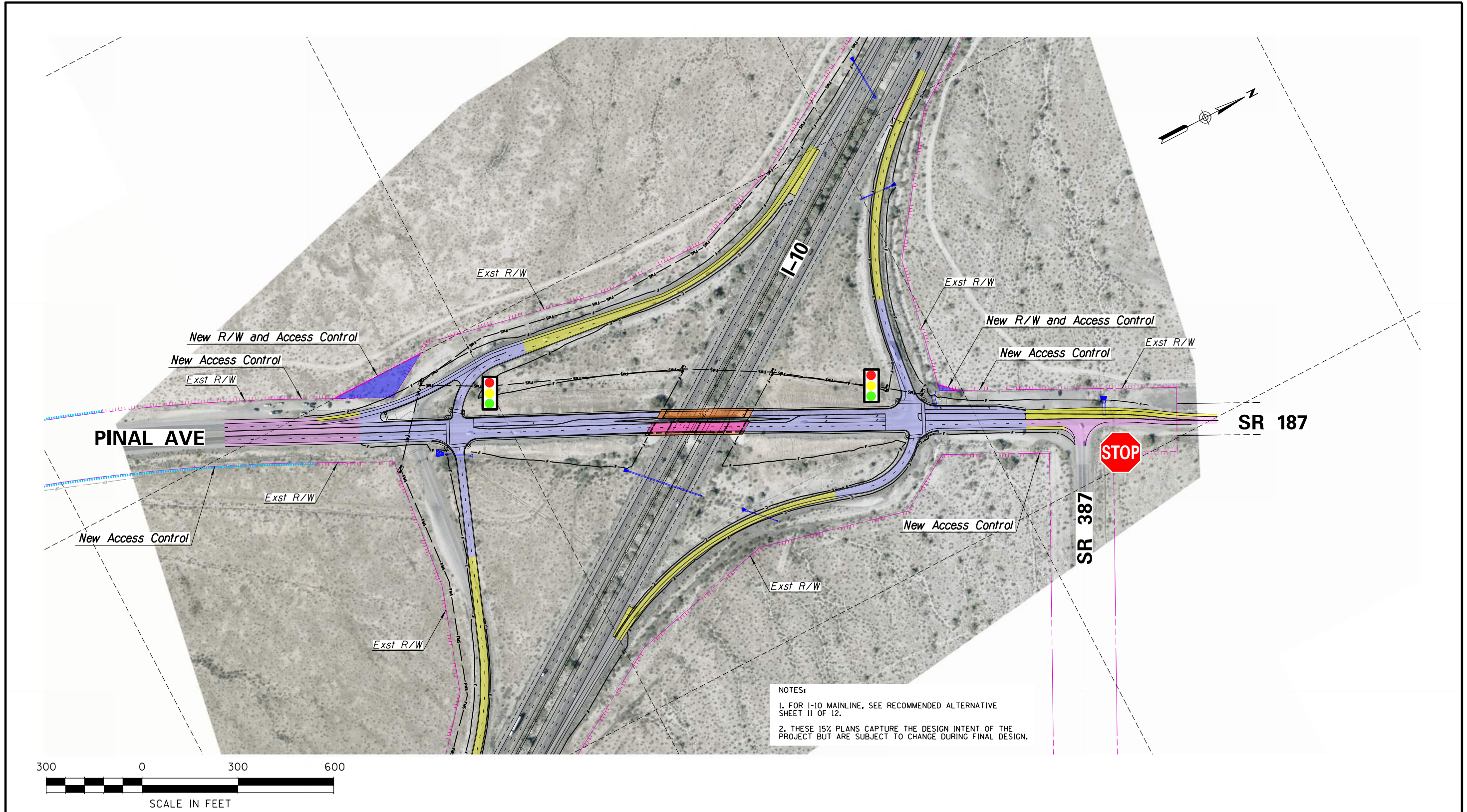
NOTES:
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2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.



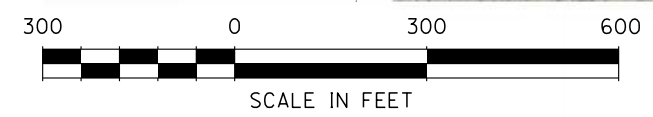
LEGEND	
Allotment Parcels	New Pavement (Concrete)
New Pavement (Asphalt)	New Bridge
Rehabilitated Bridge	Mill & Overlay
Median Cable Barrier	Concrete Barrier


**I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
DIRK LAY ROAD RECOMMENDED ALTERNATIVE**

LEGEND	
Full Access Control	Temporary Construction Easements
Restricted Access Control	Exist RW (Line)
New R/W	Exist Control of Access (Hash Marks)
MP Milepost	New Permanent Easements
	New TCE
	Land Boundary



NOTES:
 1. FOR I-10 MAINLINE, SEE RECOMMENDED ALTERNATIVE SHEET 11 OF 12.
 2. THESE 15% PLANS CAPTURE THE DESIGN INTENT OF THE PROJECT BUT ARE SUBJECT TO CHANGE DURING FINAL DESIGN.





LEGEND

- Allotment Parcels
- New Pavement (Asphalt)
- Rehabilitated Bridge
- New Pavement (Concrete)
- New Bridge
- Mill & Overlay
- Median Cable Barrier
- Concrete Barrier

**I-10 / LOOP 202 TO SR 387
 WILD HORSE PASS CORRIDOR
 SR 387 / SR 187 / PINAL AVE RECOMMENDED ALTERNATIVE**

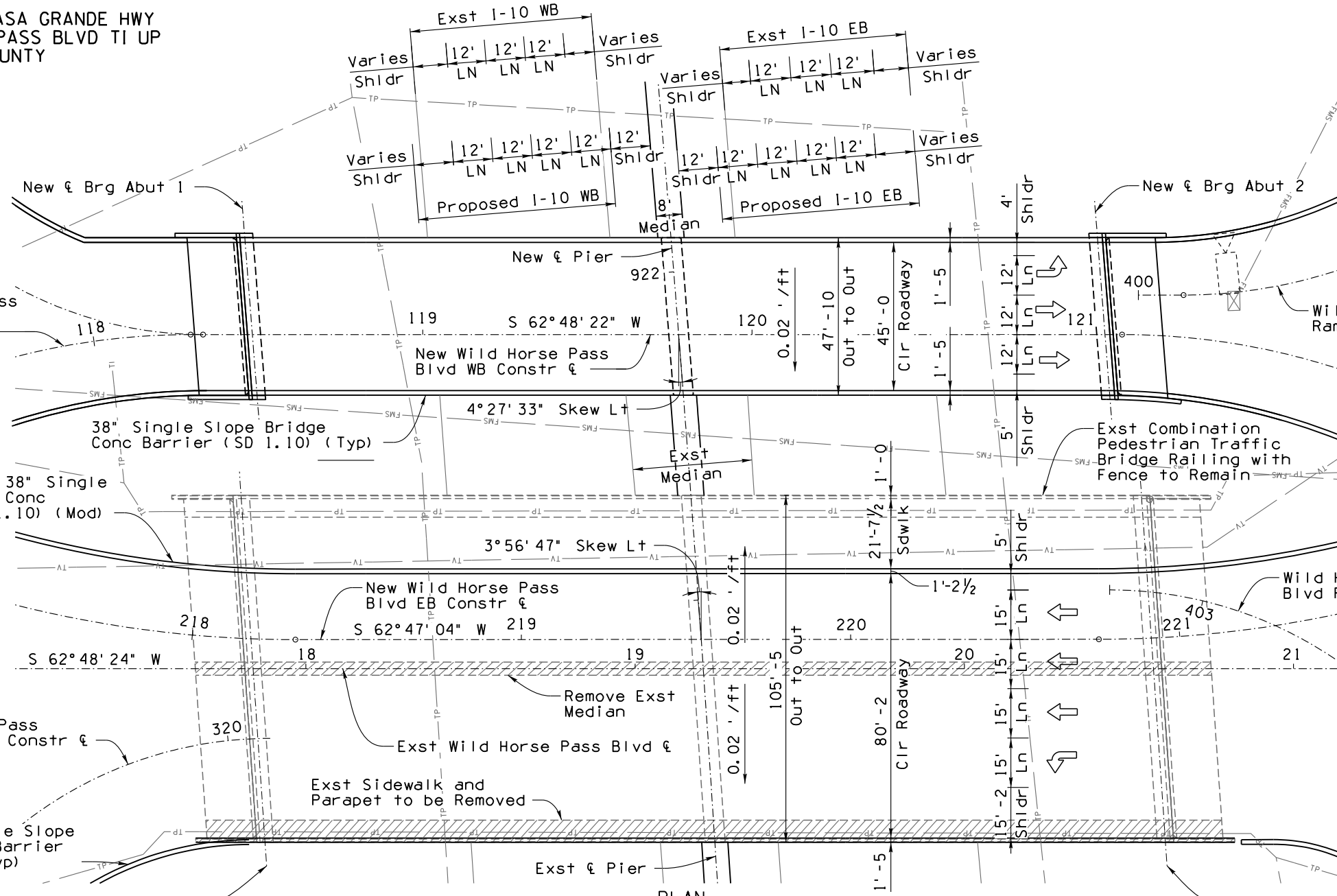
LEGEND

- Temporary Construction Easements
- Exist RW (Line)
- Exist Control of Access (Hash Marks)
- MP Milepost
- New Permanent Easements
- New TCE
- Land Boundary

PHOENIX - CASA GRANDE HWY
WILD HORSE PASS BLVD TI UP
MARICOPA COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			

PLOT DATE: 10/15/2021 TIME: 11:47 AM
 PLOT SCALE: 1/4" = 40'
 PLOT BY: RTONEY-HDR
 SURVEY NO.:
 FINISHED PLANS:
 REVISIONS:
 LOCATION:
 DATE:



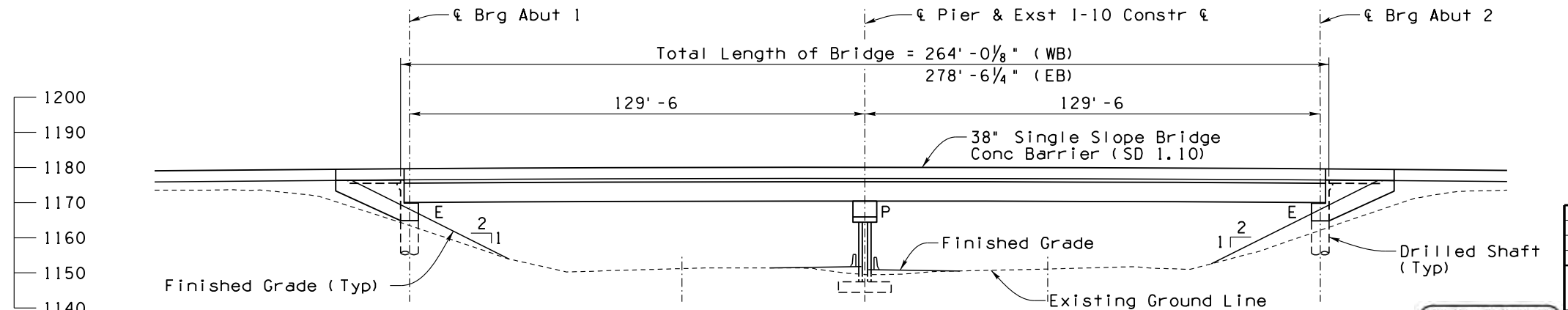
Existing 2-Span Precast Prestressed Concrete (AASHTO Type VI) Girder Bridge
New 2-Span Precast Prestressed Concrete (UBT) Girder Bridge
Skew 04°27'33" Lt
Scale: 1" = 20' - 0

NOTES:

- The original structure (Str No. 2612) was built in 2004 by the Bridge Division of the Arizona Highway Department under Project No. 202-C-501
- Dimensions, stationing, and bearings of the existing structure is based on as-built plans. Actual structural features shall be field verified.

LEGEND:

Indicates Structural Concrete Removal



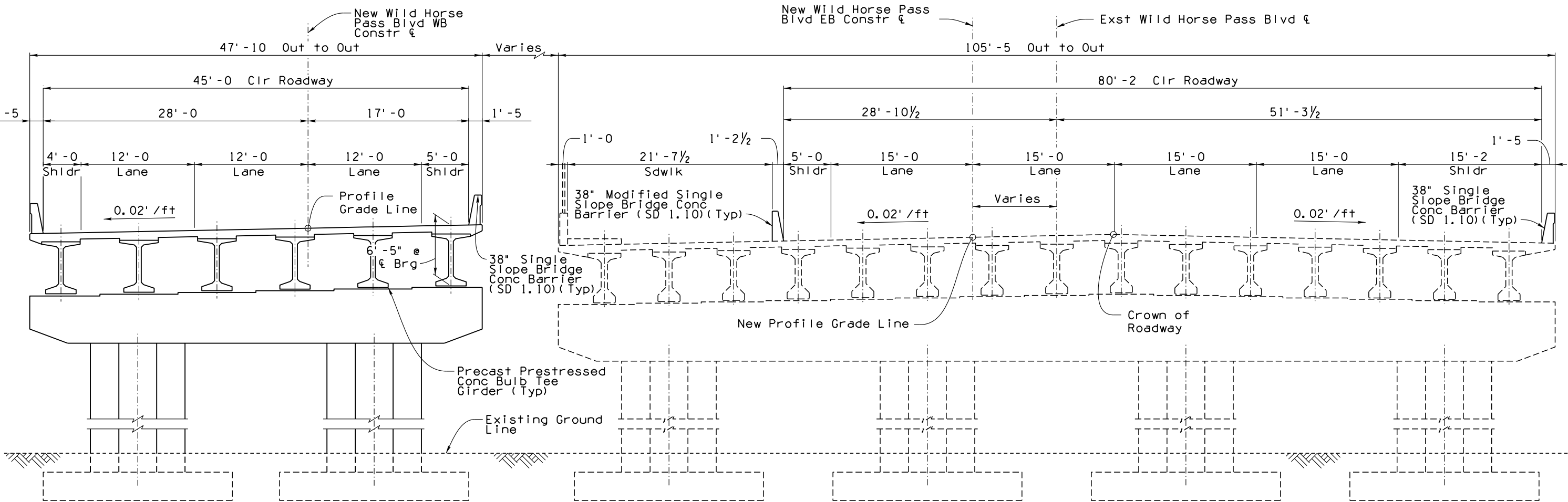
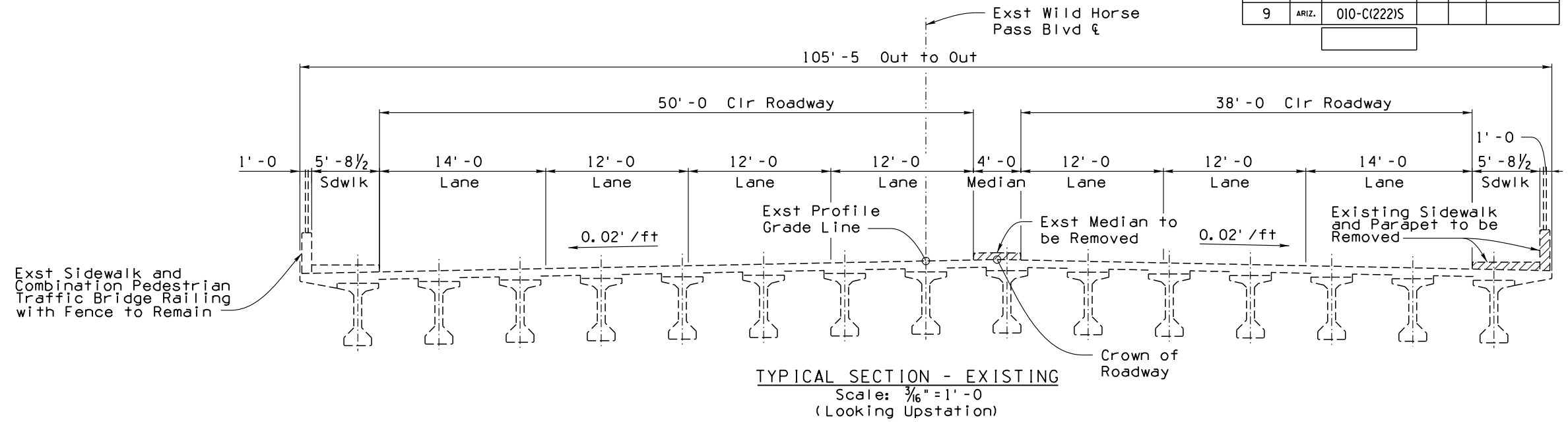
ELEVATION
(New WB Elevation Shown)
Scale: 1" = 20' - 0

DESIGN	DL	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	RDT		10/21	
CHECKED	JXH		10/21	
				STA: 921+80.87 WILD HORSE PASS BLVD TI UP GENERAL PLAN AND ELEVATION
I-10 ROUTE		MILEPOST	STRUCTURE NO.	LOCATION
				SR 202L TO SR 387
TRACS NO. F0252				DWG NO. S-1.01
				OF



PHOENIX - CASA GRANDE HWY
WILD HORSE PASS BLVD TI UP
MARICOPA COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



TYPICAL SECTION - NEW
Scale: 3/16" = 1'-0"
(Looking Upstation)

DESIGN	DL	DATE	10/21
DRAWN	RDT	DATE	10/21
CHECKED	JXH	DATE	10/21

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
BRIDGE GROUP

STA: 921+80.87
WILD HORSE PASS BLVD TI UP
(WB & EB) TYPICAL SECTION

LOCATION: SR 202L TO SR 387

ROUTE: I-10

MILEPOST: TRACS NO. F0252

STRUCTURE NO. SR 202L TO SR 387

DWG NO. S-1.02

OF



PLOT DATE: 10/15/2021 11:53 AM
PLOT SCALE: 1/16" = 1'-0"
PLOT BY: RTONEY-HDR
SURVEY NO. 106667
FINISHED PLANS

PHOENIX - CASA GRANDE HWY
 QUEEN CREEK ROAD TI UP
 MARICOPA COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			

Exst Type A Barrier and Fence to be Removed

Queen Creek Rd Ramp D Constr &

2839

439

103

N 57°00'25" E 440

New Queen Creek Rd EB Constr &

New Modified 38" Single Slope Bridge Conc Barrier (SD 1.10) (Mod)

New & Brg Abut 1

Queen Creek Rd Ramp C Constr &

10

38" Single Slope Bridge Conc Barrier (SD 1.10) (Typ)

1'-5 Typ

10'

12'

12'

12'

12'

12'

12'

12'

12'

12'

12'

12'

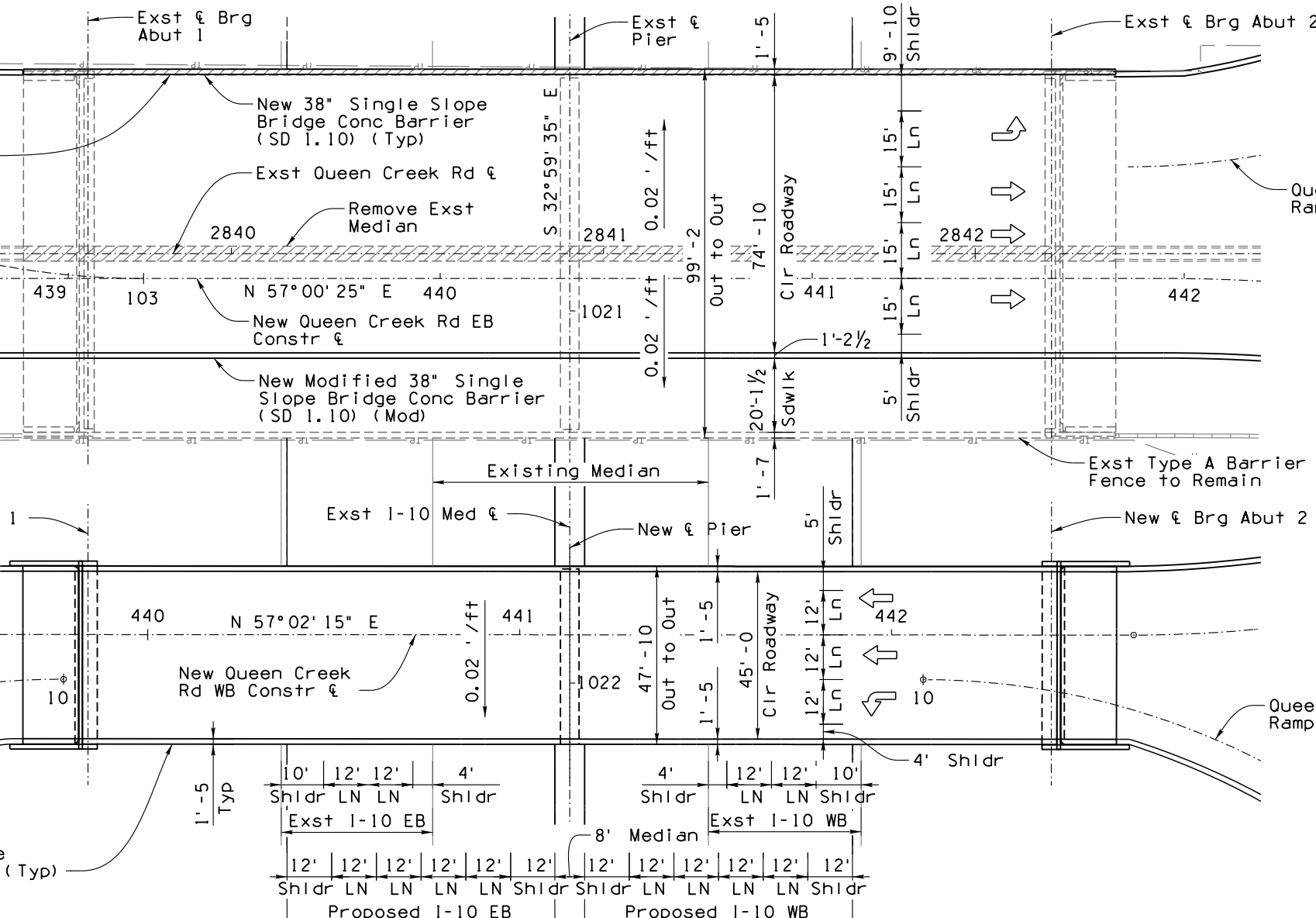
12'

12'

12'

12'

Shldr LN LN LN LN LN Shldr



NOTES:

- The original structure (Str No. 2302) was built in 1991 by the Bridge Division of the Arizona Highway Department under Project No. 1R-10-3(325)
- Dimensions, stationing, and bearings of the existing structure is based on as-built plans. Actual structural features shall be field verified.

LEGEND:

Indicates Structural Concrete Removal

1200

1190

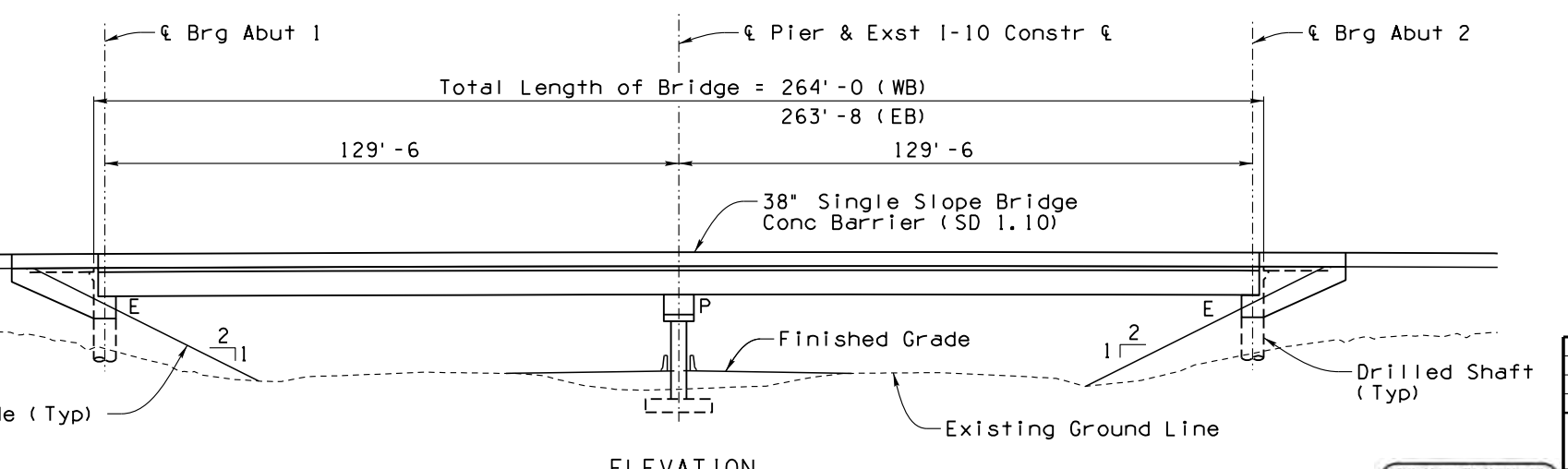
1180

1170

1160

1150

1140



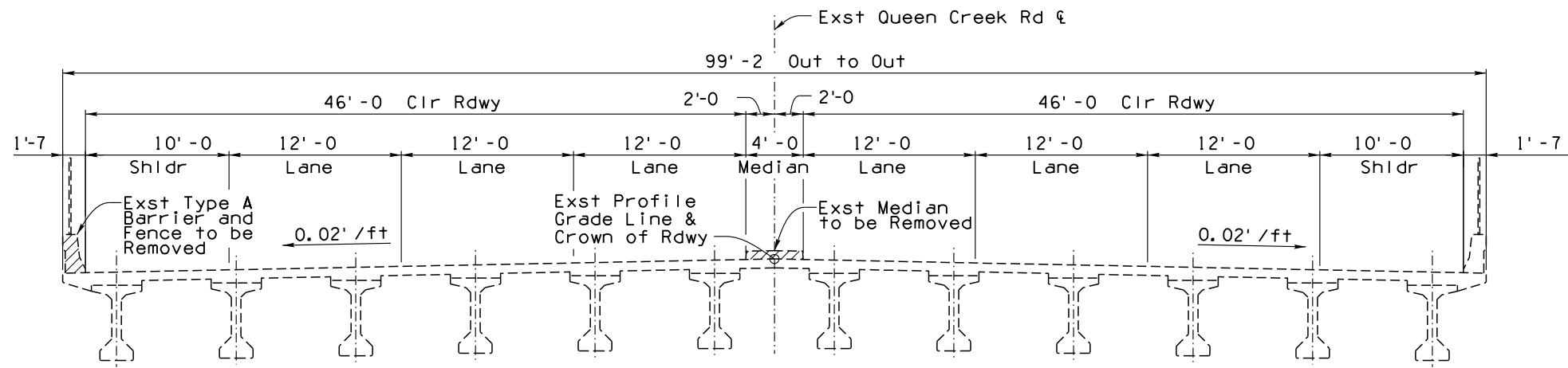
DESIGN	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	RDT	DATE	10/21	
CHECKED	JXH	DATE	10/21	
				STA: 1020+87.05 QUEEN CREEK RD TI UP GENERAL PLAN AND ELEVATION
I-10 ROUTE		MILEPOST	STRUCTURE NO.	LOCATION
				SR 202L TO SR 387
TRACS NO. F0252				DWG NO. S-1.03
				OF



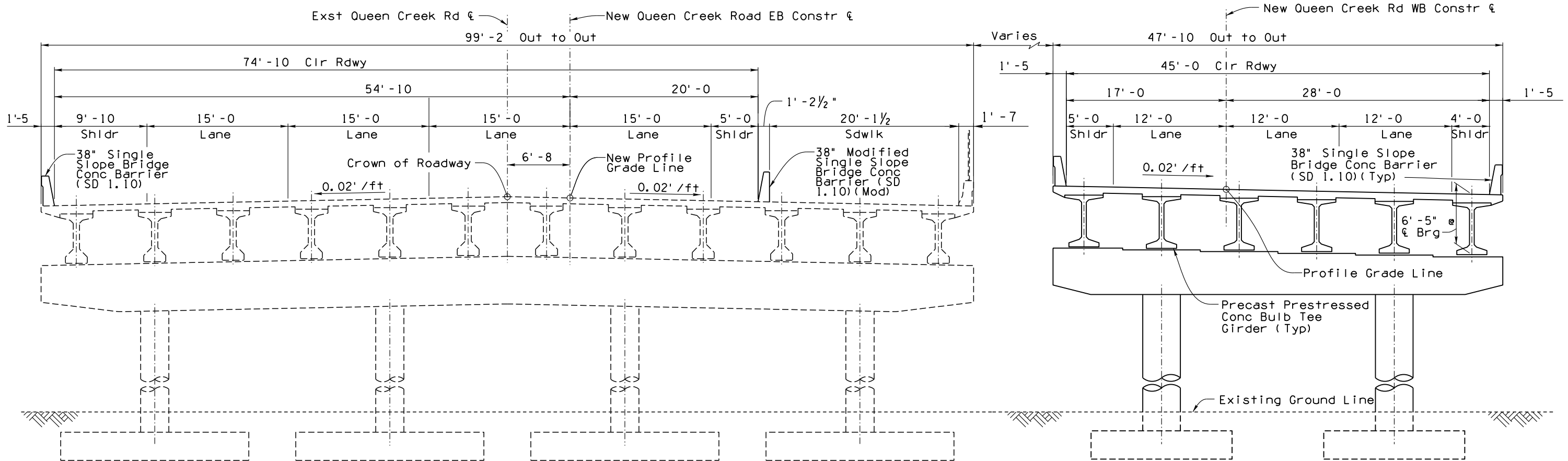
PLOT DATE: 10/15/2021 11:59 AM
 PLOT SCALE: 1"=40'
 PLOT BY: RTONEY-HDR

PHOENIX - CASA GRANDE HWY
 QUEEN CREEK ROAD TI UP
 MARICOPA COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			




TYPICAL SECTION - EXISTING
 Scale: 3/16" = 1'-0"
 (Looking Upstation)



TYPICAL SECTION - NEW
 Scale: 3/16" = 1'-0"
 (Looking Upstation)

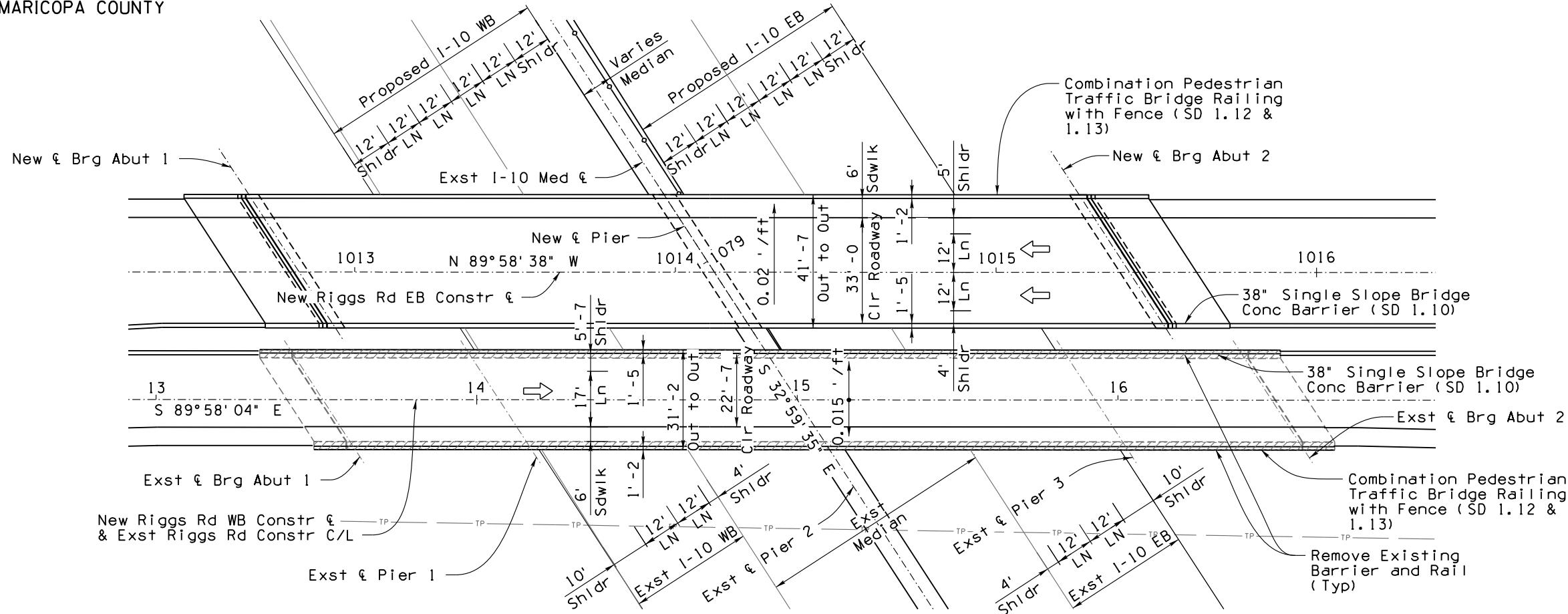
PLOT DATE: 10/15/2021 TIME: 11:12:04 AM SURVEY NO.: FINISHED PLANS: PLOT SCALE: 1/16" = 1'-0" PLOT BY: RTONEY-HDR DATE: FINISHED PLANS: SURVEY NO.: REVISIONS: LOCATION: DATE:

DESIGN	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP	
DRAWN	RDT	DATE	10/21		
CHECKED	JXH	DATE	10/21		
				STA: 1020+87.05 QUEEN CREEK RD TI UP (EB & WB) TYPICAL SECTION	
I-10	ROUTE	MILEPOST	STRUCTURE NO.	LOCATION	DWG NO. S-1.04
TRACS NO. F0252				SR 202L TO SR 387	OF



PHOENIX - CASA GRANDE HWY
RIGGS RD TI UP
MARICOPA COUNTY

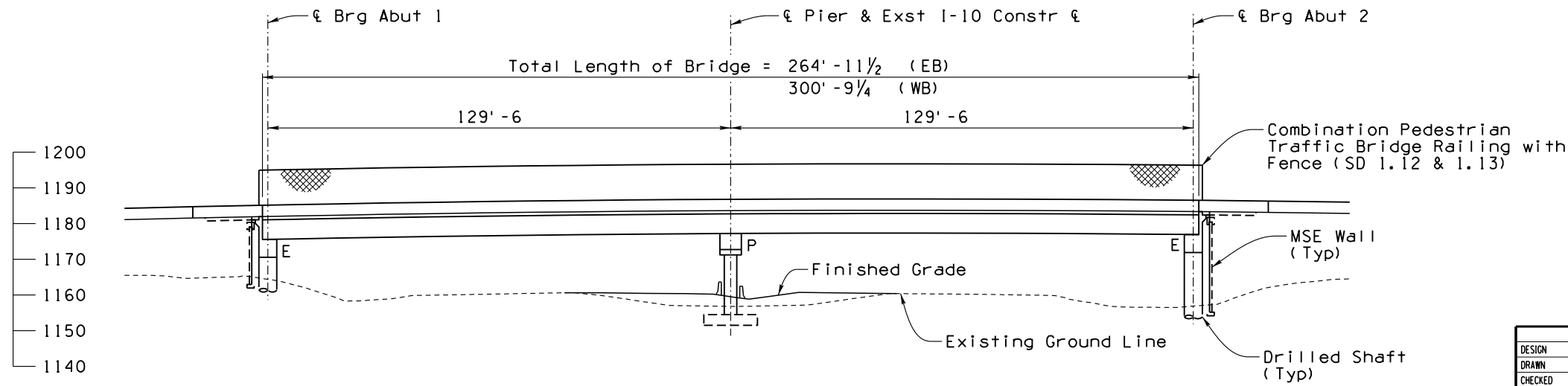
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



PLAN
Existing 4-Span Steel Girder Bridge
New 2-Span Precast Prestressed Concrete (UBT) Girder Bridge
Skew: 32°59'35" Lt
Scale: 1" = 20' - 0

- NOTES:**
- The original structure (Str No. 01148) was built in 1967 by the Bridge Division of the Arizona Highway Department under Project No. 1-10-3(36)161
 - Dimensions, stationing, and bearings of the existing structure is based on as-built plans. Actual structural features shall be field verified.

LEGEND:
 Indicates Structural Concrete Removal



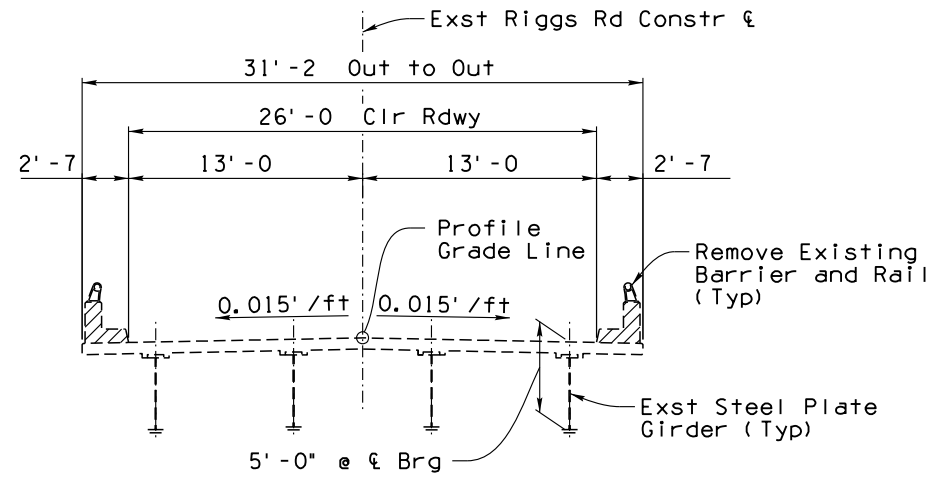
ELEVATION
(New EB Elevation Shown)
Scale: 1" = 20' - 0

DESIGN	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	RDT	DATE	10/21	
CHECKED	JXH	DATE	10/21	
				STA: 1178+48.48 RIGGS RD TI UP (WB & EB) GENERAL PLAN AND ELEVATION
I-10	ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
				SR 202L TO SR 387
TRACS NO. F0252				DWG NO. S-1.05
				OF

PLOT DATE: 10/15/2021 TIME: 11:12:11 AM
 PLOT SCALE: 1/4" = 40'
 PLOT BY: RTONEY-HDR
 SURVEY NO. FINISHED PLANS REVISIONS LOCATION DATE

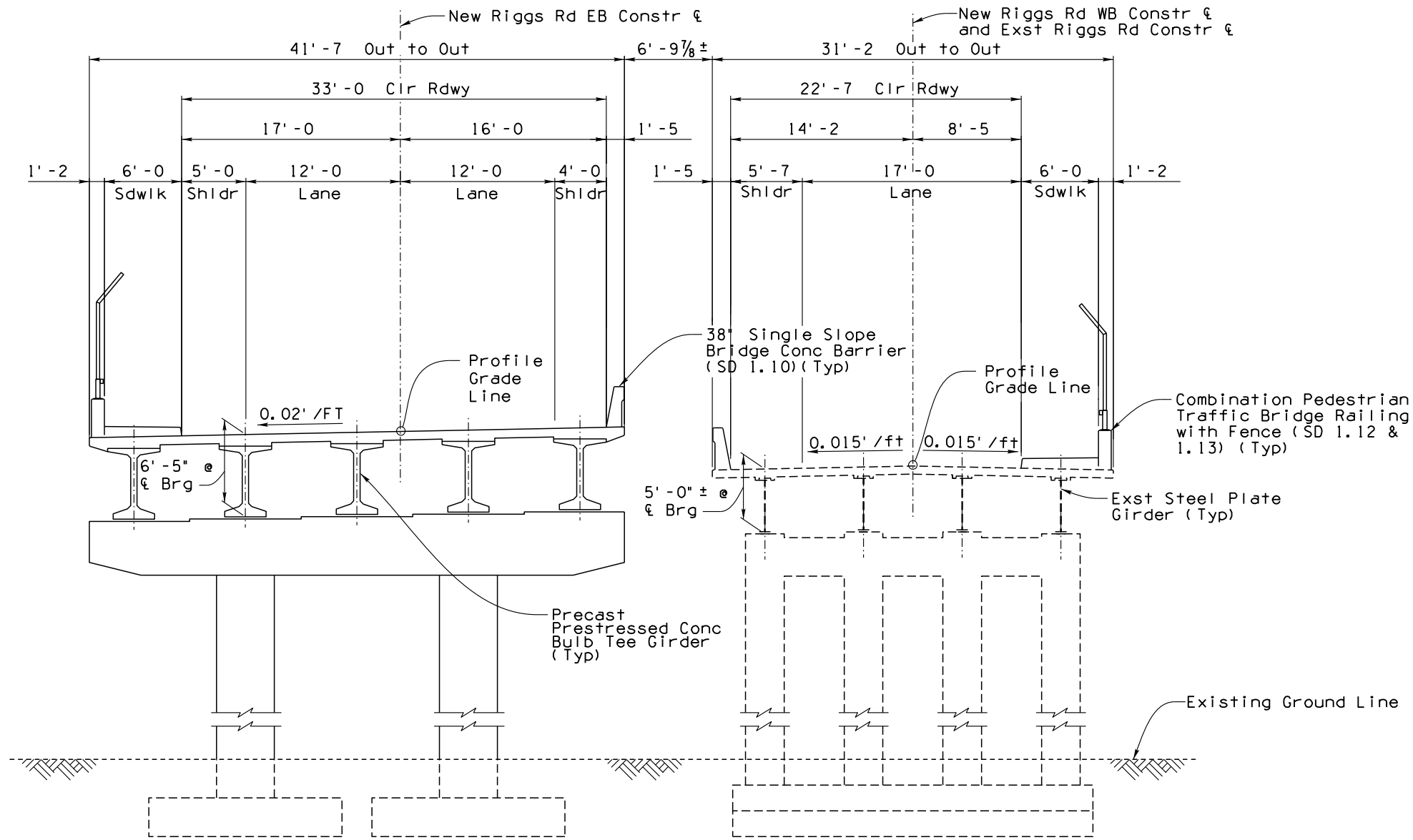
PHOENIX - CASA GRANDE HWY
RIGGS RD TI UP
MARICOPA COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



TYPICAL SECTION - EXISTING

Scale: 3/16" = 1'-0"
(Looking Upstation)



TYPICAL SECTION - NEW

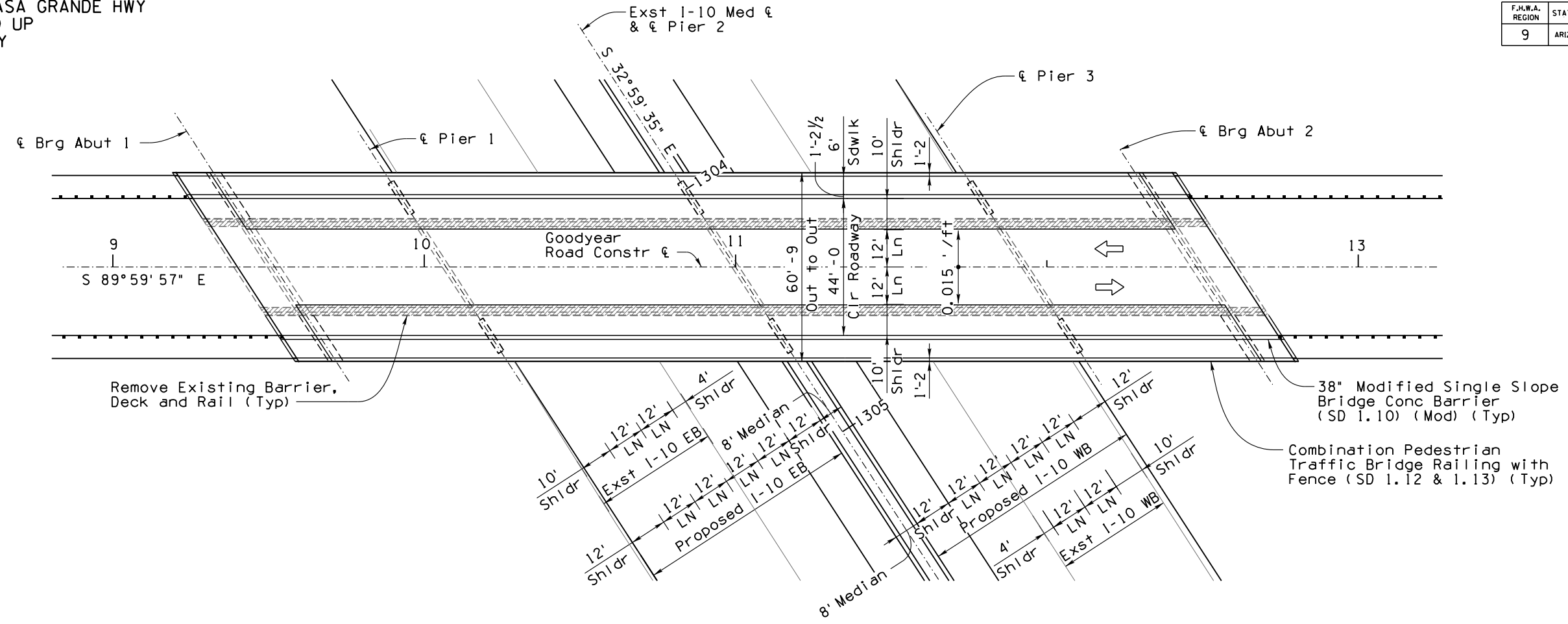
Scale: 3/16" = 1'-0"
(Looking Upstation)

DESIGN	DL	DATE	10/21
DRAWN	RDT	DATE	10/21
CHECKED	JXH	DATE	10/21
ARIZONA <small>HDR</small> <small>HOWE BROS. & CO. ENGINEERS AND ARCHITECTS</small> <small>2015 N. TRAVIS ROAD</small> <small>SUITE 2000</small> <small>PHOENIX, AZ 85024-1118</small> <small>TEL: (602) 922-7700</small>			
ARIZONA <small>Call 811 or click Arizona11.com</small>		ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STA:1178+48.48 RIGGS ROAD TI UP TYPICAL SECTION	
I-10 <small>ROUTE</small>		SR 202L TO SR 387 <small>LOCATION</small>	
TRACS NO. F0252		DWG NO. S-1.06 OF	

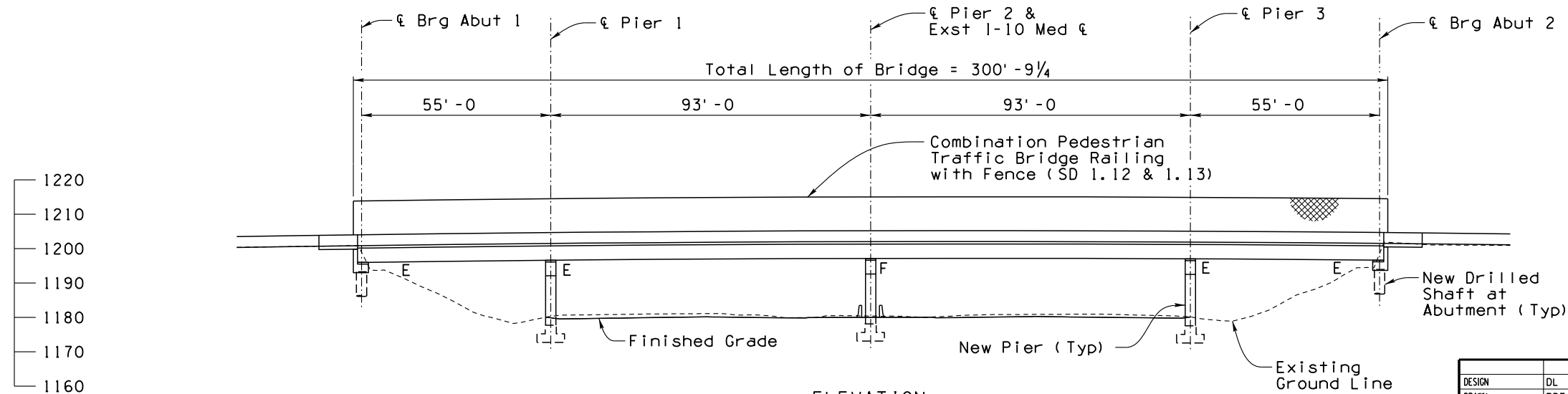
PLOT DATE: 10/15/2021 11:12:17 AM
PLOT SCALE: 1/16" = 1'-0"
PLOT BY: RTONEY-HDR
SURVEY NO. 106667
FINISHED PLANS

PHOENIX - CASA GRANDE HWY
GOODYEAR RD UP
PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



PLAN
4-Span Steel Girder Bridge
Skew: 32°59'45"
Scale: 1" = 20' - 0



ELEVATION
Scale: 1" = 20' - 0

NOTES:

- The original structure (Str No. 01149) was built in 1967 by the Bridge Division of the Arizona Highway Department under Project No. 1-10-3(38).
- Dimensions, stationing, and bearings of the existing structure is based on as-built plans. Actual structural features shall be field verified.

LEGEND:

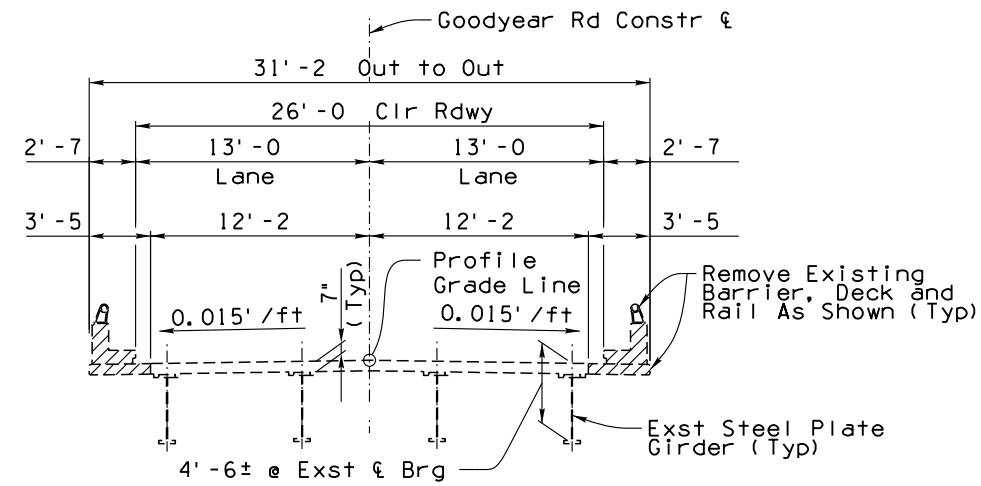
Indicates Structural Concrete Removal

DESIGN	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	RDT	DATE	10/21	
CHECKED	JXH	DATE	10/21	
DR				STA: 1304+29.60 GOODYEAR RD UP GENERAL PLAN AND ELEVATION
I-10 ROUTE		MILEPOST	STRUCTURE NO.	LOCATION
				SR 202L TO SR 387
TRACS NO. F0252				DWG NO. S-1.07
				OF

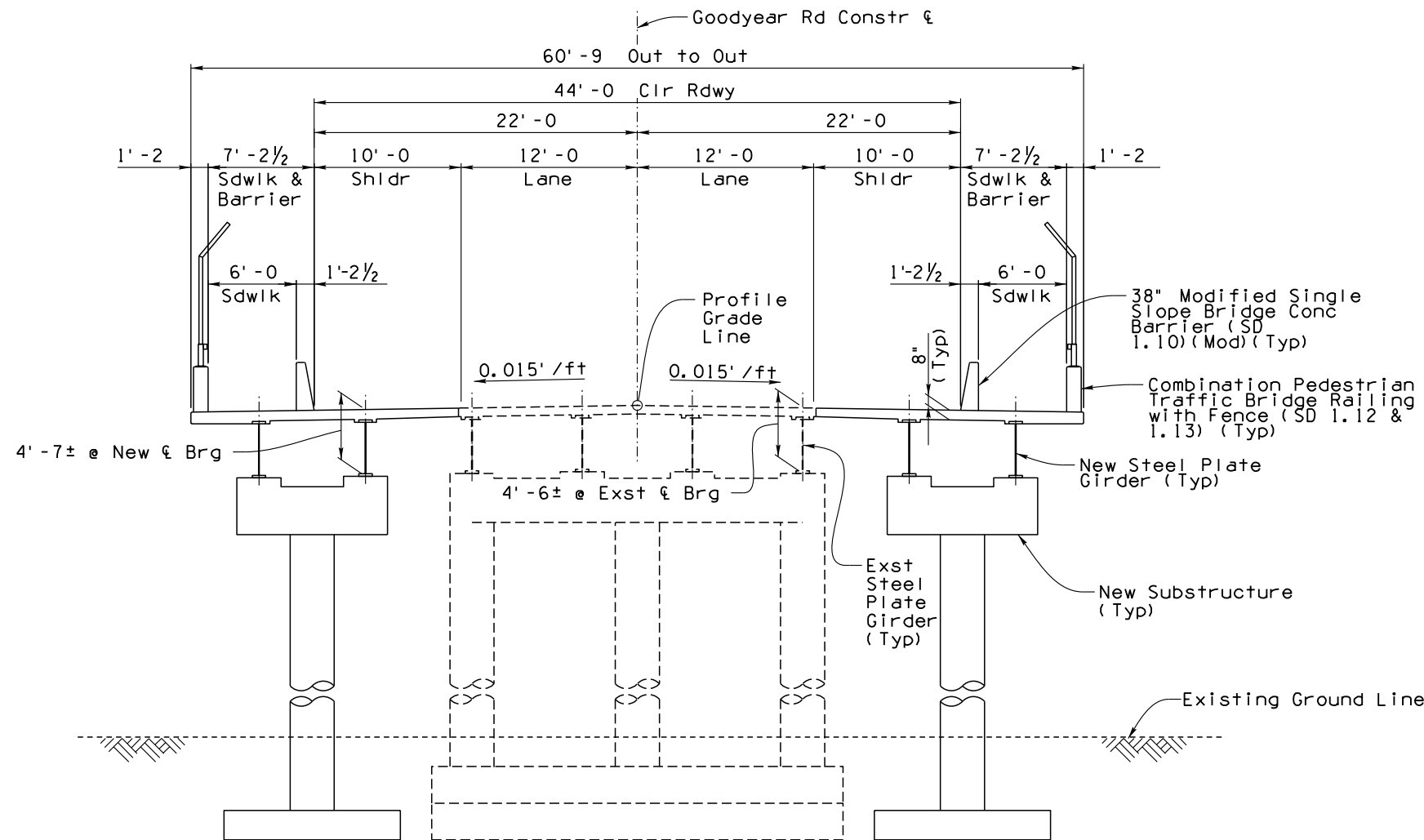


PLOT DATE: 10/15/2021 11:12:23 AM
 PLOT SCALE: 1/4" = 40'
 PLOT BY: RTONEY-HDR
 SURVEY NO. LOCATION DATE REVISIONS FINISHED PLANS SURVEY NO. LOCATION DATE REVISIONS FINISHED PLANS SURVEY NO. LOCATION DATE REVISIONS FINISHED PLANS SURVEY NO.


F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



TYPICAL SECTION - EXISTING
 Scale: 3/16" = 1'-0"
 (Looking Upstation)



TYPICAL SECTION - NEW
 Scale: 3/16" = 1'-0"
 (Looking Upstation)

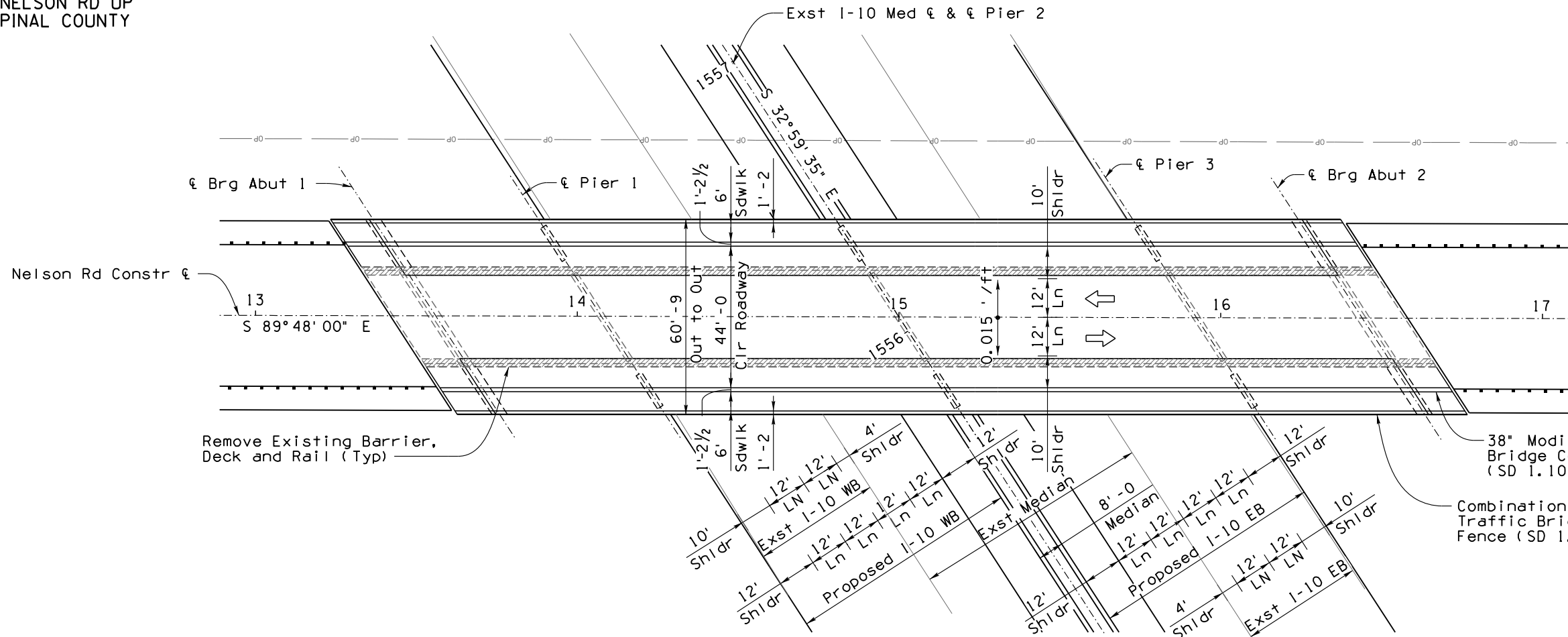
DESIGN	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP	
DRAWN	RDT	DATE	10/21		
CHECKED	JXH	DATE	10/21		
 HDR <small>HOWE BROS. & CO. ENGINEERS AND ARCHITECTS 201 E. THOMAS ROAD SUITE 2000 PHOENIX, AZ 85024-1118 TEL: (602) 924-9700</small>				LOCATION	STA:1304+29.60 GOODYEAR ROAD UP TYPICAL SECTION
				ROUTE	MILEPOST
TRACS NO. F0252				DWG NO. S-1.08	
				OF	



PLOT DATE: 10/15/2021 11:12:29 AM PLOT SCALE: 1/16" = 1'-0" PLOT BY: RTONEY-HDR
 SURVEY NO. FINISHED PLANS REVISIONS LOCATION DATE

PHOENIX - CASA GRANDE HWY
NELSON RD UP
PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			

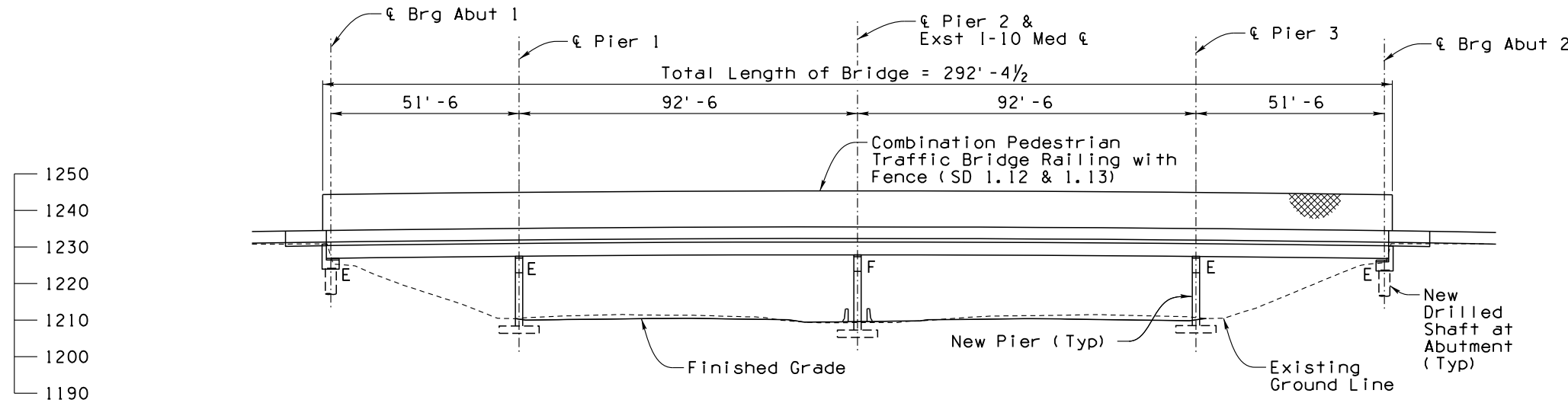


Remove Existing Barrier, Deck and Rail (Typ)

38" Modified Single Slope Bridge Conc Barrier (SD 1.10) (Mod) (Typ)

Combination Pedestrian Traffic Bridge Railing with Fence (SD 1.12 & 1.13) (Typ)

PLAN
4-Span Steel Girder Bridge
Skew: 33° 08' 44"
Scale: 1" = 20' - 0



ELEVATION
Scale: 1" = 20' - 0

NOTES:

- The original structure (Str No. 01213) was built in 1967 by the Bridge Division of the Arizona Highway Department under Project No. 1-10-3(40).
- Dimensions, stationing, and bearings of the existing structure is based on as-built plans. Actual structural features shall be field verified.

LEGEND:

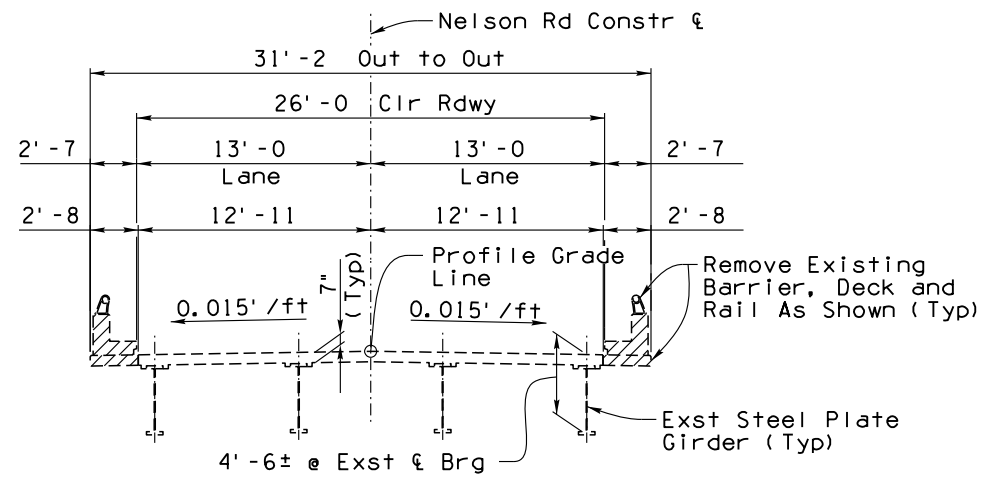
Indicates Structural Concrete Removal

PLOT DATE: 10/15/2021 11:12:38 AM
 PLOT SCALE: 1/4" = 40'
 PLOT BY: RTONEY-HDR
 SURVEY NO.:
 FINISHED PLANS:
 REVISIONS:
 LOCATION:
 DATE:

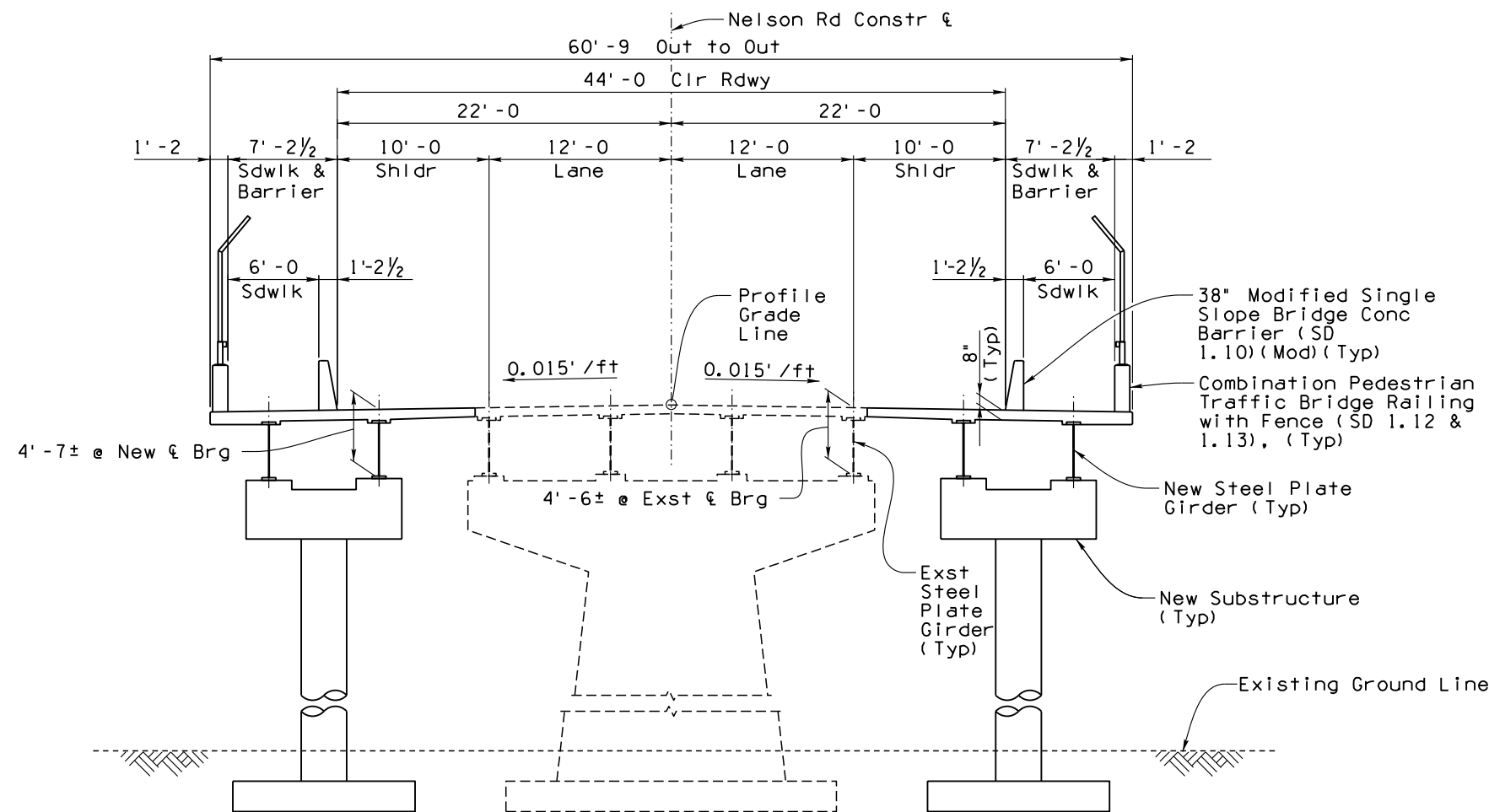
DESIGN	DL	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	RDT		10/21	
CHECKED	JXH		10/21	
				STA: 1556+05.21 NELSON RD UP GENERAL PLAN AND ELEVATION
I-10 ROUTE		MILEPOST	STRUCTURE NO.	LOCATION
				SR 202L TO SR 387
TRACS NO. F0252				DWG NO. S-1.09
				OF




F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



TYPICAL SECTION - EXISTING
 Scale: 3/16" = 1'-0"
 (Looking Upstation)



TYPICAL SECTION - NEW
 Scale: 3/16" = 1'-0"
 (Looking Upstation)

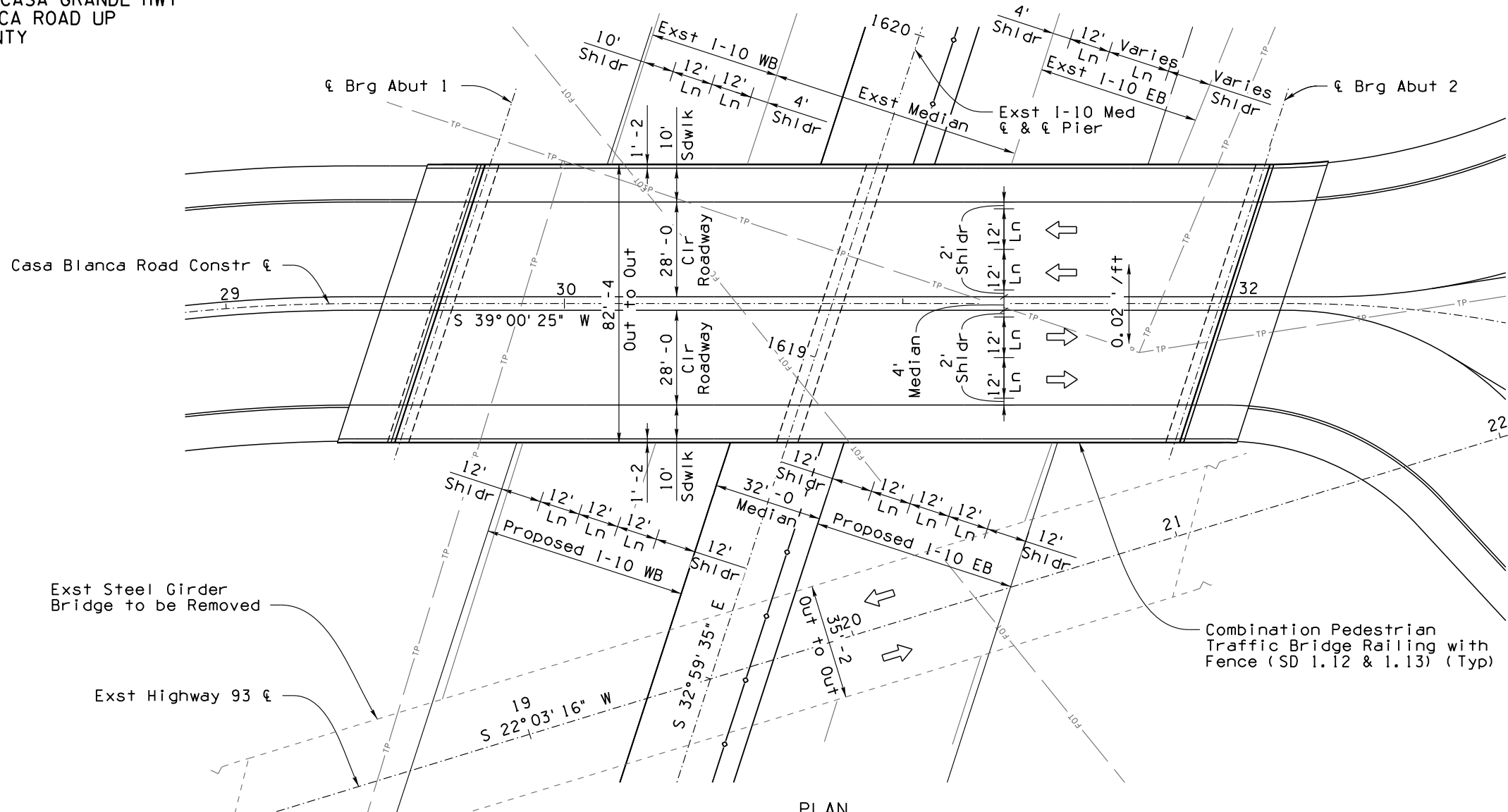
DESIGN	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	RDT	DATE	10/21	
CHECKED	JXH	DATE	10/21	
				STA:1556+05.21 NELSON ROAD TYPICAL SECTION
I-10	ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
TRACS NO. F0252				SR 202L TO SR 387
				DWG NO. S-1.10
				OF



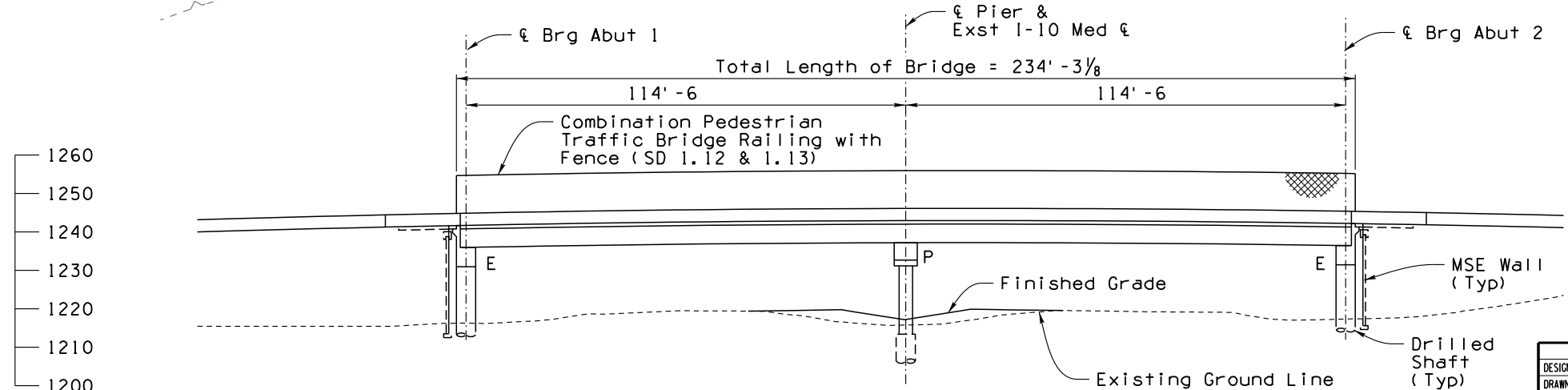
PLOT DATE: 10/15/2021 TIME: 11:12:48 AM PLOT SCALE: 1:10.6667 PLOT BY: RTONEY-HDR
 SURVEY NO. FINISHED PLANS REVISIONS LOCATION DATE

PHOENIX - CASA GRANDE HWY
CASA BLANCA ROAD UP
PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



PLAN
New 2-Span Precast Prestressed Concrete (UBT) Girder Bridge
Skew: 18° 00' 00"
Scale: 1" = 20' - 0"



ELEVATION
Scale: 1" = 20' - 0"

NOTES:

1. The original structure (Str No. 01214) was built in 1967 by the Bridge Division of the Arizona Highway Department under Project No. 1-10-3(40).
2. Dimensions, stationing, and bearings of the existing structure is based on as-built plans. Actual structural features shall be field verified.

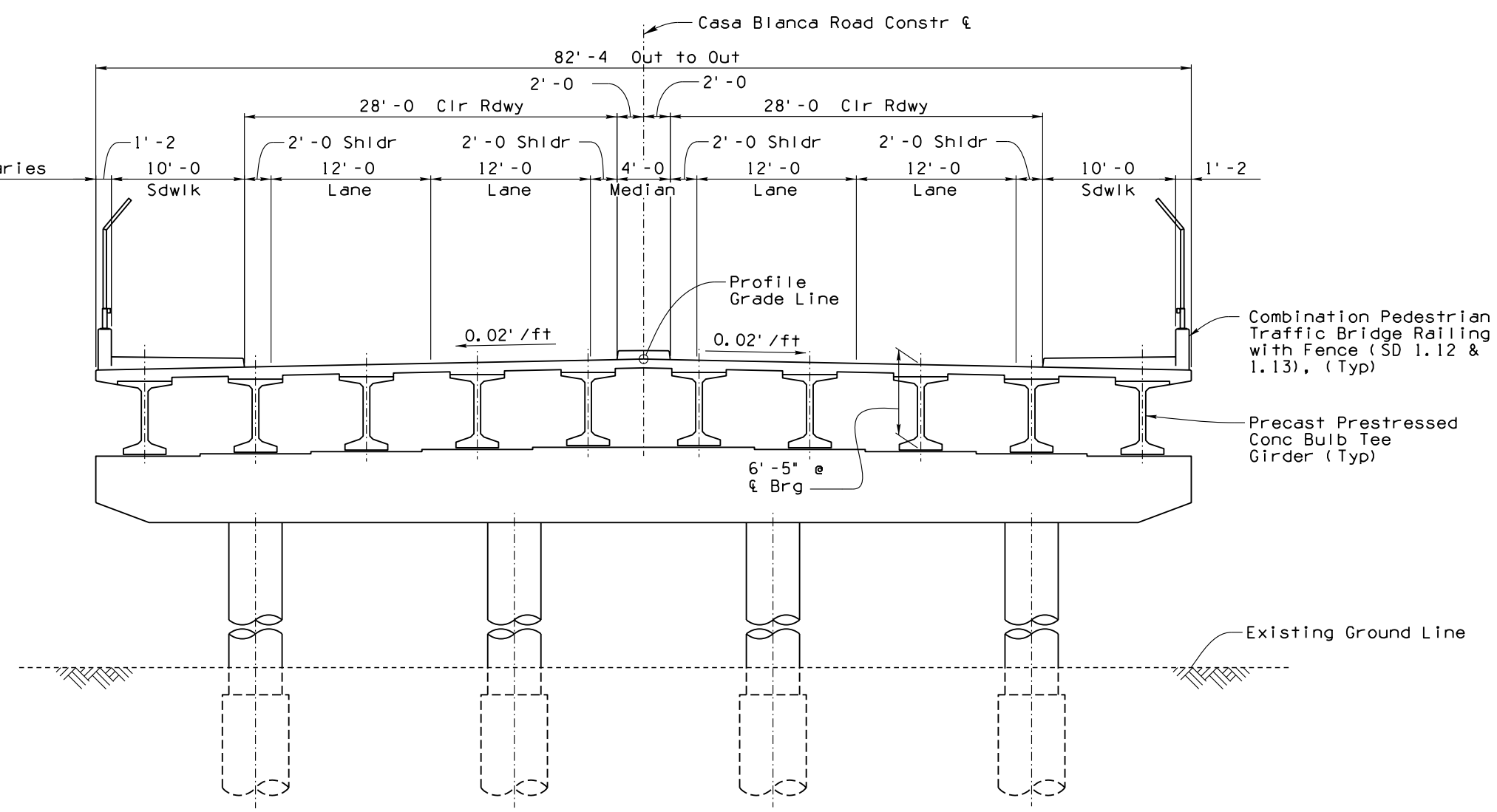
LEGEND:

Indicates Structural Concrete Removal

DESIGN	DL	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP	
DRAWN	RDT		10/21	STA:1619+16.64 CASA BLANCA ROAD UP GENERAL PLAN AND ELEVATION	
CHECKED	JXH		10/21		
1-10 ROUTE				LOCATION SR 202L TO SR 387	DWG NO. S-1.11 _____ OF _____
TRACS NO. F0252					


PLOT DATE: 10/15/2021 11:12:59 AM
 PLOT SCALE: 1/4" = 10'
 PLOT BY: RTONEY-HDR
 SURVEY NO.:
 FINISHED PLANS:
 REVISIONS:
 LOCATION:
 DATE:

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



TYPICAL SECTION
 Scale: 3/16" = 1'-0"
 (Looking Upstation)

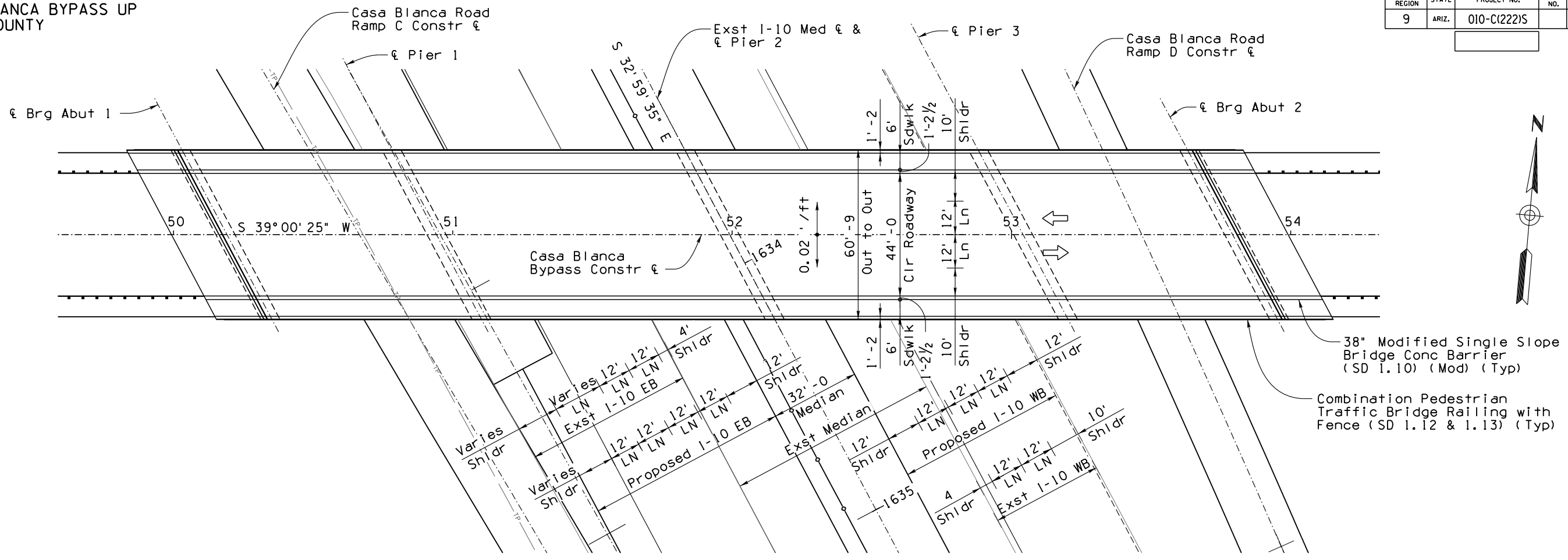
PLOT DATE: 10/15/2021 TIME: 11:13:07 AM PLOT SCALE: 1:10.6667 PLOT BY: RTONEY-HDR
 SURVEY NO. FINISHED PLANS. REVISIONS. LOCATION. DATE.

DESIGN	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STA: 1619+16.64 CASA BLANCA ROAD UP TYPICAL SECTION
DRAWN	RDT	DATE	10/21	
CHECKED	JXH	DATE	10/21	
		<small>HDR INC. 201 E. THOMAS ROAD SUITE 2000 PHOENIX, AZ 85024-1118 TEL: (602) 922-7700</small>		LOCATION SR 202L TO SR 387
I-10	ROUTE	MILEPOST	STRUCTURE NO.	
TRACS NO. F0252				OF

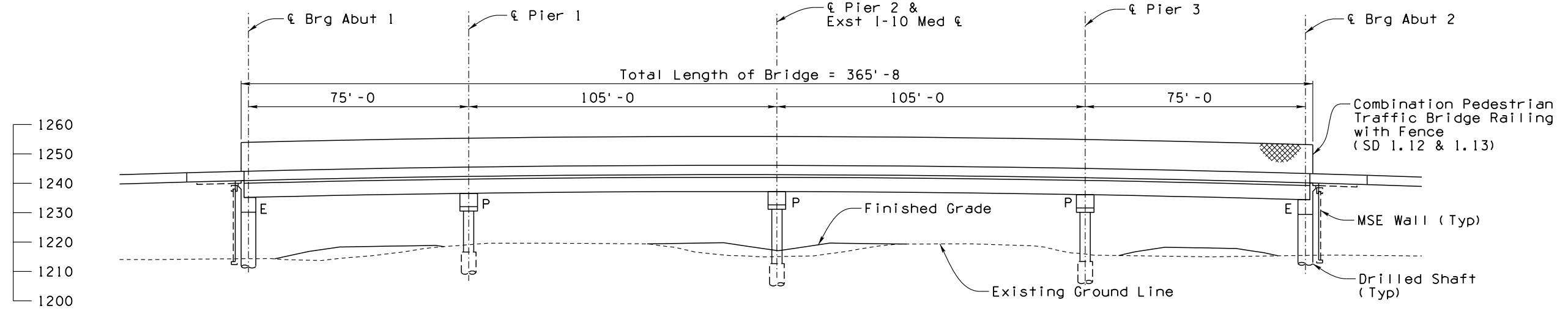


PHOENIX - CASA GRANDE HWY
CASA BLANCA BYPASS UP
PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



PLAN
New 4-Span Precast Prestressed Concrete (UBT) Girder Bridge
Skew: 27°58'37" Lt
Scale: 1" = 20' - 0



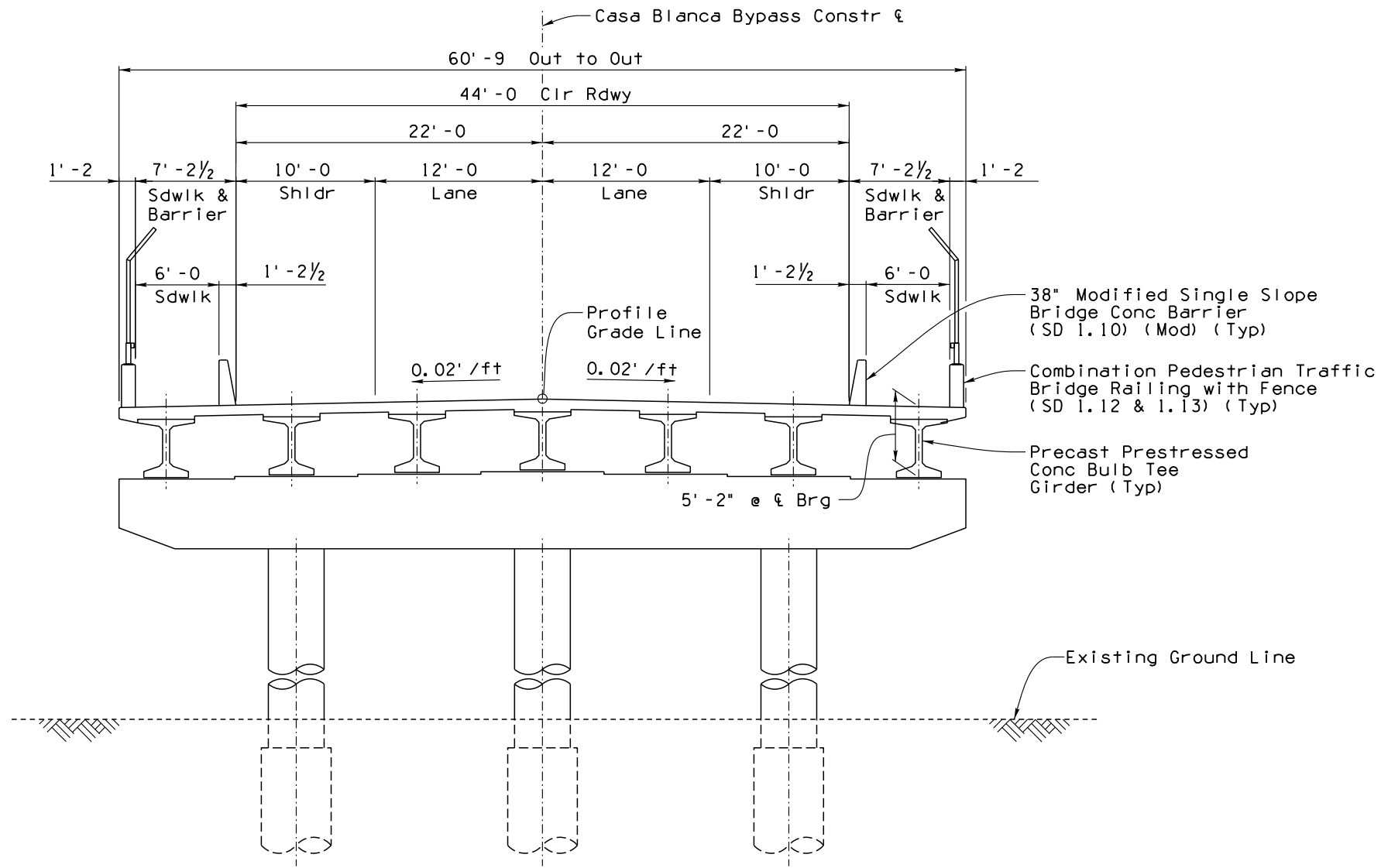
ELEVATION
Scale: 1" = 20' - 0

DESIGN	DL	DATE	10/21
DRAWN	RDT	DATE	10/21
CHECKED	JXH	DATE	10/21

			ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP	
STA:1633+88.52 CASA BLANCA BYPASS UP GENERAL PLAN AND ELEVATION			LOCATION SR 202L TO SR 387	
TRACS NO. F0252			DWG NO. S-1.13 OF	

PLOT DATE: 10/15/2021 11:13:18 AM
 PLOT SCALE: 1/4" = 10'
 PLOT BY: RTONEY-HDR
 SURVEY NO. LOCATION REVISIONS FINISHED PLANS DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



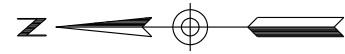
TYPICAL SECTION
 Scale: 3/16" = 1'-0"
 (Looking Upstation)

PLOT DATE: 10/15/2021 11:13:27 AM
 SURVEY NO.:
 FINISHED PLANS:
 LOCATION:
 REVISIONS:
 PLOT BY: RTONEY-HDR
 DATE:
 FINISHED PLANS:
 SURVEY NO.:
 LOCATION:
 REVISIONS:
 DATE:

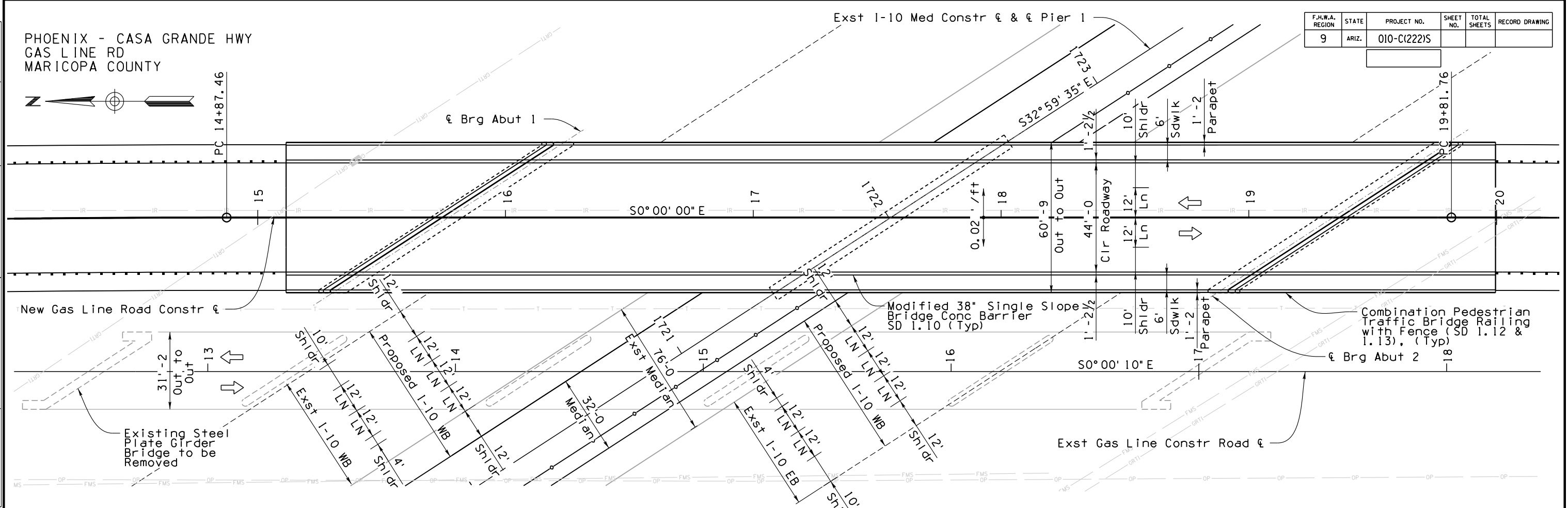
DESIGN	DL	NAME	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	RDT			10/21		
CHECKED	JXH			10/21		
I-10		ROUTE		MILEPOST		LOCATION
TRACS NO. F0252						SR 202L TO SR 387
						DWG NO. S-1.14
						OF



PHOENIX - CASA GRANDE HWY
GAS LINE RD
MARICOPA COUNTY

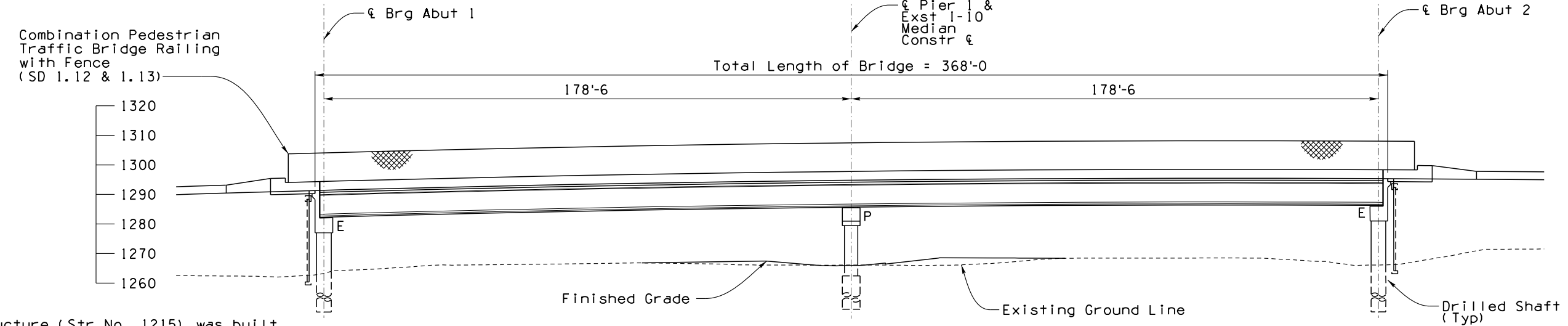


F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



PLAN

Existing 5-Span Steel Plate Girder Bridge
New 2-Span Precast Prestressed Concrete (UBT) Girder Bridge
Skew: 57°00'25" Rt
Scale: 1" = 20' - 0



ELEVATION
Scale: 1" = 20' - 0

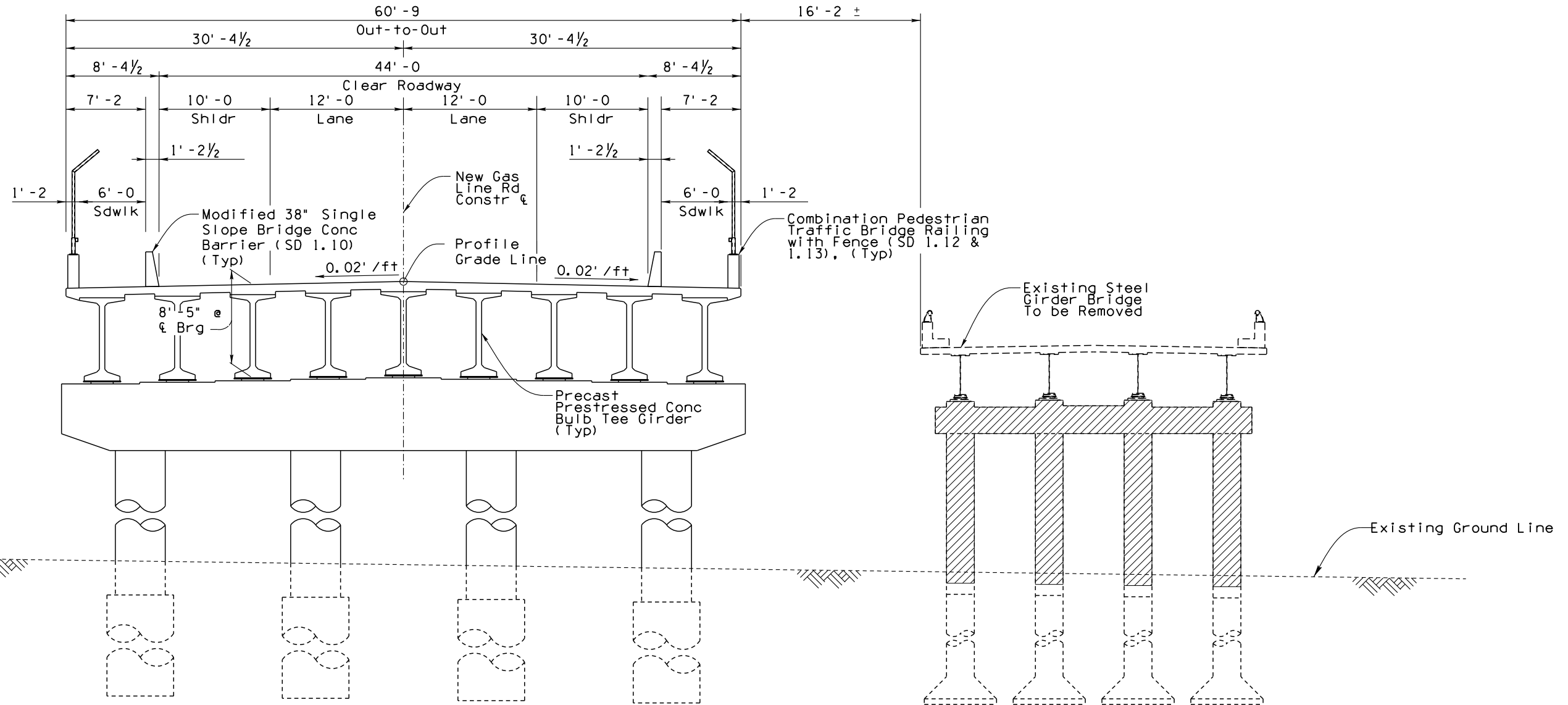
- NOTES:**
- The original structure (Str No. 1215) was built in 1967 by the Bridge Division of the Arizona Highway Department under Project No, 1-10-3(40)
 - Dimension, station and bearing of the existing structure are based on as-built plans. Actual Structural features shall be field verified.

LEGEND:
 Indicates Structural Concrete Removal

DESIGN	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
MJE		10/21	
BAM		10/21	
JMC		10/21	
AZTEC			STA: 1722+00.75 GAS LINE RD UP GENERAL PLAN AND ELEVATION
<small>501 N 44th St, Suite 300 Phoenix, AZ 85008-4505 Tel: 480-454-0402 Fax: 480-499-5565 www.aztecus.com</small>			
I-10			LOCATION
ROUTE	MILEPOST	STRUCTURE NO.	SR 202L TO SR 387
TRACS NO. F0252			DWG NO. S-1.15
			OF

PLOT DATE: 10/15/2021 11:00:06 AM
 PLOT SCALE: 1:40
 PLOT BY: hmoore-HDR
 SURVEY NO. LOCATION REVISIONS DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



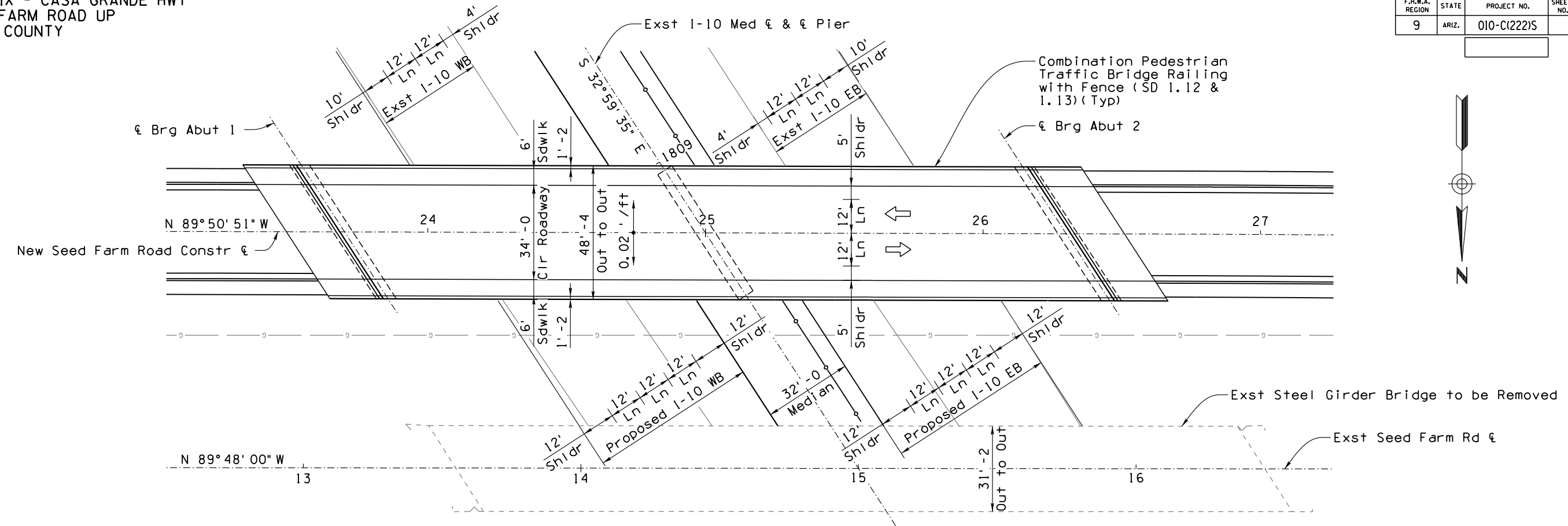
TYPICAL SECTION
 Scale: 3/16" = 1' - 0"
 (Looking Upstation)

PLOT DATE: 10/15/2021 11:07:13 AM
 SURVEY NO.:
 FINISHED PLANS:
 LOCATION:
 FINISHED PLANS:
 SURVEY NO.:
 DATE:
 PLOT BY: hmoore-HDR
 PLOT SCALE: 1/16" = 1' - 0"
 LOCATION:
 FINISHED PLANS:
 SURVEY NO.:
 DATE:
 REVISIONS:

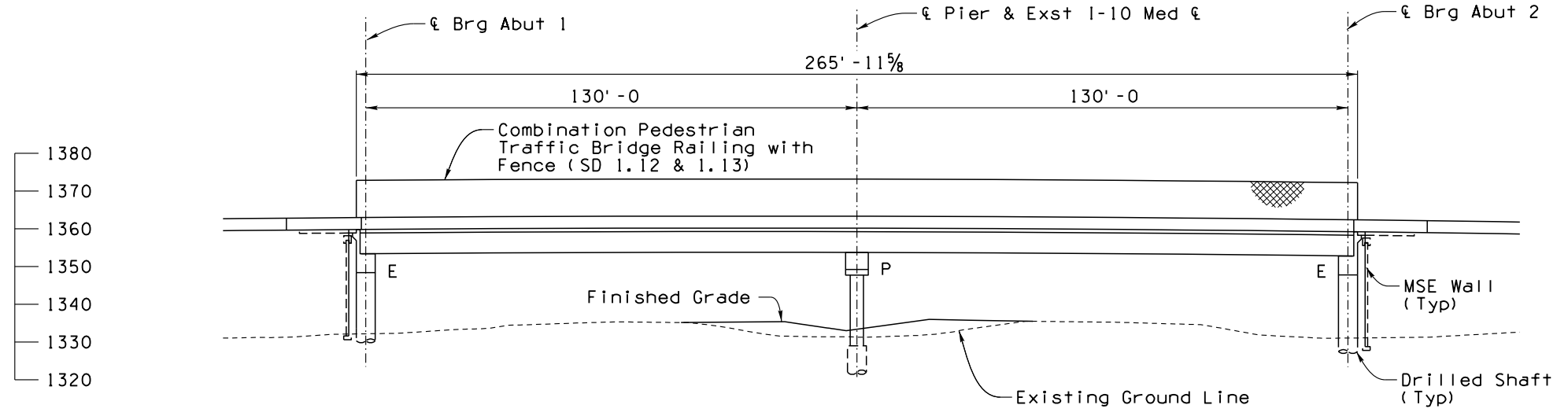
DESIGN	MJE	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	BAM	DATE	10/21	
CHECKED	JMC	DATE	10/21	
AZTEC		501 N 44th St, Suite 300 Phoenix, AZ 85008-4505 Tel: (602) 454-0402 Fax: (602) 499-5565 www.aztecus.com		STA: 1722+00.75 GAS LINE RD UP TYPICAL SECTION
I-10	ROUTE	MILEPOST	STRUCTURE NO.	LOCATION SR 202L TO SR 387
TRACS NO. F0252				DWG NO. S-1.16 OF

PHOENIX - CASA GRANDE HWY
SEED FARM ROAD UP
PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



PLAN
New 2-Span Precast Prestressed Concrete (UBT) Girder Bridge
Skew: 33° 08' 44"
Scale: 1" = 20' - 0



ELEVATION
Scale: 1" = 20' - 0

NOTES:

1. The original structure (Str No. 01216) was built in 1967 by the Bridge Division of the Arizona Highway Department under Project No. 1-10-3(40).
2. Dimensions, stationing, and bearings of the existing structure is based on as-built plans. Actual structural features shall be field verified.

LEGEND:

Indicates Structural Concrete Removal

DESIGN	DL	DATE	10/21
DRAWN	RDT	DATE	10/21
CHECKED	JXH	DATE	10/21

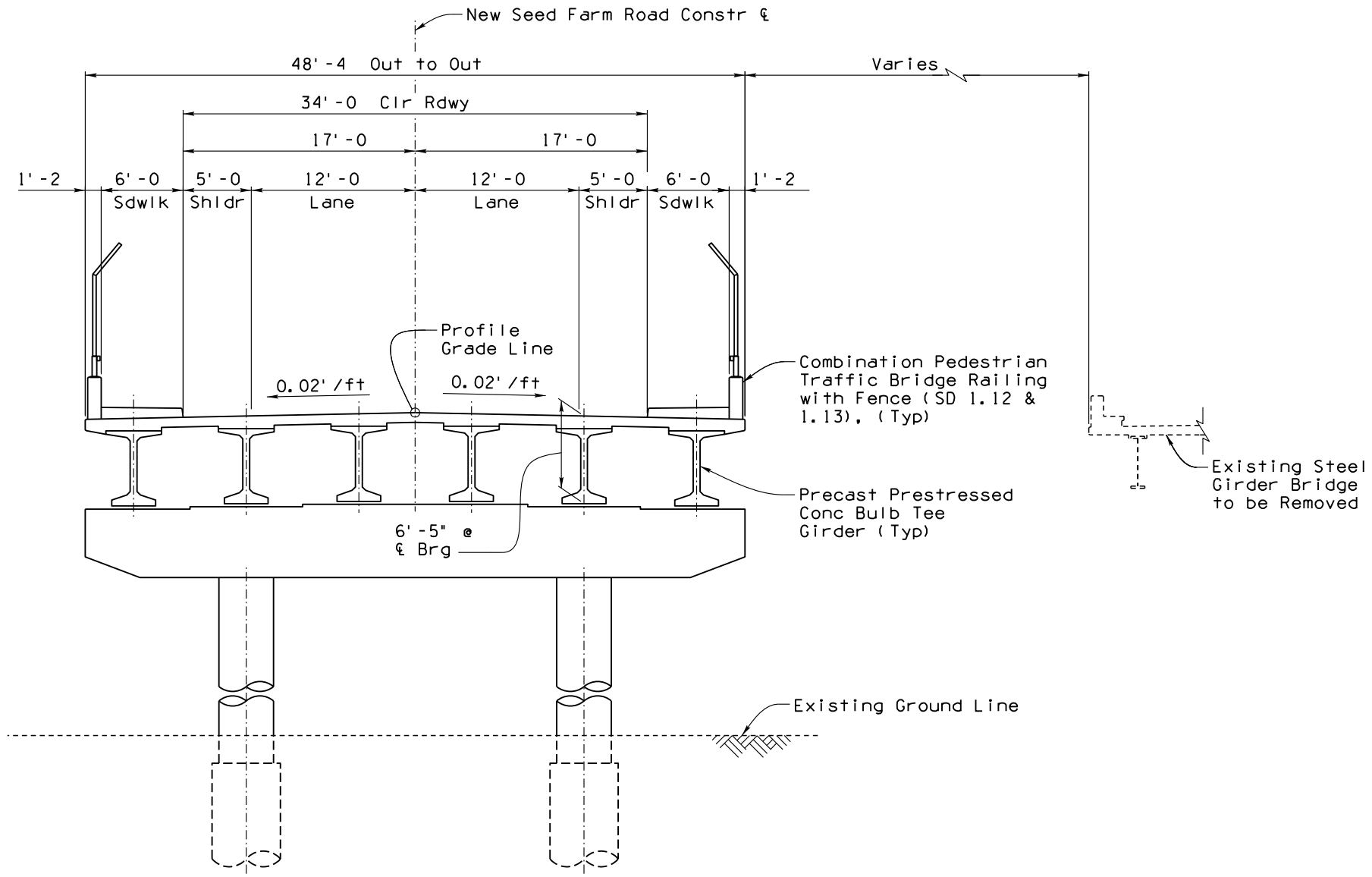
ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
BRIDGE GROUP
STA: 1808+69.60
SEED FARM ROAD UP
GENERAL PLAN AND ELEVATION

LOCATION: SR 202L TO SR 387
DWG NO. S-1.17
OF

TRACS NO. F0252


PLOT DATE: 10/15/2021 11:13:38 AM
PLOT SCALE: 1/4" = 1'-0"
PLOT BY: RTONEY-HDR

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



TYPICAL SECTION
 Scale: 3/16" = 1'-0"
 (Looking Upstasion)

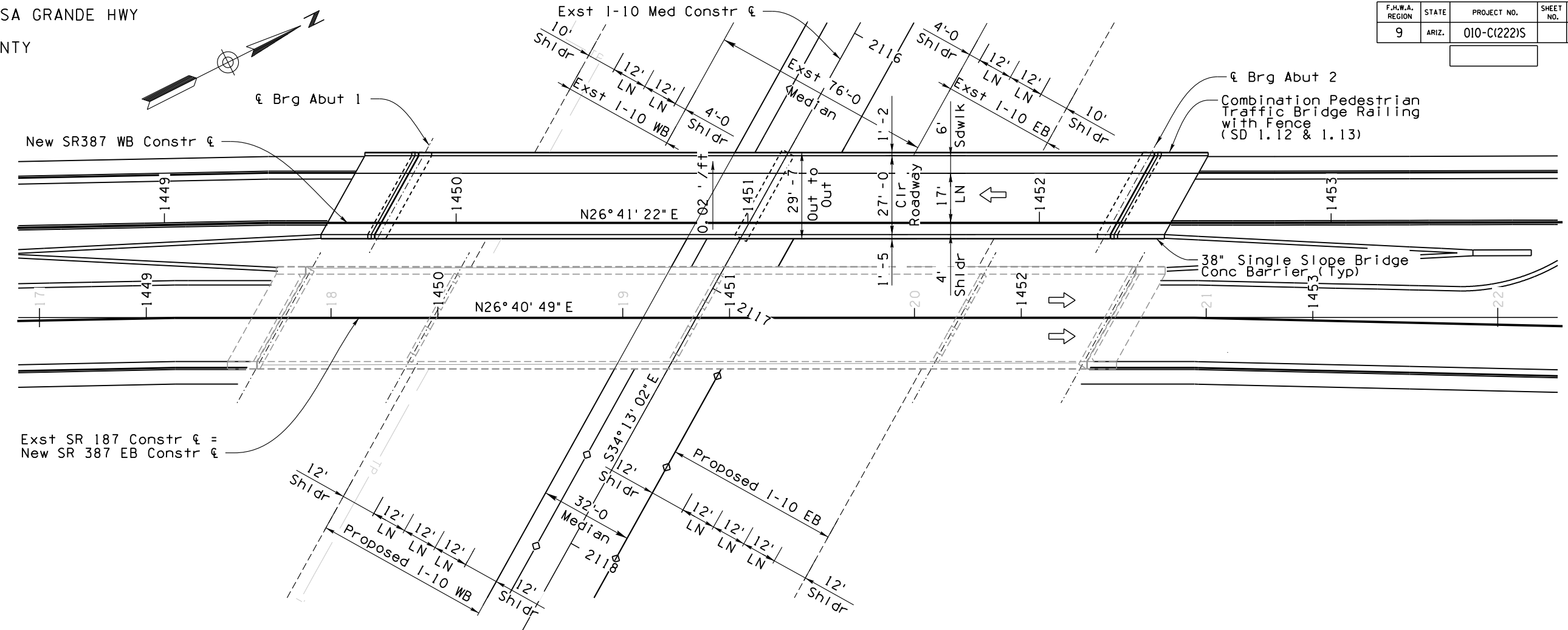
PLOT DATE: 10/15/2021 TIME: 11:13:46 AM PLOT BY: RTONEY-HDR
 SURVEY NO. FINISHED PLANS LOCATION DATE REVISIONS FINISHED PLANS SURVEY NO. LOCATION DATE REVISIONS

DESIGN	DL	NAME	DL	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	RDT		RDT	10/21		
CHECKED	JXH		JXH	10/21		
I-10		ROUTE		MILEPOST		LOCATION SR 202L TO SR 387
TRACS NO. F0252						
 HDR <small>HOWE BROS. & CO. ENGINEERS ARCHITECTS 201 E. THOMAS ROAD SUITE 1000 PHOENIX, AZ 85024-1118 TEL: (602) 924-9700</small>						DWG NO. S-1.18
						OF



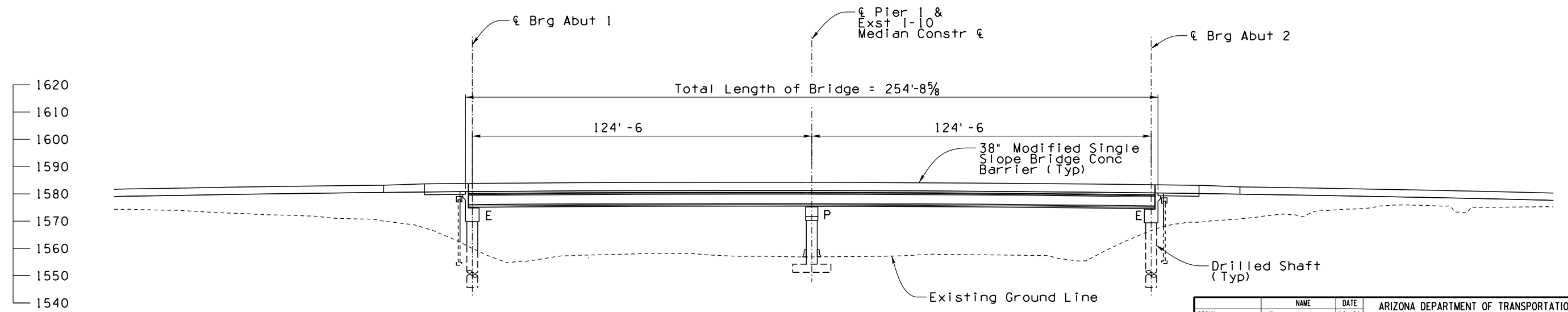
PHOENIX - CASA GRANDE HWY
 PINAL AVE UP
 MARICOPA COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



PLAN

New 2-Span Precast Prestressed Concrete (UBT) Girder Bridge
 Skew: 29°05'36" Rt
 Scale: 1" = 20' - 0

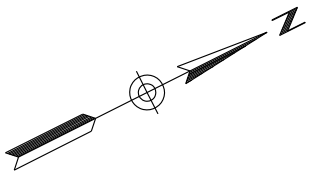


ELEVATION
 Scale: 1" = 20' - 0

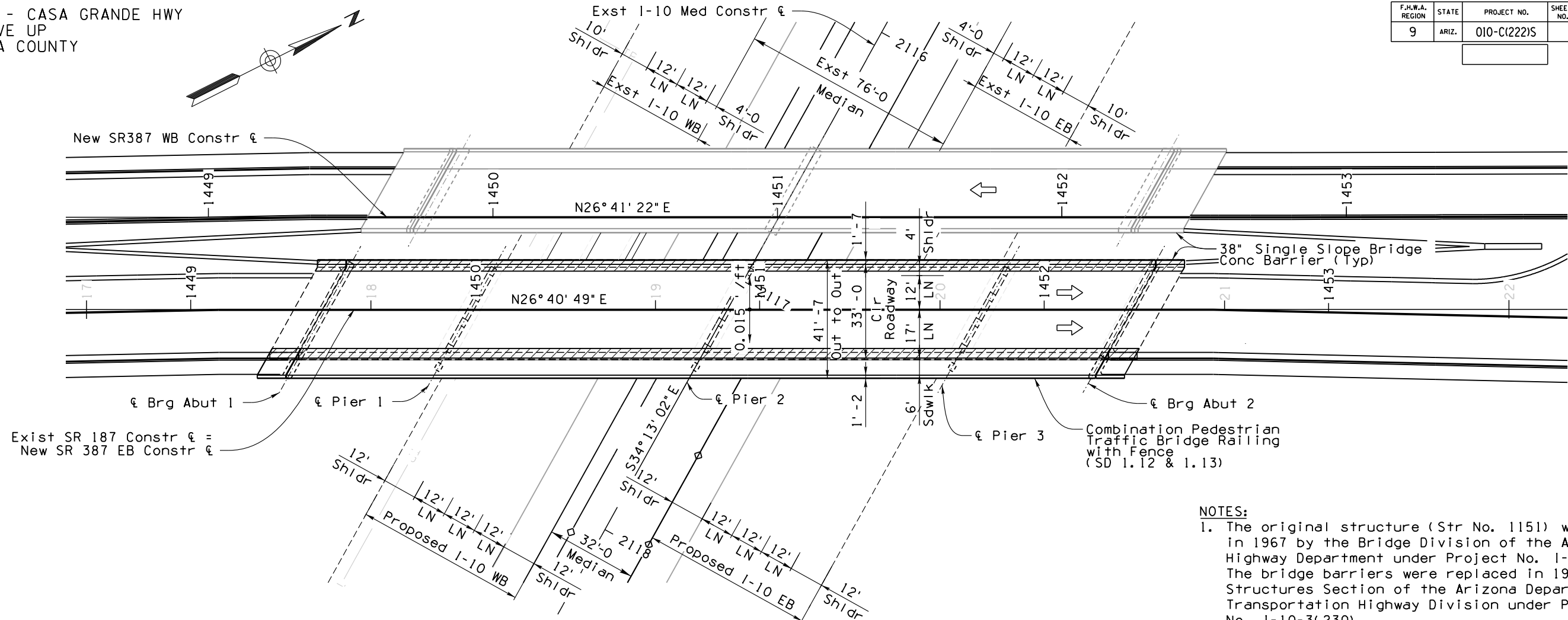
DESIGN	ME	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STA:2116+74.34 HWY 387 WB TI UP GENERAL PLAN AND ELEVATION
DRAWN	BAM	DATE	10/21	
CHECKED	JMC	DATE	10/21	
AZTEC <small>501 N 44th St, Suite 300 Phoenix, AZ 85008-4505 Tel: (602) 454-0402 Fax: (602) 499-5565 www.aztecus.com</small>		LOCATION SR 202L TO SR 387		DWG NO. S-1.19 OF
I-10 ROUTE MILEPOST STRUCTURE NO.		TRACS NO. F0252		

PLOT DATE: 10/11/2021 TIME: 2:33:24 PM
 PLOT SCALE: 1/4" = 1'-0"
 PLOT BY: hmoore-HDR
 SURVEY NO. LOCATION REVISIONS FINISHED PLANS DATE

PHOENIX - CASA GRANDE HWY
 PINAL AVE UP
 MARICOPA COUNTY



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



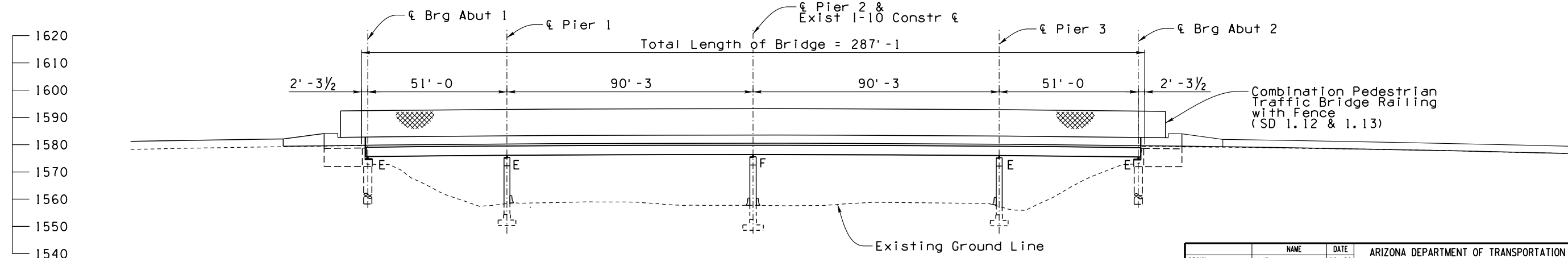
PLAN
 Existing 4-Span Steel Plate Girder Bridge Widening
 Skew: 29°05'36" R+
 Scale: 1" = 20' - 0

NOTES:

1. The original structure (Str No. 1151) was built in 1967 by the Bridge Division of the Arizona Highway Department under Project No. 1-10-3(42). The bridge barriers were replaced in 1991 by the Structures Section of the Arizona Department of Transportation Highway Division under Project No. 1-10-3(230).
2. Dimension, station and bearing of the existing structure are based on as-built plans. Actual Structural features shall be field verified.

LEGEND:

Indicates Structural Concrete Removal

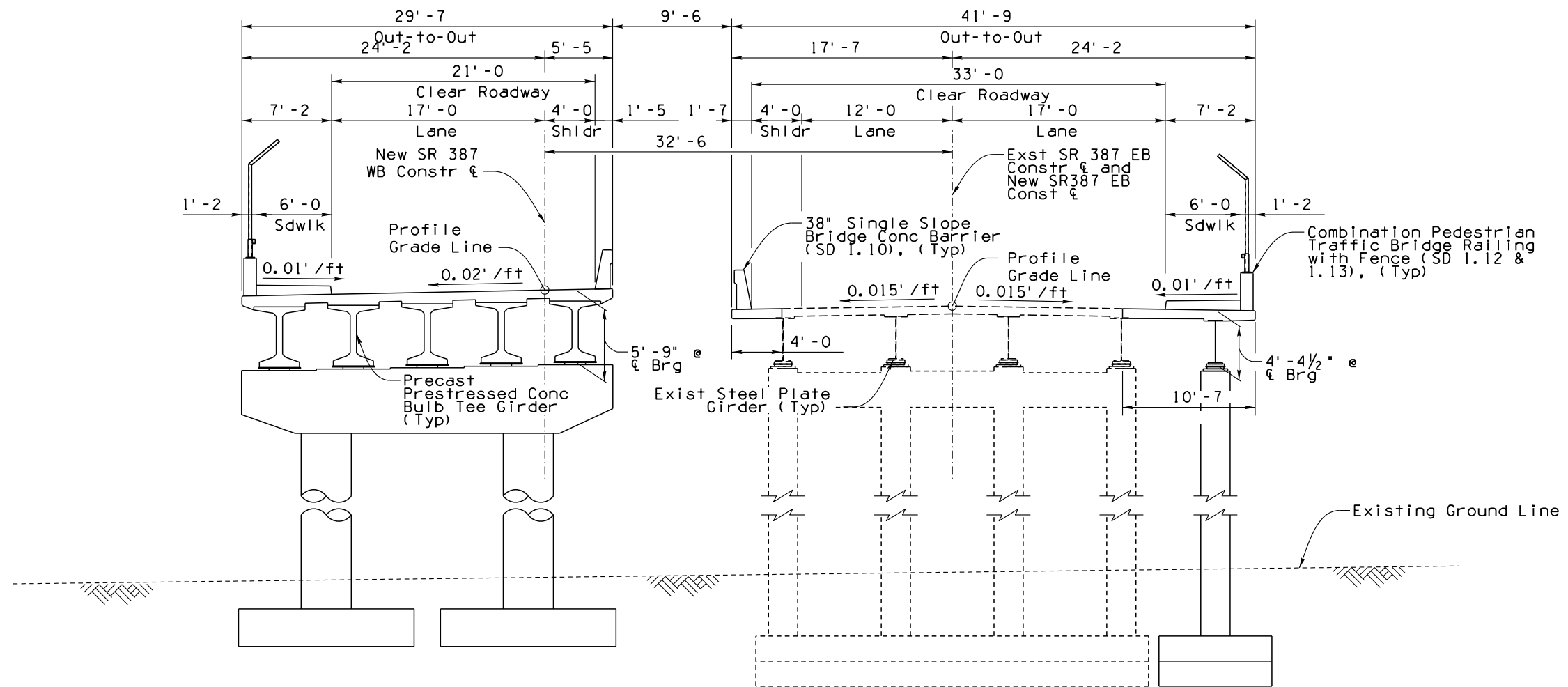
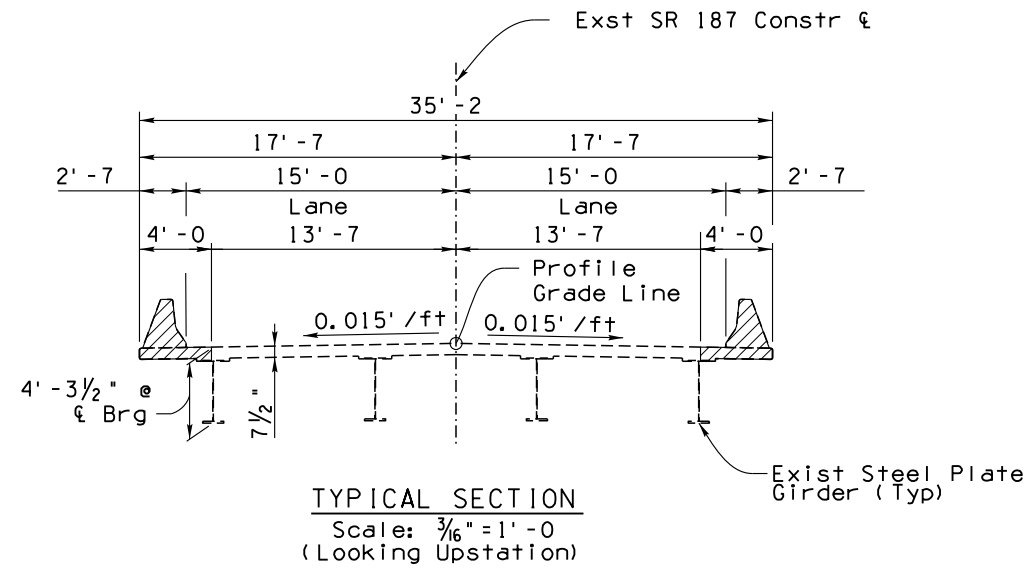


ELEVATION
 Scale: 1" = 20' - 0

DESIGN	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
MJE		10/21	
BAM		10/21	
JMC		10/21	
			STA:2117+11.63 HWY 387 EB TI UP GENERAL PLAN AND ELEVATION
I-10			LOCATION
ROUTE	MILEPOST	STRUCTURE NO.	SR 202L TO SR 387
TRACS NO. F0252			DWG NO. S-1.20
			OF

PLOT DATE: 10/11/2021 TIME: 2:21:29 PM
 PLOT SCALE: 1/4" = 40'
 PLOT BY: hmoore-HDR
 SURVEY NO. LOCATION: FINISHED PLANS: REVISIONS: DATE:

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	010-C(222)S			



DESIGN	MJE	DATE	10/21	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP
DRAWN	BAM	DATE	10/21	
CHECKED	JMC	DATE	10/21	
AZTEC		501 N 44th St, Suite 300 Phoenix, AZ 85008-4505 Tel: (602) 454-0402 Fax: (602) 499-5565 www.aztecus.com		STA:2117+11.63 HWY 387 EB & WB TI UP TYPICAL SECTION
I-10	ROUTE	MILEPOST	STRUCTURE NO.	LOCATION SR 202L TO SR 387
TRACS NO. F0252				DWG NO. S-1.21
				OF

PLOT DATE: 10/11/2021 TIME: 2:37:02 PM PLOT SCALE: 1/16" = 1'-0" PLOT BY: hmoore-HDR SURVEY NO. FINISHED PLANS. REVISIONS. LOCATION. DATE. REVISIONS. LOCATION. DATE. FINISHED PLANS. SURVEY NO. DATE.

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Appendix B. Recommended Build Alternative Detailed Cost Estimate

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**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: Alt ML2
 SEGMENT: Segment 1A - ML2 (Median Widening) MP 177 to 187 ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 10 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	
200	EARTHWORK					
	CLEARING & REMOVALS	L.SUM	1	617,000	617,000	
	ROADWAY EXCAVATION	CU.YD.	92,595	\$ 25.40	2,354,310	
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0	
	BORROW	CU.YD.	230,834	\$ 20.00	4,616,670	
	SUBGRADE TREATMENT	SQ.YD.	0			
	FURNISH WATER	MGAL	42,000	\$ 12.00	504,000	
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0	
	TOTAL ITEM 200					8,091,980
	300 & 400	BASE AND SURFACE TREATMENT				
AGGREGATE BASE		SQ.YD.	302,136	\$ 28.00	8,459,810	
CONCRETE PAVEMENT		SQ.YD.	0	\$ 100.00	0	
ASPHALT PAVEMENT		SQ.YD.	302,136	\$ 75.00	22,660,200	
AR-ACFC SURFACE		SQ.YD.	302,136	\$ 6.00	1,812,820	
MILLING & OVERLAY (AR-ACFC)		SQ.YD.	280,190	\$ 8.00	2,241,520	
MISCELLANEOUS ITEMS (mill 2.5" AC & replace 2.5" AC RT.SH)		SQ.YD.	116,746	\$ 22.00	2,568,410	
TOTAL ITEM 300 & 400					37,742,760	
500	DRAINAGE					
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0	\$ 1,200,000.00	0	
	DRAINAGE SYSTEM (OPEN)	MILE	10.00	\$ 120,000.00	1,200,000	
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0			
	PUMP STATION (NEW)	EACH	0	\$ -	0	
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	15,750	\$ 800.00	12,600,000	
	PIPE CULVERTS (New Installation)	L.FT.	13,967	\$ 800.00	11,173,600	
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	265	\$ 1,500.00	397,500	
TOTAL ITEM 500					25,371,100	
600	STRUCTURES					
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0	
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0	
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	0	\$ 300.00	0	
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0	
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0	
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0	
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0	
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0	
	BOX CULVERT	L.FT./CELL	774	\$ 2,800.00	2,167,200	
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0	
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0	
	O&M CROSSING	EACH	0		0	
	MISCELLANEOUS ITEMS (SIGN BRIDGE NON-ITS)	L.SUM	0	\$ 200,000.00	0	
	TOTAL ITEM 600					2,167,200
	700	TRAFFIC ENGINEERING				
		SIGNING (FREEWAY)	MILE/DIR	21	\$ 50,000.00	1,055,000
SIGNING (CROSS STREET)		MILE	0.00	\$ 80,000.00	0	
PAVEMENT MARKING		LANE-MILE	60	\$ 5,000.00	298,500	
LIGHTING		L.SUM	1	\$ 720,000.00	720,000	
TRAFFIC SIGNAL		EACH	0	\$ 400,000.00	0	
INTELLIGENT TRANSPO. SYSTEM (ITS) RELOCATIONS		EACH	1	\$ 30,000.00	30,000	
MISCELLANEOUS ITEMS (ITS Multiduct and FMS)		L.FT.	0	\$ -	0	
TOTAL ITEM 700					2,103,500	
800	ROADSIDE DEVELOPMENT					
	LANDSCAPING AND TOPSOIL	MILE	10	\$ -	0	
	UTILITY RELOCATION	L.SUM	0	\$ 0	0	
MISCELLANEOUS ITEMS (SEEDING)	ACRE	38	\$ 4,500.00	172,580		
TOTAL ITEM 800					172,580	
900	INCIDENTALS					
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0	
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0	
	ROADWAY APPURTENANCES	MILE	10.00	\$ 348,250.00	3,482,500	
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0	
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0	
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0	
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0	
TOTAL ITEM 900					3,482,500	
SUBTOTAL A (ITEM SUBTOTAL)					\$79,131,600	

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: Alt ML2
 SEGMENT: Segment 1A - ML2 (Median Widening) MP 177 to 187 ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 10 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

PW	PROJECT WIDE				
	TRAFFIC CONTROL (8% OF SUBTOTAL A)		8.0%		6,330,500
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)		0.0%		0
	QUALITY CONTROL (1% OF SUBTOTAL A)		1.0%		791,300
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)		1.5%		1,187,000
	EROSION CONTROL (1% OF SUBTOTAL A)		1.0%		791,300
	MOBILIZATION (8% OF SUBTOTAL A)		8.0%		6,330,500
	UNIDENTIFIED ITEMS (5.39632713100708% OF SUBTOTAL A)		5.4%		4,270,200
SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)					\$98,832,400
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	0 HOURS	\$ 120.00		0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)		6.0%		5,929,944
	CONTRACTOR INCENTIVES	1 L.SUM		1,110,000	1,110,000
	ENVIRONMENTAL MITIGATION	10 MILE	\$ 500,000.00		4,975,000
PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)					\$110,847,344
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)		1.0%		988,300
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)		5.0%		4,941,600
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)		9.0%		8,894,900
	SUBTOTAL BASE YEAR CONSTRUCTION				125,672,144
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)		10.70%		13,446,900
CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)					\$139,119,044
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)		0.50%		554,200
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)		10.70%		59,300
	SUBTOTAL PREDESIGN				613,500
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)		0.0%		0
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)		10.70%		0
	SUBTOTAL FINAL DESIGN				0
TOTAL ESTIMATED DESIGN COST					\$613,500
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				0
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)		10.70%		0
TOTAL ESTIMATED UTILITY COST					\$0
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	0.00 ACRE	\$ -		0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)		10.70%		0
ACQUISITION YEAR RIGHT-OF-WAY COSTS					\$0
TOTAL ESTIMATED PROJECT COST					\$139,733,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: Alt ML2
 SEGMENT: Segment 2A - ML2 (Median Widening) MP 161 to 168.7 ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 7.7 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	472,000	472,000
	ROADWAY EXCAVATION	CU.YD.	11,856	\$ 18.00	213,400
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	176,962	\$ 20.00	3,539,240
	SUBGRADE TREATMENT	SQ.YD.	0		0
	FURNISH WATER	MGAL	32,000	\$ 12.00	384,000
	MISCELLANEOUS ITEMS	L.SUM	1	\$ -	0
	TOTAL ITEM 200				4,608,640
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	292,140	\$ 28.00	8,179,920
	CONCRETE PAVEMENT	SQ.YD.	45,625	\$ 100.00	4,562,500
	ASPHALT PAVEMENT	SQ.YD.	246,315	\$ 75.00	18,473,630
	AR-ACFC SURFACE	SQ.YD.	543,988	\$ 6.40	3,492,050
	MILLING & OVERLAY (AR-ACFC)	SQ.YD.	119,178	\$ 13.00	1,549,310
	MISCELLANEOUS ITEMS (mill 5.5" AC & replace 5" AC)	SQ.YD.	252,048	\$ 70.00	17,643,360
	TOTAL ITEM 300 & 400				53,900,770
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0	\$ 1,200,000.00	0
	DRAINAGE SYSTEM (OPEN)	MILE	7.70	\$ 120,000.00	924,000
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0		0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	12,540	\$ 800.00	10,032,000
	PIPE CULVERTS (New Installation)	L.FT.	10,120	\$ 800.00	8,096,000
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	207	\$ 1,500.00	310,500
	TOTAL ITEM 500				19,362,500
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	0	\$ 300.00	0
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	66	\$ 2,800.00	184,800
	SIGN STRUCTURES (CANTILEVER)	EACH	29	\$ 100,000.00	2,900,000
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0		0
	MISCELLANEOUS ITEMS (SIGN BRIDGE NON-ITS)	L.SUM	0	\$ 200,000.00	0
	TOTAL ITEM 600				3,084,800
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	17	\$ 50,000.00	846,000
	SIGNING (CROSS STREET)	MILE	0.00	\$ 80,000.00	0
	PAVEMENT MARKING	LANE-MILE	61	\$ 5,000.00	306,400
	LIGHTING	L.SUM	1	\$ 4,188,000.00	4,188,000
	TRAFFIC SIGNAL	EACH	0	\$ 400,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATION	EACH	3	\$ 30,000.00	90,000
	MISCELLANEOUS ITEMS (ITS Multiduct and FMS)	L.FT.	0	\$ -	0
	TOTAL ITEM 700				5,430,400
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	MILE	8	\$ -	0
	UTILITY RELOCATION	L.SUM	0	\$ 0	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	5	\$ 4,500.00	22,500
	TOTAL ITEM 800				22,500
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	MILE	7.70	\$ 725,714.29	5,588,000
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				5,588,000
SUBTOTAL A (ITEM SUBTOTAL)					\$91,997,600

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: Alt ML2
 SEGMENT: Segment 2A - ML2 (Median Widening) MP 161 to 168.7 ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 7.7 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

PW	PROJECT WIDE				
	TRAFFIC CONTROL (8% OF SUBTOTAL A)		8.0%		7,359,800
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)		0.0%		0
	QUALITY CONTROL (1% OF SUBTOTAL A)		1.0%		920,000
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)		1.5%		1,380,000
	EROSION CONTROL (1% OF SUBTOTAL A)		1.0%		920,000
	MOBILIZATION (8% OF SUBTOTAL A)		8.0%		7,359,800
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)		20.0%		18,399,500
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$128,336,700
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)		6.0%		7,700,202
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 1,130,000	1,130,000
	ENVIRONMENTAL MITIGATION	MILE	7.66	\$ 500,000.00	3,830,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$140,996,902
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)		1.0%		1,283,400
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)		5.0%		6,416,800
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)		9.0%		11,550,300
	SUBTOTAL BASE YEAR CONSTRUCTION				160,247,402
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)		10.70%		17,146,500
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$177,393,902
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)		0.50%		705,000
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)		10.70%		75,400
	SUBTOTAL PREDESIGN				780,400
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)		8.0%		11,279,800
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)		10.70%		1,206,900
	SUBTOTAL FINAL DESIGN				12,486,700
	TOTAL ESTIMATED DESIGN COST				\$13,267,100
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				0
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)		10.70%		0
	TOTAL ESTIMATED UTILITY COST				\$0
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.00	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)		10.70%		0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$190,661,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: Alt ML2
 SEGMENT: Segment 3B - ML2 (Median Widening) Gila River to 177 (Excl. F0270) ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 3.3 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	203,000	203,000
	ROADWAY EXCAVATION	CU.YD.	7,250	\$ 18.00	130,500
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	115,127	\$ 20.00	2,302,540
	SUBGRADE TREATMENT	SQ.YD.	0		0
	FURNISH WATER	MGAL	18,000	\$ 12.00	216,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				2,852,040
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	141,659	\$ 28.00	3,966,450
	CONCRETE PAVEMENT	SQ.YD.	0	\$ 100.00	0
	ASPHALT PAVEMENT	SQ.YD.	141,659	\$ 75.00	10,624,430
	AR-ACFC SURFACE	SQ.YD.	141,659	\$ 6.00	849,960
	MILLING & OVERLAY (AR-ACFC)	SQ.YD.	91,519	\$ 8.00	732,150
	MISCELLANEOUS ITEMS (mill 2.5" AC & replace 2.5" AC RT.SH	SQ.YD.	38,133	\$ 22.00	838,930
	TOTAL ITEM 300 & 400				17,011,920
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0	\$ 1,200,000.00	0
	DRAINAGE SYSTEM (OPEN)	MILE	3.30	\$ 120,000.00	396,000
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0		0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	4,480	\$ 800.00	3,584,000
	PIPE CULVERTS (New Installation)	L.FT.	3,686	\$ 800.00	2,948,800
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	56	\$ 1,500.00	84,000
	TOTAL ITEM 500				7,012,800
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	0	\$ 300.00	0
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0		0
	MISCELLANEOUS ITEMS (SIGN BRIDGE NON-ITS)	L.SUM	0	\$ 200,000.00	0
	TOTAL ITEM 600				0
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	7	\$ 50,000.00	325,000
	SIGNING (CROSS STREET)	MILE	0.00	\$ 80,000.00	0
	PAVEMENT MARKING	LANE-MILE	20	\$ 5,000.00	97,500
	LIGHTING	L.SUM	1	\$ 360,000.00	360,000
	TRAFFIC SIGNAL	EACH	0	\$ 400,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct and FMS)	L.FT	0	\$ -	0
	TOTAL ITEM 700				782,500
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	MILE	3	\$ -	0
	UTILITY RELOCATION	L.SUM	0	\$ 0	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	11	\$ 4,500.00	50,400
	TOTAL ITEM 800				50,400
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	MILE	3.30	\$ 344,696.97	1,137,500
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				1,137,500
	SUBTOTAL A (ITEM SUBTOTAL)				\$28,847,200

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: Alt ML2
 SEGMENT: Segment 3B - ML2 (Median Widening) Gila River to 177 (Excl. F0270) ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 3.3 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

PW	PROJECT WIDE				
	TRAFFIC CONTROL (8% OF SUBTOTAL A)		8.0%		2,307,800
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)		0.0%		0
	QUALITY CONTROL (1% OF SUBTOTAL A)		1.0%		288,500
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)		1.5%		432,700
	EROSION CONTROL (1% OF SUBTOTAL A)		1.0%		288,500
	MOBILIZATION (8% OF SUBTOTAL A)		8.0%		2,307,800
	UNIDENTIFIED ITEMS (5.99884910840567% OF SUBTOTAL A)		6.0%		1,730,500
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$36,203,000
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	hour	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)		6.0%		2,172,180
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 910,000	910,000
	ENVIRONMENTAL MITIGATION	MILE	3	\$ 500,000.00	1,625,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$40,910,180
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)		1.0%		362,000
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)		5.0%		1,810,200
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)		9.0%		3,258,300
	SUBTOTAL BASE YEAR CONSTRUCTION				46,340,680
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)		10.70%		4,958,500
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$51,299,180
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)		0.50%		204,600
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)		10.70%		21,900
	SUBTOTAL PREDESIGN				226,500
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)		0.0%		0
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)		10.70%		0
	SUBTOTAL FINAL DESIGN				0
	TOTAL ESTIMATED DESIGN COST				\$226,500
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				0
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)		10.70%		0
	TOTAL ESTIMATED UTILITY COST				\$0
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.00	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)		10.70%		0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$51,526,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: WH2
 SEGMENT: WH2 - Wild Horse Pass Boulevard DDI ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.6 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	\$ 316,000.00	316,000
	ROADWAY EXCAVATION	CU.YD.	39,025	\$ 18.00	702,450
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	114,902	\$ 20.00	2,298,040
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	19,000	\$ 12.00	228,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				3,544,490
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	36,602	\$ 12.00	439,220
	CONCRETE PAVEMENT	SQ.YD.	31,274	\$ 60.00	1,876,440
	ASPHALT PAVEMENT	SQ.YD.	5,328	\$ 55.00	293,040
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	4,296	\$ 13.00	55,850
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	10,237	\$ 28.00	286,640
	TOTAL ITEM 300 & 400				2,951,190
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	1	\$ 400,000.00	400,000
	DRAINAGE SYSTEM (OPEN)	L.FT.	0.00	\$ -	0
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	552	\$ 1,000.00	552,000
	PIPE CULVERTS (New Installation)	L.FT.	200	\$ 350.00	70,000
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	10	\$ 1,500.00	15,000
	TOTAL ITEM 500				1,037,000
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	12,628	\$ 260.00	3,283,280
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	1	\$ 167,000.00	167,000
	TOTAL ITEM 600				3,450,280
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	2.00	\$ 50,000.00	100,000
	SIGNING (CROSS STREET)	MILE	4.00	\$ 80,000.00	320,000
	PAVEMENT MARKING	LANE-MILE	8.00	\$ 5,000.00	40,000
	LIGHTING	L.SUM	1	\$ 500,000.00	500,000
	TRAFFIC SIGNAL	EACH	2	\$ 350,000.00	700,000
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 15.00	0
	TOTAL ITEM 700				1,660,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	112,000	\$ 12.00	1,344,000
	UTILITY RELOCATION	L.SUM	0	\$ 100,000.00	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	0	\$ 4,500.00	0
	TOTAL ITEM 800				1,344,000
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	1	\$ 400,000.00	400,000
	ADA IMPROVEMENTS	EACH	16	\$ 4,000.00	64,000
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				464,000
	SUBTOTAL A (ITEM SUBTOTAL)				\$14,451,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: WH2
 SEGMENT: WH2 - Wild Horse Pass Boulevard DDI ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.6 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	433,500
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	144,500
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	216,800
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	144,500
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	1,156,100
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	2,890,200
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$19,436,600
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	1,166,196
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 70,000.00	70,000
	ENVIRONMENTAL MITIGATION	MILE	0.60	\$ 500,000.00	300,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$20,972,796
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	194,400
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	971,800
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	1,749,300
	SUBTOTAL BASE YEAR CONSTRUCTION				23,888,296
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	2,556,000
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$26,444,296
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	104,900
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	11,200
	SUBTOTAL PREDESIGN				116,100
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			8.0%	1,677,800
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	179,500
	SUBTOTAL FINAL DESIGN				1,857,300
	TOTAL ESTIMATED DESIGN COST				\$1,973,400
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS		1	2,000,000	2,000,000
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	214,000
	TOTAL ESTIMATED UTILITY COST				\$2,214,000
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$30,632,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: QC2
 SEGMENT: QC2 - SR 347/Queen Creek Road DDI ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 1.0 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	\$ 611,000.00	611,000
	ROADWAY EXCAVATION	CU.YD.	12,160	\$ 18.00	218,880
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	219,764	\$ 20.00	4,395,280
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	24,000	\$ 12.00	288,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				5,513,160
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	62,316	\$ 12.00	747,790
	CONCRETE PAVEMENT	SQ.YD.	23,599	\$ 60.00	1,415,940
	ASPHALT PAVEMENT	SQ.YD.	38,717	\$ 55.00	2,129,440
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0	\$ 13.00	0
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	16,918	\$ 28.00	473,700
	TOTAL ITEM 300 & 400				4,766,870
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	1	\$ 400,000.00	400,000
	DRAINAGE SYSTEM (OPEN)	L.FT.	0	\$ -	0
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	1,792	\$ 1,000.00	1,792,000
	PIPE CULVERTS (New Installation)	L.FT.	1200	\$ 350.00	420,000
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	40	\$ 1,500.00	60,000
	TOTAL ITEM 500				2,672,000
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	12,628	\$ 260.00	3,283,280
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	1	\$ 158,000.00	158,000
	TOTAL ITEM 600				3,441,280
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	2.00	\$ 50,000.00	100,000
	SIGNING (CROSS STREET)	MILE	4.00	\$ 80,000.00	320,000
	PAVEMENT MARKING	LANE-MILE	8.00	\$ 5,000.00	40,000
	LIGHTING	L.SUM	1	\$ 500,000.00	500,000
	TRAFFIC SIGNAL	EACH	2	\$ 350,000.00	700,000
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT	0	\$ 15.00	0
	TOTAL ITEM 700				1,660,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	130,000	\$ 12.00	1,560,000
	UTILITY RELOCATION	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	0	\$ 4,500.00	0
	TOTAL ITEM 800				1,560,000
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	1	\$ 400,000.00	400,000
	ADA IMPROVEMENTS	EACH	16	\$ 4,000.00	64,000
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				464,000
	SUBTOTAL A (ITEM SUBTOTAL)				\$20,077,300

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: QC2
 SEGMENT: QC2 - SR 347/Queen Creek Road DDI ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 1.0 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	602,300
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	200,800
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	301,200
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	200,800
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	1,606,200
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	4,015,500
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$27,004,100
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	1,620,246
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 110,000.00	110,000
	ENVIRONMENTAL MITIGATION	MILE	1.00	\$ 500,000.00	500,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$29,234,346
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	270,000
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	1,350,200
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	2,430,400
	SUBTOTAL BASE YEAR CONSTRUCTION				33,284,946
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	3,561,500
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$36,846,446
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	146,200
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	15,600
	SUBTOTAL PREDESIGN				161,800
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			8.0%	2,338,700
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	250,200
	SUBTOTAL FINAL DESIGN				2,588,900
	TOTAL ESTIMATED DESIGN COST				\$2,750,700
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS		1	\$ 1,000,000	1,000,000
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	107,000
	TOTAL ESTIMATED UTILITY COST				\$1,107,000
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$40,705,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: RR4
 SEGMENT: RR4 - Riggs Road Crossroad and Bridge Improvements ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 1.0 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	\$ 360,000.00	360,000
	ROADWAY EXCAVATION	CU.YD.	4,842	\$ 18.00	87,160
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	43,184	\$ 20.00	863,680
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	12,000	\$ 12.00	144,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				1,454,840
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	30,714	\$ 12.00	368,570
	CONCRETE PAVEMENT	SQ.YD.	16,356	\$ 60.00	981,360
	ASPHALT PAVEMENT	SQ.YD.	14,358	\$ 55.00	789,690
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0	\$ 13.00	0
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	3,866	\$ 28.00	108,250
	TOTAL ITEM 300 & 400				2,247,870
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	1	\$ 400,000.00	400,000
	DRAINAGE SYSTEM (OPEN)	L.FT.	0.00	\$ -	0
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	200	\$ 1,000.00	200,000
	PIPE CULVERTS (New Installation)	L.FT.	347	\$ 350.00	121,450
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	12	\$ 1,500.00	18,000
	TOTAL ITEM 500				739,450
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	11,018	\$ 260.00	2,864,680
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REHABILITATION)	SQ.FT.	9,374	\$ 200.00	1,874,800
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	1	\$ 180,000.00	180,000
	TOTAL ITEM 600				4,919,480
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	2.00	\$ 50,000.00	100,000
	SIGNING (CROSS STREET)	MILE	4.00	\$ 80,000.00	320,000
	PAVEMENT MARKING	LANE-MILE	8.00	\$ 5,000.00	40,000
	LIGHTING	L.SUM	1	\$ 500,000.00	500,000
	TRAFFIC SIGNAL	EACH	2	\$ 350,000.00	700,000
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 15.00	0
	TOTAL ITEM 700				1,660,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	160,000	\$ 10.00	1,600,000
	UTILITY RELOCATION	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	0	\$ 4,500.00	0
	TOTAL ITEM 800				1,600,000
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	1	\$ 400,000.00	400,000
	ADA IMPROVEMENTS	EACH	10	\$ 4,000.00	40,000
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				440,000
	SUBTOTAL A (ITEM SUBTOTAL)				\$13,061,600

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: RR4
 SEGMENT: RR4 - Riggs Road Crossroad and Bridge Improvements ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 1.0 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	391,800
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	130,600
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	195,900
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	130,600
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	1,044,900
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	2,612,300
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$17,567,700
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	1,054,062
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 50,000.00	50,000
	ENVIRONMENTAL MITIGATION	MILE	1.00	\$ 500,000.00	500,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$19,171,762
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	175,700
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	878,400
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	1,581,100
	SUBTOTAL BASE YEAR CONSTRUCTION				21,806,962
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	2,333,300
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$24,140,262
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	95,900
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	10,300
	SUBTOTAL PREDESIGN				106,200
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			8.0%	1,533,700
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	164,100
	SUBTOTAL FINAL DESIGN				1,697,800
	TOTAL ESTIMATED DESIGN COST				\$1,804,000
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS		1	500,000	500,000
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	53,500
	TOTAL ESTIMATED UTILITY COST				\$553,500
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$26,498,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: GY2
 SEGMENT: GY2 - Goodyear Road Bridge and Crossroad Widening ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.4 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	\$ 85,000.00	85,000
	ROADWAY EXCAVATION	CU.YD.	1,000	\$ 18.00	18,000
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	34,545	\$ 20.00	690,900
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	11,000	\$ 12.00	132,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				925,900
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	11,207	\$ 12.00	134,480
	CONCRETE PAVEMENT	SQ.YD.	9,025	\$ 60.00	541,500
	ASPHALT PAVEMENT	SQ.YD.	2,182	\$ 55.00	120,010
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0	\$ 13.00	0
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	0	\$ 28.00	0
	TOTAL ITEM 300 & 400				795,990
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0	\$ -	0
	DRAINAGE SYSTEM (OPEN)	L.SUM	1.00	\$ 100,000.00	100,000
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	0	\$ 1,000.00	0
	PIPE CULVERTS (New Installation)	L.FT.	0	\$ 350.00	0
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	0	\$ 1,500.00	0
	TOTAL ITEM 500				100,000
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	0	\$ 300.00	0
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	10,500	\$ 310.00	3,255,000
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	1	\$ 156,000.00	156,000
	TOTAL ITEM 600				3,411,000
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	0.00	\$ 50,000.00	0
	SIGNING (CROSS STREET)	MILE	0.50	\$ 80,000.00	40,000
	PAVEMENT MARKING	LANE-MILE	2.00	\$ 5,000.00	10,000
	LIGHTING	L.SUM	0	\$ -	0
	TRAFFIC SIGNAL	EACH	0	\$ 350,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 15.00	0
	TOTAL ITEM 700				50,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	0	\$ 15.00	0
	UTILITY RELOCATION	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	6	\$ 4,500.00	27,000
	TOTAL ITEM 800				27,000
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	1	\$ 300,000.00	300,000
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				300,000
	SUBTOTAL A (ITEM SUBTOTAL)				\$5,609,900

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: GY2
 SEGMENT: GY2 - Goodyear Road Bridge and Crossroad Widening ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.4 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	168,300
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	56,100
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	84,100
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	56,100
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	448,800
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	1,122,000
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$7,545,300
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	452,718
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 20,000.00	20,000
	ENVIRONMENTAL MITIGATION	MILE	0.40	\$ 500,000.00	200,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$8,218,018
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	75,500
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	377,300
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	679,100
	SUBTOTAL BASE YEAR CONSTRUCTION				9,349,918
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	1,000,400
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$10,350,318
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	41,100
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	4,400
	SUBTOTAL PREDESIGN				45,500
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			8.0%	657,400
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	70,300
	SUBTOTAL FINAL DESIGN				727,700
	TOTAL ESTIMATED DESIGN COST				\$773,200
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS		0	0	0
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	0
	TOTAL ESTIMATED UTILITY COST				\$0
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$11,124,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: NR2
 SEGMENT: NR2 - Nelson Road Bridge and Crossroad Widening ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.4 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	\$ 46,000.00	46,000
	ROADWAY EXCAVATION	CU.YD.	868	\$ 18.00	15,620
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	32,042	\$ 20.00	640,840
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	11,000	\$ 12.00	132,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				834,460
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	10,769	\$ 12.00	129,230
	CONCRETE PAVEMENT	SQ.YD.	8,712	\$ 60.00	522,720
	ASPHALT PAVEMENT	SQ.YD.	2,057	\$ 55.00	113,140
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0	\$ 13.00	0
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	0	\$ 28.00	0
	TOTAL ITEM 300 & 400				765,090
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0	\$ -	0
	DRAINAGE SYSTEM (OPEN)	L.SUM	1.00	\$ 100,000.00	100,000
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	0	\$ 1,000.00	0
	PIPE CULVERTS (New Installation)	L.FT.	0	\$ 350.00	0
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	0	\$ 1,500.00	0
	TOTAL ITEM 500				100,000
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	0	\$ 300.00	0
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	10,209	\$ 310.00	3,164,790
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	1	\$ 156,000.00	156,000
	TOTAL ITEM 600				3,320,790
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	0.00	\$ 50,000.00	0
	SIGNING (CROSS STREET)	MILE	0.50	\$ 80,000.00	40,000
	PAVEMENT MARKING	LANE-MILE	2.00	\$ 5,000.00	10,000
	LIGHTING	L.SUM	0	\$ -	0
	TRAFFIC SIGNAL	EACH	0	\$ 350,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 15.00	0
	TOTAL ITEM 700				50,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	0	\$ 15.00	0
	UTILITY RELOCATION	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	6	\$ 4,500.00	27,000
	TOTAL ITEM 800				27,000
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	1	\$ 300,000.00	300,000
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				300,000
	SUBTOTAL A (ITEM SUBTOTAL)				\$5,397,300

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: NR2
 SEGMENT: NR2 - Nelson Road Bridge and Crossroad Widening ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.4 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	161,900
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	54,000
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	81,000
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	54,000
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	431,800
	UNIDENTIFIED ITEMS (6% OF SUBTOTAL A)			6.0%	323,800
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$6,503,800
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	390,228
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 20,000.00	20,000
	ENVIRONMENTAL MITIGATION	MILE	0.40	\$ 500,000.00	200,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$7,114,028
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	65,000
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	325,200
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	585,300
	SUBTOTAL BASE YEAR CONSTRUCTION				8,089,528
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	865,600
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$8,955,128
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	35,600
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	3,800
	SUBTOTAL PREDESIGN				39,400
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			0.0%	0
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	0
	SUBTOTAL FINAL DESIGN				0
	TOTAL ESTIMATED DESIGN COST				\$39,400
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS		1	1,750,000	1,750,000
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	187,300
	TOTAL ESTIMATED UTILITY COST				\$1,937,300
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$10,932,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: CB6
 SEGMENT: CB6 - SR 587/Casa Blanca Road TI - Diamond TI with Casa Blanca Road Bypass ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.8 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	\$ 889,000.00	889,000
	ROADWAY EXCAVATION	CU.YD.	11,113	\$ 18.00	200,030
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	303,054	\$ 20.00	6,061,080
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	29,000	\$ 12.00	348,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				7,498,110
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	75,270	\$ 12.00	903,240
	CONCRETE PAVEMENT	SQ.YD.	18,803	\$ 60.00	1,128,180
	ASPHALT PAVEMENT	SQ.YD.	56,467	\$ 55.00	3,105,690
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0	\$ 13.00	0
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	0	\$ 28.00	0
	TOTAL ITEM 300 & 400				5,137,110
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	1	\$ 600,000.00	600,000
	DRAINAGE SYSTEM (OPEN)	L.SUM	1.00	\$ 150,000.00	150,000
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	785	\$ 1,000.00	785,000
	PIPE CULVERTS (New Installation)	L.FT.	1200	\$ 350.00	420,000
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	22	\$ 1,500.00	33,000
	TOTAL ITEM 500				1,988,000
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	41,502	\$ 260.00	10,790,520
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	0	\$ -	0
	TOTAL ITEM 600				10,790,520
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	2.00	\$ 50,000.00	100,000
	SIGNING (CROSS STREET)	MILE	6.00	\$ 80,000.00	480,000
	PAVEMENT MARKING	LANE-MILE	10.00	\$ 5,000.00	50,000
	LIGHTING	L.SUM	1	\$ 700,000.00	700,000
	TRAFFIC SIGNAL	EACH	0	\$ 350,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 15.00	0
	TOTAL ITEM 700				1,330,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	203,300	\$ 10.00	2,033,000
	UTILITY RELOCATION	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	0	\$ 4,500.00	0
	TOTAL ITEM 800				2,033,000
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	18,000	\$ 130.00	2,340,000
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	1	\$ 600,000.00	600,000
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				2,940,000
	SUBTOTAL A (ITEM SUBTOTAL)				\$31,716,700

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: CB6
 SEGMENT: CB6 - SR 587/Casa Blanca Road TI - Diamond TI with Casa Blanca Road Bypass ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.8 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	951,500
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	317,200
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	475,800
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	317,200
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	2,537,300
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	6,343,300
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$42,659,000
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	2,559,540
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 120,000.00	120,000
	ENVIRONMENTAL MITIGATION	MILE	0.80	\$ 500,000.00	400,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$45,738,540
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	426,600
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	2,133,000
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	3,839,300
	SUBTOTAL BASE YEAR CONSTRUCTION				\$2,137,440
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	5,578,700
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$57,716,140
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	228,700
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	24,500
	SUBTOTAL PREDESIGN				253,200
	FINAL DESIGN SERVICES (0% OF CONSTRUCTION YEAR COST)			0.0%	0
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	0
	SUBTOTAL FINAL DESIGN				0
	TOTAL ESTIMATED DESIGN COST				\$253,200
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS	L.SUM	1	\$ 2,000,000.00	2,000,000
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	214,000
	TOTAL ESTIMATED UTILITY COST				\$2,214,000
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$60,184,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: GL3
 SEGMENT: **GL3 - Gasline Road - Bridge Replacement Off Alignment** ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.5 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	\$ 427,000.00	427,000
	ROADWAY EXCAVATION	CU.YD.	15,918	\$ 18.00	286,520
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	64,388	\$ 20.00	1,287,760
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	14,000	\$ 12.00	168,000
	MISCELLANEOUS ITEMS	L.SUM	1	\$ 32,550.00	32,550
	TOTAL ITEM 200				2,201,830
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	17,076	\$ 12.00	204,910
	CONCRETE PAVEMENT	SQ.YD.	8,316	\$ 60.00	498,960
	ASPHALT PAVEMENT	SQ.YD.	8,760	\$ 55.00	481,800
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0	\$ 13.00	0
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	0	\$ 28.00	0
	TOTAL ITEM 300 & 400				1,185,670
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0	\$ -	0
	DRAINAGE SYSTEM (OPEN)	L.SUM	1	\$ 320,400.00	320,400
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	0	\$ 1,000.00	0
	PIPE CULVERTS (New Installation)	L.FT.	561	\$ 165.00	92,570
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	6	\$ 1,500.00	9,000
	TOTAL ITEM 500				421,970
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	21,450	\$ 311.00	6,670,950
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	0	\$ -	0
	TOTAL ITEM 600				6,670,950
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	0.00	\$ 50,000.00	0
	SIGNING (CROSS STREET)	MILE	0.50	\$ 80,000.00	40,000
	PAVEMENT MARKING	LANE-MILE	2.00	\$ 5,000.00	10,000
	LIGHTING	L.SUM	0	\$ -	0
	TRAFFIC SIGNAL	EACH	0	\$ 350,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 15.00	0
	TOTAL ITEM 700				50,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	0	\$ 15.00	0
	UTILITY RELOCATION	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	8	\$ 4,500.00	36,000
	TOTAL ITEM 800				36,000
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	11,606	\$ 130.00	1,508,780
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	1	\$ 375,000.00	375,000
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				1,883,780
	SUBTOTAL A (ITEM SUBTOTAL)				\$12,450,200

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: GL3
 SEGMENT: **GL3 - Gasline Road - Bridge Replacement Off Alignment** ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.5 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	373,500
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	124,500
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	186,800
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	124,500
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	996,000
	UNIDENTIFIED ITEMS (6% OF SUBTOTAL A)			6.0%	747,000
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$15,002,500
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	900,150
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 30,000.00	30,000
	ENVIRONMENTAL MITIGATION	MILE	0.50	\$ 500,000.00	250,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$16,182,650
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	150,000
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	750,100
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	1,350,200
	SUBTOTAL BASE YEAR CONSTRUCTION				18,432,950
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	1,972,300
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$20,405,250
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	80,900
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	8,700
	SUBTOTAL PREDESIGN				89,600
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			0.0%	0
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	0
	SUBTOTAL FINAL DESIGN				0
	TOTAL ESTIMATED DESIGN COST				\$89,600
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENT	L.SUM	1	\$ 1,540,000.00	1,540,000
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	164,800
	TOTAL ESTIMATED UTILITY COST				\$1,704,800
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$22,200,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: SF4
 SEGMENT: SF4 - Seed Farm Road - New Spread Diamond w/Bridge Replacement ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.8 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1	\$ 535,000.00	535,000
	ROADWAY EXCAVATION	CU.YD.	92,412	\$ 18.00	1,663,420
	DRAINAGE EXCAVATION	CU.YD.	3,685	\$ 18.00	66,330
	BORROW	CU.YD.	160,714	\$ 20.00	3,214,280
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	25,000	\$ 12.00	300,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				5,779,030
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	32,702	\$ 12.00	392,420
	CONCRETE PAVEMENT	SQ.YD.	6,831	\$ 60.00	409,860
	ASPHALT PAVEMENT	SQ.YD.	25,871	\$ 55.00	1,422,910
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0	\$ 13.00	0
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	0	\$ 28.00	0
	TOTAL ITEM 300 & 400				2,225,190
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	1	\$ 90,000.00	90,000
	DRAINAGE SYSTEM (OPEN)	L.SUM	0.00	\$ -	0
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	1,100	\$ 2,400.00	2,640,000
	PIPE CULVERTS (New Installation)	L.FT.	1441	\$ 125.00	180,130
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	31	\$ 1,000.00	31,000
	TOTAL ITEM 500				2,941,130
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	12,826	\$ 256.00	3,283,460
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	0	\$ -	0
	TOTAL ITEM 600				3,283,460
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	2.00	\$ 50,000.00	100,000
	SIGNING (CROSS STREET)	MILE	4.00	\$ 13,000.00	52,000
	PAVEMENT MARKING	LANE-MILE	8.00	\$ 5,000.00	40,000
	LIGHTING	L.SUM	1	\$ 700,000.00	700,000
	TRAFFIC SIGNAL	EACH	0	\$ 350,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 15.00	0
	TOTAL ITEM 700				892,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	222,600	\$ 10.00	2,226,000
	UTILITY RELOCATION	L.SUM	0	\$ 100,000.00	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	0	\$ 4,500.00	0
	TOTAL ITEM 800				2,226,000
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	8,995	\$ 130.00	1,169,350
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	1	\$ 600,000.00	600,000
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				1,769,350
	SUBTOTAL A (ITEM SUBTOTAL)				\$19,116,200

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: SF4
 SEGMENT: SF4 - Seed Farm Road - New Spread Diamond w/Bridge Replacement ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.8 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	573,500
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	191,200
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	286,700
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	191,200
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	1,529,300
	UNIDENTIFIED ITEMS (6% OF SUBTOTAL A)			6.0%	1,147,000
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$23,035,100
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	1,382,106
	CONTRACTOR INCENTIVES	L.SUM	1	\$ 50,000.00	50,000
	ENVIRONMENTAL MITIGATION	MILE	0.80	\$ 500,000.00	400,000
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$24,867,206
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	230,400
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	1,151,800
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	2,073,200
	SUBTOTAL BASE YEAR CONSTRUCTION				28,322,606
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	3,030,500
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$31,353,106
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	124,300
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	13,300
	SUBTOTAL PREDESIGN				137,600
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			0.0%	0
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	0
	SUBTOTAL FINAL DESIGN				0
	TOTAL ESTIMATED DESIGN COST				\$137,600
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS	L.SUM	1	\$ 1,080,000.00	1,080,000
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	115,600
	TOTAL ESTIMATED UTILITY COST				\$1,195,600
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$32,687,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: DL4
 SEGMENT: DL4 - Dirk Lay Road - Bridge and Approach Removal ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.5 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	1.00	\$ 400,000.00	400,000
	ROADWAY EXCAVATION	CU.YD.	37,004	\$ 18.00	666,070
	DRAINAGE EXCAVATION	CU.YD.	0	\$ 18.00	0
	BORROW	CU.YD.	0	\$ 20.00	0
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0
	FURNISH WATER	MGAL	11,000	\$ 12.00	132,000
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 200				1,198,070
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	0	\$ 12.00	0
	CONCRETE PAVEMENT	SQ.YD.	0	\$ 60.00	0
	ASPHALT PAVEMENT	SQ.YD.	0	\$ 55.00	0
	AR-ACFC SURFACE	SQ.YD.	0	\$ 11.00	0
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0	\$ 13.00	0
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	0	\$ 28.00	0
	TOTAL ITEM 300 & 400				0
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0	\$ -	0
	DRAINAGE SYSTEM (OPEN)	L.SUM	0	\$ -	0
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0
	PUMP STATION (NEW)	EACH	0	\$ -	0
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	0	\$ 1,000.00	0
	PIPE CULVERTS (New Installation)	L.FT.	0	\$ 350.00	0
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	0	\$ 1,500.00	0
	TOTAL ITEM 500				0
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	0	\$ 300.00	0
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0	\$ 200.00	0
	BOX CULVERT	L.FT./CELL	0	\$ 2,800.00	0
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0
	O&M CROSSING	EACH	0	\$ -	0
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	0	\$ -	0
	TOTAL ITEM 600				0
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	0.00	\$ 50,000.00	0
	SIGNING (CROSS STREET)	MILE	0.00	\$ 80,000.00	0
	PAVEMENT MARKING	LANE-MILE	0.00	\$ 5,000.00	0
	LIGHTING	L.SUM	0.00	\$ -	0
	TRAFFIC SIGNAL	EACH	0	\$ 350,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0.00	\$ 30,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 15.00	0
	TOTAL ITEM 700				0
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	0	\$ 15.00	0
	UTILITY RELOCATION	L.SUM	0	\$ -	0
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	9	\$ 4,500.00	40,500
	TOTAL ITEM 800				40,500
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0	\$ 130.00	0
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0
	ROADWAY APPURTENANCES	L.SUM	0	\$ -	0
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ 250,000.00	0
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0
	TOTAL ITEM 900				0
	SUBTOTAL A (ITEM SUBTOTAL)				\$1,238,600

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: DL4
 SEGMENT: DL4 - Dirk Lay Road - Bridge and Approach Removal ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.5 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	37,200
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	12,400
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	18,600
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	12,400
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	99,100
	UNIDENTIFIED ITEMS (6% OF SUBTOTAL A)			6.0%	74,300
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$1,492,600
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	89,556
	CONTRACTOR INCENTIVES	L.SUM	0	\$ -	0
	ENVIRONMENTAL MITIGATION	MILE	0.50	\$ 125,000.00	62,500
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				\$1,644,656
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	14,900
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	74,600
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	134,300
	SUBTOTAL BASE YEAR CONSTRUCTION				1,868,456
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	199,900
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$2,068,356
DES	PREDESIGN AND FINAL DESIGN				
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	8,200
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	900
	SUBTOTAL PREDESIGN				9,100
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			0.0%	0
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	0
	SUBTOTAL FINAL DESIGN				0
	TOTAL ESTIMATED DESIGN COST				\$9,100
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				0
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	0
	TOTAL ESTIMATED UTILITY COST				\$0
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$2,078,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: PA3
 SEGMENT: PA3 - SR 387/SR 187/Pinal Avenue - Bridge and Crossroad Widening ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.5 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	
200	EARTHWORK					
	CLEARING & REMOVALS	L.SUM	1	\$ 300,000.00	300,000	
	ROADWAY EXCAVATION	CU.YD.	2,450	\$ 18.00	44,100	
	DRAINAGE EXCAVATION	CU.YD.		\$ 18.00		
	BORROW	CU.YD.	57,818	\$ 20.00	1,156,360	
	SUBGRADE TREATMENT	SQ.YD.	0	\$ -	0	
	FURNISH WATER	MGAL	13,000	\$ 12.00	156,000	
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0	
	TOTAL ITEM 200					1,656,460
	300 & 400	BASE AND SURFACE TREATMENT				
		AGGREGATE BASE	SQ.YD.	32,643	\$ 12.00	391,720
CONCRETE PAVEMENT		SQ.YD.	19,507	\$ 60.00	1,170,410	
ASPHALT PAVEMENT		SQ.YD.	13,137	\$ 55.00	722,520	
AR-ACFC SURFACE		SQ.YD.	0	\$ 11.00	0	
MILLING & OVERLAY (1" AR-ACFC)		SQ.YD.	0	\$ 13.00	0	
MISCELLANEOUS ITEMS (mill & replace 3" AC)		SQ.YD.	5,964	\$ 28.00	166,990	
TOTAL ITEM 300 & 400					2,451,640	
500	DRAINAGE					
	DRAINAGE SYSTEM (CLOSED)	L.SUM	1	\$ 100,000.00	100,000	
	DRAINAGE SYSTEM (OPEN)	L.SUM	0.00	\$ -	0	
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0	\$ -	0	
	PUMP STATION (NEW)	EACH	0	\$ -	0	
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	150	\$ 1,000.00	150,000	
	PIPE CULVERTS (New Installation)	L.FT.	228	\$ 350.00	79,800	
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	6	\$ 1,500.00	9,000	
TOTAL ITEM 500					338,800	
600	STRUCTURES					
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0	\$ -	0	
	FLYOVER HOV RAMP	SQ.FT.	0	\$ -	0	
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	21,420	\$ 248.00	5,312,160	
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0	\$ 310.00	0	
	RIVER CROSSING BRIDGE	SQ.FT.	0	\$ -	0	
	PEDESTRIAN BRIDGE	SQ.FT.	0	\$ -	0	
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0	\$ 350.00	0	
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	1,148	\$ 200.00	229,600	
	BOX CULVERT	L.FT./CELL	123	\$ 2,800.00	344,400	
	SIGN STRUCTURES (CANTILEVER)	EACH	0	\$ 100,000.00	0	
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0	\$ 275,000.00	0	
	O&M CROSSING	EACH	0	\$ -	0	
	MISCELLANEOUS ITEMS (BRIDGE BARRIER REPLACEMENT)	L.SUM	1	\$ 120,000.00	120,000	
	TOTAL ITEM 600					6,006,160
	700	TRAFFIC ENGINEERING				
		SIGNING (FREEWAY)	MILE/DIR	2.00	\$ 50,000.00	100,000
SIGNING (CROSS STREET)		MILE	4.00	\$ 80,000.00	320,000	
PAVEMENT MARKING		LANE-MILE	8.00	\$ 5,000.00	40,000	
LIGHTING		L.SUM	1	\$ 700,000.00	700,000	
TRAFFIC SIGNAL		EACH	2	\$ 350,000.00	700,000	
INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS		EACH	0.00	\$ 30,000.00	0	
MISCELLANEOUS ITEMS (ITS Multiduct)		L.FT.	0	\$ 15.00	0	
TOTAL ITEM 700					1,860,000	
800	ROADSIDE DEVELOPMENT					
	LANDSCAPING AND TOPSOIL	SQ.YD.	160,000	\$ 10.00	1,600,000	
	UTILITY RELOCATION	L.SUM	0	\$ -	0	
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	0	\$ 4,500.00	0	
TOTAL ITEM 800					1,600,000	
900	INCIDENTALS					
	RETAINING WALLS	SQ.FT.	7,920	\$ 130.00	1,029,600	
	SOUND WALLS	SQ.FT.	0	\$ 60.00	0	
	ROADWAY APPURTENANCES	L.SUM	1	\$ 870,000.00	870,000	
	ADA IMPROVEMENTS	EACH	0	\$ 4,000.00	0	
	TRANSIT APPURTENANCES	L.SUM	0	\$ -	0	
	RAILROAD ACCOMMODATIONS	L.SUM	0	\$ -	0	
	MISCELLANEOUS ITEMS	L.SUM	0	\$ -	0	
	TOTAL ITEM 900					1,899,600
SUBTOTAL A (ITEM SUBTOTAL)					\$15,812,700	

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: PA3
 SEGMENT: PA3 - SR 387/SR 187/Pinal Avenue - Bridge and Crossroad Widening ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 0.5 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	
PW	PROJECT WIDE					
	TRAFFIC CONTROL (3% OF SUBTOTAL A)			3.0%	474,400	
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0	
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	158,100	
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	237,200	
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	158,100	
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	1,265,000	
	UNIDENTIFIED ITEMS (5% OF SUBTOTAL A)			5.0%	790,600	
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)					\$18,896,100
	OTHER PROJ	OTHER PROJECT COSTS				
DPS TRAFFIC CONTROL		HOUR	0	\$ 120.00	0	
JOINT PROJECT AGREEMENT ITEMS					0	
TERO TRIBAL TAX (6% OF SUBTOTAL B)				6.0%	1,133,766	
CONTRACTOR INCENTIVES		L.SUM	1	\$ 60,000.00	60,000	
ENVIRONMENTAL MITIGATION		MILE	0.50	\$ 500,000.00	250,000	
PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)					\$20,339,866	
INFL	INFLATION AND BELOW THE LINE ITEMS					
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	189,000	
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	944,800	
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	1,700,600	
	SUBTOTAL BASE YEAR CONSTRUCTION					23,174,266
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	2,479,600	
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)					\$25,653,866
DES	PREDESIGN AND FINAL DESIGN					
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	101,700	
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	10,900	
	SUBTOTAL PREDESIGN					112,600
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			0.0%	0	
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	0	
SUBTOTAL FINAL DESIGN					0	
TOTAL ESTIMATED DESIGN COST					\$112,600	
UTIL	UTILITY RELOCATION					
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS		1	\$ 150,000	150,000	
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	16,100	
TOTAL ESTIMATED UTILITY COST					\$166,100	
R/W	RIGHT-OF-WAY					
	RIGHT-OF-WAY / EASEMENT	ACRE	0.0	\$ -	0	
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0	
ACQUISITION YEAR RIGHT-OF-WAY COSTS					\$0	
TOTAL ESTIMATED PROJECT COST					\$25,933,000	

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: SR 202L to SR 387
 SEGMENT: ADOT Fiber Optic Conduit Installation ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 25.00 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	
200	EARTHWORK					
	CLEARING & REMOVALS	L.SUM	0			
	ROADWAY EXCAVATION	CU.YD.	0			
	DRAINAGE EXCAVATION	CU.YD.	0			
	BORROW	CU.YD.	0			
	SUBGRADE TREATMENT	SQ.YD.	0			
	FURNISH WATER	MGAL	0			
	MISCELLANEOUS ITEMS	L.SUM				
	TOTAL ITEM 200					0
	300 & 400	BASE AND SURFACE TREATMENT				
AGGREGATE BASE		SQ.YD.	0			
CONCRETE PAVEMENT		SQ.YD.	0			
ASPHALT PAVEMENT		SQ.YD.	0			
ARAC SURFACE		SQ.YD.	0			
MILLING & OVERLAY (1" AR-ACFC)		SQ.YD.	0			
MISCELLANEOUS ITEMS (mill & replace 3" AC)		SQ.YD.	0			
TOTAL ITEM 300 & 400						0
500	DRAINAGE					
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0			
	DRAINAGE SYSTEM (OPEN)	MILE	0.00			
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0			
	PUMP STATION (NEW)	EACH	0			
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	0			
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	0			
TOTAL ITEM 500					0	
600	STRUCTURES					
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0			
	FLYOVER HOV RAMP	SQ.FT.	0			
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	0			
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0			
	RIVER CROSSING BRIDGE	SQ.FT.	0			
	PEDESTRIAN BRIDGE	SQ.FT.	0			
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0			
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0			
	BOX CULVERT	L.FT./CELL	0			
	SIGN STRUCTURES (CANTILEVER)	EACH	0			
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0			
	O&M CROSSING	EACH	0			
	MISCELLANEOUS ITEMS (SIGN BRIDGE NON-ITS)	L.SUM	0			
	TOTAL ITEM 600					0
	700	TRAFFIC ENGINEERING				
		SIGNING (FREEWAY)	MILE/DIR	0.00	\$ -	0
		SIGNING (CROSS STREET)	MILE	0.00	\$ -	0
		PAVEMENT MARKING	LANE-MILE	0	\$ -	0
		LIGHTING	L.SUM	0	\$ -	0
TRAFFIC SIGNAL		EACH	0	\$ -	0	
INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS		EACH	0	\$ -	0	
PULLBOXES (Material and Install)		EACH	125	\$ 4,000.00	500,000	
MISCELLANEOUS ITEMS (GRTI 4-way 2" Armored Duraline Conduit)		L.FT.	0	\$ 4.20	0	
MISCELLANEOUS ITEMS (ADOT 7-way 2" Armored Duraline Conduit)		L.FT.	128,778	\$ 4.20	540,870	
MISCELLANEOUS ITEMS (GRTI 100% Conduit Trench Installation)		L.FT.	0	\$ 7.80	0	
MISCELLANEOUS ITEMS (GRTI 50% Conduit Installation)		L.FT.	0	\$ 8.06	0	
MISCELLANEOUS ITEMS (ADOT 100% Conduit Trench Installation)		L.FT.	4,330	\$ 7.80	33,770	
MISCELLANEOUS ITEMS (ADOT 50% Conduit Installation)		L.FT.	124,448	\$ 8.06	1,003,050	
MISCELLANEOUS ITEMS (ADOT FMS FO and Hardware)		L.SUM	1	\$ -	0	
TOTAL ITEM 700						2,077,690
800		ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	0			
	UTILITY RELOCATION	L.SUM	0			
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	0			
TOTAL ITEM 800					0	
900	INCIDENTALS					
	RETAINING WALLS	SQ.FT.	0			
	SOUND WALLS	SQ.FT.	0			
	ROADWAY APPURTENANCES	MILE	0.00			
	ADA IMPROVEMENTS	EACH	0			
	TRANSIT APPURTENANCES	L.SUM	0			
	RAILROAD ACCOMMODATIONS	L.SUM	0			
	MISCELLANEOUS ITEMS	L.SUM	0			
TOTAL ITEM 900					0	
SUBTOTAL A (ITEM SUBTOTAL)					\$2,077,700	

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: SR 202L to SR 387
 SEGMENT: ADOT Fiber Optic Conduit Installation ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 25.00 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	
PW	PROJECT WIDE					
	TRAFFIC CONTROL (8% OF SUBTOTAL A)			8.0%	166,200	
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0	
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	20,800	
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	31,200	
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	20,800	
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	166,200	
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	415,500	
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)					\$2,898,400
	OTHER PROJ	OTHER PROJECT COSTS				
		DPS TRAFFIC CONTROL	HOUR	0	\$ 120.00	0
JOINT PROJECT AGREEMENT ITEMS					0	
TERO TRIBAL TAX (6% OF SUBTOTAL B)				6.0%	173,904	
CONTRACTOR INCENTIVES		L.SUM	0	\$ -	0	
ENVIRONMENTAL MITIGATION (GRTI 50%)		MILE	0	\$ 12,500.00	0	
ENVIRONMENTAL MITIGATION (ADOT 50%)		MILE	25	\$ 12,500.00	312,500	
PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)					\$3,384,804	
INFL	INFLATION AND BELOW THE LINE ITEMS					
	POST DESIGN SERVICES (1% OF SUBTOTAL B)			1.0%	29,000	
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL B)			5.0%	144,900	
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.0%	260,900	
	SUBTOTAL BASE YEAR CONSTRUCTION					3,819,604
INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	408,700		
CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)					\$4,228,304	
DES	PREDESIGN AND FINAL DESIGN					
	PREDESIGN/NEPA/PI SERVICES (0.50% OF CONSTRUCTION YEAR COST)			0.50%	16,900	
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	1,800	
	SUBTOTAL PREDESIGN					18,700
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			8.0%	270,800	
INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	29,000		
SUBTOTAL FINAL DESIGN					299,800	
TOTAL ESTIMATED DESIGN COST					\$318,500	
UTIL	UTILITY RELOCATION					
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				0	
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	0	
TOTAL ESTIMATED UTILITY COST					\$0	
R/W	RIGHT-OF-WAY					
	RIGHT-OF-WAY / EASEMENT	ACRE	0.00	\$ -	0	
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0	
ACQUISITION YEAR RIGHT-OF-WAY COSTS					\$0	
TOTAL ESTIMATED PROJECT COST					\$4,547,000	

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: SR 202L to SR 387
 SEGMENT: ADOT FMS Fiber Optic Backbone and Hardware Installation (No Conduit costs) ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 25.00 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	EARTHWORK				
	CLEARING & REMOVALS	L.SUM	0		
	ROADWAY EXCAVATION	CU.YD.	0		
	DRAINAGE EXCAVATION	CU.YD.	0		
	BORROW	CU.YD.	0		
	SUBGRADE TREATMENT	SQ.YD.	0		
	FURNISH WATER	MGAL	0		
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 200				0
300 & 400	BASE AND SURFACE TREATMENT				
	AGGREGATE BASE	SQ.YD.	0		
	CONCRETE PAVEMENT	SQ.YD.	0		
	ASPHALT PAVEMENT	SQ.YD.	0		
	ARAC SURFACE	SQ.YD.	0		
	MILLING & OVERLAY (1" AR-ACFC)	SQ.YD.	0		
	MISCELLANEOUS ITEMS (mill & replace 3" AC)	SQ.YD.	0		
	TOTAL ITEM 300 & 400				0
500	DRAINAGE				
	DRAINAGE SYSTEM (CLOSED)	L.SUM	0		
	DRAINAGE SYSTEM (OPEN)	MILE	0.00		
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	0		
	PUMP STATION (NEW)	EACH	0		
	PIPE CULVERTS (Remove & Replace or Jack & Bore)	L.FT.	0		
	MISCELLANEOUS ITEMS (Culvert end sections)	EACH	0		
	TOTAL ITEM 500				0
600	STRUCTURES				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.	0		
	FLYOVER HOV RAMP	SQ.FT.	0		
	OVERPASS TI BRIDGE (CONCRETE GIRDER)	SQ.FT.	0		
	OVERPASS TI BRIDGE (STEEL GIRDER)	SQ.FT.	0		
	RIVER CROSSING BRIDGE	SQ.FT.	0		
	PEDESTRIAN BRIDGE	SQ.FT.	0		
	BRIDGE WIDENING (STEEL GIRDER)	SQ.FT.	0		
	BRIDGE REHABILITATION (DECK REPLACEMENT)	SQ.FT.	0		
	BOX CULVERT	L.FT./CELL	0		
	SIGN STRUCTURES (CANTILEVER)	EACH	0		
	ITS SIGN BRIDGE AND DMS PANEL	EACH	0		
	O&M CROSSING	EACH	0		
	MISCELLANEOUS ITEMS (SIGN BRIDGE NON-ITS)	L.SUM	0		
	TOTAL ITEM 600				0
700	TRAFFIC ENGINEERING				
	SIGNING (FREEWAY)	MILE/DIR	0.00	\$ 35,000.00	0
	SIGNING (CROSS STREET)	MILE	0.00	\$ 65,000.00	0
	PAVEMENT MARKING	LANE-MILE	0	\$ 5,000.00	0
	LIGHTING	L.SUM	0	\$ -	0
	TRAFFIC SIGNAL	EACH	0	\$ 250,000.00	0
	INTELLIGENT TRANSP. SYSTEM (ITS) RELOCATIONS	EACH	0	\$ 50,000.00	0
	ITS PULLBOXES	EACH	0	\$ 4,000.00	0
	MISCELLANEOUS ITEMS (ITS Multiduct)	L.FT.	0	\$ 23.00	0
	MISCELLANEOUS ITEMS (FMS FO and Hardware)	L.SUM	1	\$ 6,450,000.00	6,450,000
	TOTAL ITEM 700				6,450,000
800	ROADSIDE DEVELOPMENT				
	LANDSCAPING AND TOPSOIL	SQ.YD.	0		
	UTILITY RELOCATION	L.SUM	0		
	MISCELLANEOUS ITEMS (SEEDING)	ACRE	0		
	TOTAL ITEM 800				0
900	INCIDENTALS				
	RETAINING WALLS	SQ.FT.	0		
	SOUND WALLS	SQ.FT.	0		
	ROADWAY APPURTENANCES	MILE	0.00		
	ADA IMPROVEMENTS	EACH	0		
	TRANSIT APPURTENANCES	L.SUM	0		
	RAILROAD ACCOMMODATIONS	L.SUM	0		
	MISCELLANEOUS ITEMS	L.SUM	0		
	TOTAL ITEM 900				0
	SUBTOTAL A (ITEM SUBTOTAL)				\$6,450,000

**ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY**

ROUTE: I-10 MARICOPA PROJECT DESCRIPTION: SR 202L to SR 387
 SEGMENT: ADOT FMS Fiber Optic Backbone and Hardware Installation (No Conduit costs) ESTIMATE LEVEL: 15% (FY23\$ Base)
 LENGTH: 25.00 miles ADOT PROJECT NO.: F0252 DATE: 6/2/23

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
PW	PROJECT WIDE				
	TRAFFIC CONTROL (8% OF SUBTOTAL A)			8.0%	516,000
	DUST PALLIATIVE (0% OF SUBTOTAL A)(INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	64,500
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	96,800
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	64,500
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	516,000
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	1,290,000
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				\$8,997,800
OTHER PROJ	OTHER PROJECT COSTS				
	DPS TRAFFIC CONTROL	HOUR	0	\$ 65.00	0
	JOINT PROJECT AGREEMENT ITEMS				0
	TERO TRIBAL TAX (6% OF SUBTOTAL B)			6.0%	539,868
	CONTRACTOR INCENTIVES	L.SUM	0	\$ -	0
	ENVIRONMENTAL MITIGATION	MILE	0.00	\$ 25,000.00	0
	PRESENT YEAR CONSTRUCTION BID COST (EXCLUDING UTILITIES & R/W)				120
	\$9,537,668				
INFL	INFLATION AND BELOW THE LINE ITEMS				
	POST DESIGN SERVICES (1% OF SUBTOTAL A)			1.0%	95,400
	CONSTRUCTION CONTINGENCIES (5% OF SUBTOTAL A)			5.0%	476,900
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL A)			9.0%	858,400
	SUBTOTAL BASE YEAR CONSTRUCTION				10,968,368
	INDIRECT COST ALLOCATION (10.7% OF SUBTOTAL B + OTHER PROJECT COSTS)			10.70%	1,173,600
	CONSTRUCTION YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				\$12,141,968
	POST DESIGN SERVICES (0% OF SUBTOTAL B)				\$0
DES	CONSTRUCTION CONTINGENCIES (0% OF SUBTOTAL B)				\$0
	CONSTRUCTION ENGINEERING (9% OF SUBTOTAL B)			9.00%	0
	INDIRECT COST ALLOCATION (10.7% OF ALL PREDESIGN COSTS)			10.70%	0
	SUBTOTAL PREDESIGN				10.7%
	FINAL DESIGN SERVICES (8% OF CONSTRUCTION YEAR COST)			8.0%	763,000
	INDIRECT COST ALLOCATION (10.7% OF ALL DESIGN COSTS)			10.70%	81,600
	SUBTOTAL FINAL DESIGN				844,600
	TOTAL ESTIMATED DESIGN COST				\$844,600
				10.70%	
UTIL	UTILITY RELOCATION				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				0
	INDIRECT COST ALLOCATION (10.7% OF ALL UTILITY COSTS)			10.70%	0
	TOTAL ESTIMATED UTILITY COST				\$0
R/W	RIGHT-OF-WAY				
	RIGHT-OF-WAY / EASEMENT	ACRE	0.00	\$ -	0
	INDIRECT COST ALLOCATION (10.7% OF ALL RIGHT-OF-WAY COSTS)			10.70%	0
	ACQUISITION YEAR RIGHT-OF-WAY COSTS				\$0
	TOTAL ESTIMATED PROJECT COST				\$12,987,000

Appendix C. Transport of Hazardous Materials Letter

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I-10 | LOOP 202 TO SR-387 WILD HORSE PASS CORRIDOR

September 18, 2020

Mr. David White
General Manager
Wild Horse Pass Development Authority
5350 N. 48th Street
Chandler, AZ 85226

Subject: I-10 Hazardous and Radioactive Waste Transport Restrictions over the Gila River Indian Community

During the scoping phase associated with the *I-10: State Route 202L to State Route 387 Environmental Assessment*, the Gila River Indian Community (the Community) requested that ADOT restrict hazardous materials¹ and radioactive waste² transport from I-10 across the Community. Since these are broad categories of materials, definitions from the U.S. Code of Federal Regulations are footnoted. Given the Community's concern regarding this topic, ADOT has considered the Community's request using the federal guidance and regulations pertaining to the transport of hazardous materials and radioactive waste as a foundation for responding to this request, while furthering ADOT's efforts to collaborate and partner with the Community to identify a vision for improvements on I-10 and how it interacts with the Community. ADOT identified two potential candidate routes, one to the east and another to the west of the I-10 corridor, and evaluated them through the route criteria identified in the federal guidance.

A related comment was also received from the Community related to what ADOT does to contain accidental hazardous material spills that might occur along I-10. Currently, the ADOT Hazardous Material Response team has procedures to quickly contain, absorb and clean up a potential spill anywhere along I-10. For spills that might occur within the Community limits, ADOT's incident response team also coordinates with the Gila River Indian Community Department of Environmental Quality prior to any disturbance or removal of vegetation.

Background

According to the U.S. Department of Transportation, hazardous materials are substances that pose an unreasonable threat to the public and the environment (e.g., explosives, flammable liquids, compressed gasses, etc.). Truck drivers transporting hazardous materials (as classified by law) are required to display a placard on the truck indicating how dangerous the load is.

¹ As defined in 49 CFR 173.403, a hazardous material is a substance or material, including a hazardous substance, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, or property when transported in commerce, and which has been so designated.

² As defined in 49 CFR 173.403, radioactive material means any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values of the table in 49 CFR 173.436 or values derived according to the instructions in 49 CFR 173.433.

U.S. Code 49 – Transportation, Chapter 51 – Transportation of Hazardous Material provides statutory requirements for the transport of hazardous materials and radioactive waste. The purpose of Chapter 51 is to protect against the risks to life, property, and the environment that are inherent in the transportation of hazardous material in intrastate, interstate, and foreign commerce.

Section 5112, *Highway routing of hazardous material*, prescribes by regulation, standards for states and Tribal governments to use in transporting hazardous material in commerce. These standards ensure that a highway routing designation, limitation, or requirement of a state or Tribal Nation shall enhance public safety, while ensuring the through highway routing for the transportation of hazardous material between adjacent areas, and that the designation does not result in an unreasonable burden on commerce. (49 USC Ch. 51: Transportation of Hazardous Material).

I-10 is one of only three coast-to-coast interstates in the country; it connects Tucson with Phoenix and Los Angeles to the west and El Paso and Houston to the east. At nearly 2,500 miles, I-10 stretches between Jacksonville, Florida, and Santa Monica, California, carrying coast-to-coast passenger and truck traffic across the southern United States. According to the Arizona State Freight Plan³, the I-10 corridor is Arizona's major freight corridor, and is dominated by traffic flows generated by manufacturing, consumer goods, and transportation and logistics sectors, highlighting the importance of trade with California for these sectors.

The Phoenix to Tucson "megapolitan area" – a term describing two or more metropolitan areas connected by transportation, business and culture – has been dubbed the Arizona Sun Corridor. This corridor is one of 10 U.S. markets expected to see most of the nation's growth in the next 35 years. The I-10 corridor provides the connection through the Sun Corridor, from Phoenix to Nogales, Mexico (by way of Interstate 19).

Arizona's Sun Corridor megaregion begins at the United States-Mexico border and stretches north, encompassing portions of five counties. This region is home to approximately eight out of every 10 Arizonans and includes one of the busiest freight border crossings between the United States and Mexico. According to the information from the Federal Highway Administration's (FHWA) Freight Management and Operations web page⁴, the region's population is expected to increase dramatically in the coming years, with experts forecasting a more than 100 percent population growth between 2010 and 2050.

I-10 provides the most direct connection between Arizona's largest cities (Phoenix and Tucson). In addition to its role as a through-route, I-10 ties together major freight clusters throughout the state, the greatest concentration of which are located along the I-10 corridor in Phoenix and Tucson, including freight activity clusters located at Tolleson, Sky Harbor Airport, Chandler, and the Port of Tucson. As such, I-10 is a component of an integrated network of services, business and industrial parks, and associated businesses purposely planned and built in close proximity to the interstate.

As a result, all materials routed along I-10 include materials destined for locations throughout the urbanized area. Regardless of the routing, alternate through-routes must still consider the freight traffic destined to and/or from the Phoenix metropolitan area.

³ ADOT. Arizona State Freight Plan (2017).

⁴ <https://ops.fhwa.dot.gov/publications/fhwahop17033/index.htm>

Federal Guidance

When evaluating alternative freight routes for hazardous and radioactive waste, federal law⁵ requires that a state or Tribal Nation shall consider a number of specific factors.

The primary analysis criteria are risk and trip efficiency. Risk is typically defined as the likelihood of an accident multiplied by the expected consequence, where population is used as the proxy measure for expected consequence. Trip efficiency is measured as the deviation in trip distance or travel time relative to the minimum distance or travel time path. A variety of other criteria, including proximity to emergency response, type of hazardous material, and certain roadway and traffic conditions are considered to be of moderate importance; and *subjective criteria* include hazardous material spill damage potential, the number of potential evacuees, and exposure to environmentally sensitive areas are considered as well.

In considering this information, several alternate routes to I-10 through the Community were evaluated. The evaluation followed guidance outlined in the *Hazardous Materials Highway Routing Route Plan Guidance Report to Congress (2009)*, herein referred to as the Guidance Report, which describes a GIS-based approach to characterizing routes. Alternate routes for I-10 are shown in **Exhibit 1**. Alternative A follows the I-10 corridor through the Community, Alternative B follows Interstate 8 and State Route (SR) 85 to connect to I-10 in the West Valley of the Phoenix metro area, and Alternative C follows SR 87, SR 287, SR 79, US 60, I-10, and I-17. Exhibit 1 also highlights population centers and freight land use clusters for the evaluation.

It is important to note that materials destined for the Phoenix metropolitan area along the alternate routes (including the freight activity clusters of Tolleson, Sky Harbor Airport, and Chandler noted previously) would have to either travel a significantly longer, less reliable route (including roadway segments that are not fully access-controlled, or in proximity to emergency services and other factors noted in the guidance discussed below).

⁵ U.S. Code, Title 49. Transportation, Subtitle III. General and Intermodal Programs, Chapter 51. Transportation of Hazardous Material.

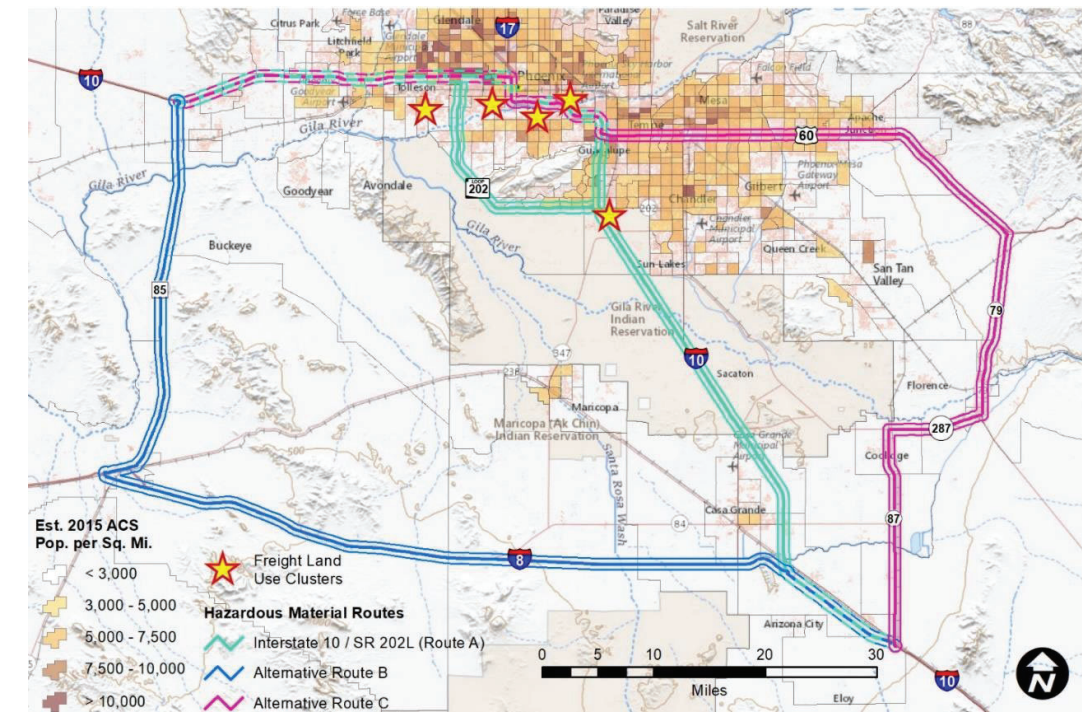


Exhibit 1

Population density

The density threshold outlined in the Guidance Report, provides information relative to recommendations for restrictions. This guidance suggests that areas of urban densities (defined as a population density of 3,000 people per square mile within a half-mile of the roadway). Exhibit 1 shows the population densities for I-10 (and alternative routes) through the Phoenix metropolitan area. It is worth noting that the population densities within a half-mile of I-10 for the Community are lower than the urban densities 3,000 people per square mile threshold.

Trip length

For this evaluation, trip length is evaluated from two perspectives; non-stop trips through the Phoenix metro area and trips with origins/destinations/way-stops in the Phoenix metro area. Due to the proprietary nature of business freight data, reliable data is not available to define what this mix of traffic is between the two trip types. However, based on the size of the Phoenix area market, the large amount of freight generating land uses in the Phoenix area, and the number of freight industry support services (truck stops, service facilities, etc.) within the Phoenix metro area, it is reasonable to assume that the majority of freight trips between Phoenix and Tucson will have either have an origin, a destination, or a way stop in the Phoenix metro area. By extrapolation, it can be also assumed then that the majority of hazardous or radioactive material trips would also have origins, destinations, or way stops in the Phoenix metro area. Therefore, a greater emphasis is put on the trip length analysis for the Phoenix area origin/destination/way-stop trips below.

Following the security criteria methodology described in the Guidance Report, each of the scenarios ('non-stop through trips' and 'Phoenix area origination/destination/way-stop trips') were evaluated for the alternative routes.

The first criterion considers the ratio of the distance traveled through urban zones for the most direct Route (A) divided by the distance through urban zones for the proposed alternative route (B). The proposed alternative route is further considered if: $A / B > 1.5$.

The results of this evaluation criteria are shown in Table 1.

Table 1. Identification of Selected Candidate Routes Based on Security Criteria

Route	Overall Length (mi.)	Distance through urban zones ^a (mi.)	A/B ^b	A/B > 1.5? ^c
Non-stop Through-routing (trips bypassing Phoenix area)				
Alternative A I-10 and I-17	98.4	34.7	N/A	N/A
Alternative B I-8 and SR 85	112.2	~1.0 ^d	~34.7	YES ^e
Alternative C SR 87/287/79 US 60, I-10, I-17	133.7	39.4	0.88	NO
Downtown-routing (trips origin/destination/way-stops in Phoenix area)				
Alternative A I-10 and I-17	68.1	14.9	N/A	N/A
Alternative B I-8, SR 85, I-10	141.9	19.5	0.77	NO
Alternative C SR 87/287/79 US 60, I-10, I-17	96.8	40.6	0.37	NO

Source: *Hazardous Materials Highway Routing Route Plan Guidance Report to Congress (2009)*.

Notes:

- a. Urban zones are defined as a population density of 3,000 people per square mile within a half-mile of the roadway (this analysis considered U.S. Census Tracts).
- b. The ratio of the distance traveled through urban zones for the most direct route (A), divided by the distance through urban zones for the proposed alternative route, B.
- c. According to the Guidance the proposed alternative route is given consideration if $A/B > 1.5$.
- d. Actual distance through urban zones is zero; however, a nominal value was assigned to avoid the division by zero.
- e. Alternative B travels through mostly unpopulated areas and therefore offers advantages for non-stop through-routing trips based on security considerations.

Non-stop Through trips: For I-10 trips that pass through the Phoenix metro area without any stops, potential alternative routes were found to have greater distances than the current I-10 route A (14 and 36 percent, respectively for Alternative Routes B and C). While the longer Alternative B impacts only minimal urban density populations, Alternative C covers 13 percent more distance through urban densities than the current I-10 route. Consequently, Alternative C does not meet the Guidance Report security criteria for consideration as an alternate route for through trips. Alternative B, by contrast, does satisfy the A/B requirement for non-stop through trips and thus does require additional consideration based on this specific measure, despite its longer length.

Phoenix area origin/destination/way-stop trips: When considering hazardous materials that have origins, destinations or way stops within the Phoenix metropolitan area, Alternative Route B would create out-of-direction travel to the metropolitan area. Alternative Route C would not require out-of-direction travel, but would still add more length to the trip. Using central Phoenix as an assumed stop⁶, Alternative Route B would increase the trip length by 75 percent, whereas Alternative Route C would increase the trip by 29 percent. These added trip lengths would both increasingly impact

⁶ For the purpose of this memo, the I-10 and I-17 interchange (colloquially referred to as the "Stack Interchange") is used to calculate distance to the freight activity clusters (which are noted as Tolleson, Sky Harbor Airport, and Chandler).

populations of urban densities (13 and 74 percent, respectively for Alternative Routes B and C) and would increase hazardous material shipments on undivided highways or highways without access control compared to the existing route of I-10 that does meet those guidelines. Neither of the alternate Phoenix area origin/destination/way-stop trips evaluated meet the Guidance Report security criteria for consideration as an alternate route.

Other factors considered

- The Guidance Report to Congress recommends that preferred routes for local hazardous material shipments occur on divided, limited-access highways traversing the urban area; as is the case with I-10. Both Alternative Routes B and C would rely on undivided highways or highways without access control.
- I-10 is in proximity to emergency response facilities, and their capabilities to contain and suppress hazardous material releases within the impact zones, should an incident occur. Access to emergency services on Alternative Routes B and C would be less frequent with response times being longer.
- Regardless of the route chosen, all materials will have to cross the Gila River, either upstream (Alternative Route C) or downstream (Alternative Route B) of the existing I-10 crossing.
- Should transport restrictions be placed on I-10, hazardous or radioactive material deliveries to sites within the Community itself such as gasoline, propane, and industrial materials and waste would have to use other state, county, or Community roadways to serve gas stations, vehicle repair facilities, industrial complexes, medical facilities, etc.

Conclusion

ADOT has considered the Community's request using the federal guidance and regulations pertaining to the transport of hazardous materials and radioactive waste. The summary of this analysis is as follows:

- As noted in Exhibit 1, I-10 is the most direct route through the Sun Corridor region connecting major activity centers in California, Texas, Mexico, and Nevada for both non-stop pass-through trips as well as for trips with stops in the Phoenix area. The federal standards note that deviations from the most direct route shall be minimized. Effects on commerce are a consideration, and the federal standards specifically noted that, "Any NRHM [non-radioactive hazardous material] routing designation made in accordance with this subpart shall not create an **unreasonable burden upon interstate or intrastate commerce.**" The added trip lengths are meaningful, and in some cases, significant. As a result, limiting hazardous materials from I-10 without considering these factors would seem an unreasonable burden, especially on intrastate commerce which relies on the access controlled I-10 to connect Arizona's Sun Corridor with other major activity centers surrounding Arizona.
- Alternate routes to I-10 would result in uncalculated delays due to increased accidents as a result of the increased travel distance. Further, transportation infrastructure redundancy is limited throughout the region. Although the routes B and C offer potential considerations for

re-routing they would require longer travel distances and lack the full access-controlled standards as compared to the existing I-10 corridor

- Alternate routes to I-10 would generally expose larger populations to increase risk due to the longer trip lengths, the length of the trips through populated areas, lower proximity to emergency services, and the lower class of roadways these longer trips need to utilize. The exception to this is Alternative B for non-stop through trips, but given the non-stop through trips represent a fraction of the total trips, the overall added length of this alternative and the undue burden this added length puts on interstate commerce, and the lack of emergency response services along this alternative, Alternative B does not seem to be an attractive option when all factors are considered.
- Limiting hazardous materials from I-10 would limit the ability to safely and efficiently transport hazardous materials originating or destined for locations within the Gila River Indian Community itself.

Based on the alternate routes analysis and additional factors noted, ADOT does not recommend a change to the current policy of allowing hazardous material and radioactive waste to travel on I-10. ADOT would like to continue to coordinate with the Community on this topic and adhere to the stringent safety regulations by which these materials are transported across Arizona and nationally. ADOT values the partnership with the Community and is available to coordinate any questions or comments that the Community may have on this document.

Lastly, ADOT has initiated an I-10 incident management working group to plan and coordinate traffic management when incidents on I-10 require restrictions or closures within or near the Community boundaries. This working group includes the Gila River Indian Community Police, Fire, Emergency Services, and Transportation departments; as well as ADOT Incident Response, the Department of Public Safety (DPS), and Maricopa Association of Governments (MAG). A working group meeting was held on June 25, 2020 and quarterly meetings have been scheduled. Hazardous material transport is a topic the working group can incorporate to identify potential strategies, as that working group deems most applicable. Thank you for your partnership throughout this study process and we look forward to coordinating on this effort.

Sincerely,



Carlos Lopez, PE
Project Manager
Arizona Department of Transportation, Multimodal Planning Division

Attachment: Reference documents

[REFERENCE DOCUMENTS]

FHWA. 1996. *Highway Routing of Hazardous Materials Guidelines for Applying Criteria*. Publication No. FHWA-HI-97-003 (November 1996).

This document is a revision of the July 1985 U.S Department of Transportation (DOT) publication entitled *Guidelines for Applying Criteria to Designate Routes for Transporting Hazardous Materials (DOT/RSPA/OHMT-89-02)*, and reflects the new regulations regarding highway routing of non-radioactive hazardous materials (NRHM) (49 CFR Part 397).

ADOT. 2010. *Hazardous Materials Transportation in Arizona, Final Report 624*. HDR Engineering, for ADOT.

This report summarizes data, and provides references to other researched material and provide a set of viable recommendations for the preparation of a hazardous materials transportation plan (HMTP) for ADOT.

ADOT. 2010. *Hazardous Materials Transportation in Arizona, Final Report 624*. HDR Engineering, for ADOT.

This report summarizes data, and provides references to other researched material and provide a set of viable recommendations for the preparation of a hazardous materials transportation plan (HMTP) for ADOT.



I-10 | LOOP 202 TO SR-387 WILD HORSE PASS CORRIDOR

July 7, 2021

Mr. David White
General Manager
Wild Horse Pass Development Authority
5350 N. 48th Street
Chandler, AZ 85226

Subject: Resubmittal of Letter Report Regarding I-10 Hazardous and Radioactive Waste Transport Restrictions over the Gila River Indian Community

In September 2020, ADOT submitted a letter report to the Community responding to the Community's concerns expressed as part of the scoping process for the I-10 Wild Horse Pass Corridor Study regarding the transport of hazardous and radioactive materials across the portion of I-10 located on Community Lands (Letter Report). While ADOT received feedback via email from the Community on January 7, 2021 that the Community had no comments on the Letter Report, a subsequent request by the Community was made to add a cover letter summarizing the Letter Report and resubmitting it for review. Because this is a documented Community concern, ADOT is responding to this request by submitting this cover letter for your review. ADOT is requesting that the Community provide written feedback to ADOT on this latest letter.

The Letter Report provided ADOT's analysis of the Community's request to restrict hazardous and radioactive material transport across the portion of I-10 located on Community lands. ADOT utilized federal guidance and regulations as the basis to conduct the analysis. This effort included an alternate route analysis that considered routes to the east and west of the Community along with analysis criteria that considered population densities and trip length. Based on the alternate route analysis and factors noted, ADOT does not recommend a change to the current policy of allowing hazardous material and radioactive waste to travel on I-10.

The detailed justification for this recommendation is noted in the attached Letter Report, but is summarized as follows:

- Federal standards note that deviation from the most direct route to major activity centers shall be minimized and not create an unreasonable burden upon interstate or intrastate commerce. Limiting hazardous materials on I-10 would constitute an unreasonable burden, especially on intrastate commerce, which relies on the access controlled I-10 to connect Arizona's Sun Corridor with other major activity centers surrounding Arizona.
- Alternate routes to I-10 would result in additional delays due to the increased travel distances, the limited use of fully access-controlled freeways, and the increase in accidents that would result due to the increased travel distances and the use of non-access controlled roadways on those alternate routes.

- Alternate routes to I-10 would generally increase safety risks due to the longer trip lengths, the length of the trips through populated areas, lower proximity to emergency services, and the lower class of roadways these longer trips need to utilize.
- Limiting hazardous materials from I-10 would limit the ability to safely and efficiently transport hazardous materials originating or destined for locations within the Gila River Indian Community itself (including deliveries of liquid and gas fuels, fireworks, pesticides, medical waste, paint, etc.), forcing these deliveries to local Community roads and other state highways across the Community.

ADOT is committed to adhering to the federal safety regulations by which these materials are transported across Arizona and nationally. ADOT also understands the Community's concerns on this topic. ADOT has initiated an I-10 incident management working group to plan and coordinate traffic management when incidents on I-10 require restrictions or closures within or near the Community boundaries. This working group includes the Gila River Indian Community Police, Fire, Emergency Services, and Transportation departments; as well as ADOT Incident Response, the Department of Public Safety (DPS), and Maricopa Association of Governments (MAG). Hazardous material transport is a topic the working group can incorporate to identify potential strategies, as that working group deems most applicable.

ADOT would invite a continued dialogue on this issue if the Community has further concerns. ADOT values the partnership with the Community and is available to coordinate any questions or comments that the Community may have on this topic.

Thank you for your partnership throughout this study process and we look forward to the Community's feedback on this issue.

Sincerely,

Carlos Lopez, PE
Project Manager
Arizona Department of Transportation, Multimodal Planning
Division

Attachment: September 18, 2020 Hazardous Material Transport Letter

Bombardier, Brian

From: Carlos Lopez <clopez@azdot.gov>
Sent: Wednesday, August 11, 2021 11:53 AM
To: Bombardier, Brian; solmsted@azdot.gov
Cc: Herlihy, Matthew; Quinn Castro
Subject: Fwd: FW: LT_F0252_I-10_SR 202L to 387_Cover Letter Haz Mat Transport_2021 07 07 (LM edits)
Attachments: LT_F0252_I-10_SR 202L to 387_Cover Letter Haz Mat Transport_2021 07 07 (LM edits).docx

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

FYI - for the I-10 project record. No further comments from the Community on the Hazmat transport memo.

Thanks,

----- Forwarded message -----

From: David White <dwhite@wildhorsepass.com>
Date: Wed, Aug 11, 2021 at 11:40 AM
Subject: FW: LT_F0252_I-10_SR 202L to 387_Cover Letter Haz Mat Transport_2021 07 07 (LM edits)
To: Carlos Lopez <clopez@azdot.gov>
Cc: Ian A. Shavitz <lshavitz@lippes.com>, Javier Ramos <Javier.Ramos@gric.nsn.us>

Hi Carlos,

I discussed this with both Ian and Javier today. And, while we have provided revisions to the letter (see email below), we have no comments on the revised letter as before. Please let me know if you have any questions.

Thanks,

Dave White

From: Ian A. Shavitz <lshavitz@lippes.com>
Sent: Monday, July 19, 2021 12:02 PM
To: Carlos Lopez <clopez@azdot.gov>
Cc: Quinn Castro <QCastro@azmag.gov>; David White <dwhite@wildhorsepass.com>; Javier Ramos <Javier.Ramos@gric.nsn.us>; Steven Johnson <Steven.Johnson@gric.nsn.us>
Subject: LT_F0252_I-10_SR 202L to 387_Cover Letter Haz Mat Transport_2021 07 07 (LM edits)

Carlos,

As discussed, please see our proposed revisions to the Hazardous Materials cover letter. If you have any questions, please let me know. Otherwise, please finalize and send to the Community along with the Haz Mat memo.

Best,

Ian

Ian A. Shavitz
Partner



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--

Carlos D. Lopez, PE

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Multimodal Planning Division

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Appendix D. Americans with Disabilities Act Report

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010 MA 161 F0252 01L & 02L
010-C (222)S
SR 202L Santan to SR 387
I-10

ADA COMPLIANCE AND FEASIBILITY REPORT

January 6, 2020

PREPARED BY
HDR ENGINEERING INC

PREPARED FOR

Infrastructure Delivery and Operations



010 MA 161 F0252 01L & 02L

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INTRODUCTION

Project No. F0252 01L & 02L [Federal Project 010-C(222)S] I-10 – GRIC Study, is a study that looks at widening the I-10 to three lanes in both directions, starting at SR 202L and continuing until SR 387. The study is also looking at improving and/or replacing the current infrastructure. It is located on I-10 in Pinal County, in the Gila River Indian Reservation. The proposed project limits begin at milepost (MP) 161.20, and end at MP 187.00. The approximate length of the project is 26 miles.

The ADOT Feature Inventory System (FIS) Database identified 24 ADA features within the project limits. There are an additional 10 ADA features within the project limits that are not in the ADOT FIS Database. Of all of these features, 22 are not in compliance with current ADA standards. Table 1: List of Total ADA Features provides a summary of all compliant and non-compliant ADA features within the project limits. Table 1 also provides a separate summary of the ADA features not currently in the ADOT FIS Database. A more detailed summary of the different ADA feature types can be found in Table 2: Summary of All Proposed Action Items.

All the ADA features impacted by the project will be reconstructed to comply with ADA standards and should be inspected post construction to ensure that they do in fact meet ADA standards.

Table 1: List of Total ADA Features

Feature Type	Compliant	Non-Compliant	Total in FIS	Not in FIS	No Longer Existent	Existing ADA Total	Total Proposed Improvements	Constructed Improvements
Sidewalk	3	1	4	-	-	4	1	
Curb Ramps (& Curb Ramp Needs)	-	8	8	-	-	8	8	
Driveways	-	-	-	-	-	-	-	
Accessible Pedestrian Signals (APS)	-	10	9	1	-	10	10	
Railing	-	-	-	-	-	-	-	
Pedestrian Island Crossings	-	3	3	-	-	3	3	
Pedestrian Overpass/Underpass	-	-	-	-	-	-	-	
Obstructions	-	-	-	-	-	-	-	
Crosswalks	9	-	-	9	-	9	-	
Total	12	22	24	10	0	34	22	0

Table 2: Summary All Proposed Action Items

	Total Action Items	Total Proposed Improvements	Total Improvements
Proposed Action Item- Sidewalk			
Reconstruct Sidewalk Curb with this Project	1	1	1
To Remain, No Action	3	0	0
Sidewalk Subtotal:			1
Proposed Action Item- Curb Ramps			
Reconstruct curb ramp with this Project	8	8	8
To Remain, No Action	0	0	0
Curb Ramp Subtotal:			8
Proposed Action Item –Driveways			
No Driveways exist within Project Limits	0	0	0
Driveway Subtotal:			0
Proposed Action Item-Accessible Pedestrian Signals (APS)			
Relocate APS	10	10	10
To Remain, No Action	0	0	0
Accessible Pedestrian Signal Subtotal:			10
Proposed Action Item-Railing			
No Railing exists within Project Limits	0	0	0
Railing Subtotal:			0
Proposed Action Item-Pedestrian Island Crossings			
Add Truncated Domes	3	3	3
Pedestrian Island Crossing Subtotal:			3
Proposed Action Item-Pedestrian Overpass/Underpass Crossing			
No Pedestrian Overpass/Underpass Crossings exist within Project Limits	0	0	0
Pedestrian Overpass/Underpass Crossing Subtotal:			0

Table 2: Summary All Proposed Action Items

	Total Action Items	Total Proposed Improvements	Total Improvements
Proposed Action Item-Obstructions & Needs			
No Obstructions & Needs exist within Project Limits	0	0	0
Obstructions & Needs Subtotal:			0
Proposed Action Item-Crosswalks			
To Remain, No Action	9	0	0
Crosswalk Subtotal:			0
Proposed Action Item- Pedestrian Furniture & Bus Stops			
No Pedestrian Furniture & Bus Stops exist within Project Limits	0	0	0
Pedestrian Furniture & Bus Stops Subtotal:			0
Total	34	22	22

1. SIDEWALK

Field survey found a total of 4 sidewalk locations totaling 98 feet of sidewalk throughout the project limits. There is 1 location with a non-compliant sidewalk totaling 30 feet. The remaining 3 locations include 68 feet of ADA compliant sidewalk. All 4 locations are listed in the ADOT FIS Database.

Table 3: Summary of Proposed Sidewalk Action Items summarizes the recommended action items for each of the sidewalk locations. More details about each specific sidewalk location can be found in Table 4: ADA Non-Compliant Sidewalk, which lists only the non-compliant sidewalk locations, and Table 5: ADA Compliant Sidewalk, which lists only the compliant sidewalk locations.

Table 3: Summary of Proposed Sidewalk Action Items

Proposed Action Item- Sidewalk	Total
Reconstruct Sidewalk Curb with this Project	1
To Remain, No Action	3
Total	4

Table 4: ADA Non-Compliant Sidewalk

Asset ID	Location	Beginning MP	Approx. Length (Ft)	Reason for Non-Compliance		Proposed Action	Final Design	Constructed
				From F0252 01L & 02L FIS Report	From Field Survey			
1028011	Sta 18+28.79, 46.0' Rt.	162.462	30	In FIS Database	Broken Concrete on Curb	Reconstruct curb on the sidewalk with this project	New ADA compliant curb will be installed	
			Total:	30'				

Table 5: ADA Compliant Sidewalk

Asset ID	Location	Beginning MP	Approx. Length (Ft)	Reason for Non-Compliance		Proposed Action	Final Design	Constructed
				From H7383 01D FIS Report	From Field Survey			
1028013	Sta 21+70.88, 46.0' Rt.	162.459	12	In FIS Database	Compliant	To Remain, No Action	ADA compliant sidewalk will remain	
1028015	Sta 21+63.56, 46.0' Lt.	162.475	24	In FIS Database	Compliant	To Remain, No Action	ADA compliant sidewalk will remain	
1028017	Sta 18+28.39, 46.0' Lt.	162.479	32	In FIS Database	Compliant	To Remain, No Action	ADA compliant sidewalk will remain	
Total:			68'					

2. CURB RAMPS

Field survey found a total of 8 curb ramp locations throughout the project limits. All 8 of the curb ramp locations do not meet current ADA standards. All of these 8 locations are listed in the ADOT FIS Database.

Table 6: Summary of Proposed Curb Ramp Action Items summarizes the recommended action for each of the curb ramp locations. Detailed survey will be necessary at all locations where a new curb ramp is required. More details about each specific curb ramp location can be found in Table 7: ADA Non-Compliant Curb Ramps, which lists only the non-compliant curb ramp locations.

Table 6: Summary of Proposed Curb Ramp Action Items

Proposed Action Item- Curb Ramps	Total
Reconstruct Curb Ramp with this Project	8
To Remain, No Action	0
Total	8

Table 7: ADA Non-Compliant Curb Ramps

Asset ID	Location	Beginning MP	Reason for Non-Compliance		Proposed Action	Final Design	Constructed
			From F0252 01L & 02L FIS Report	From Field Survey			
1383462	61.52' Lt WHP Sta 22+30.23	162.48	In FIS Database	No Detectable Warnings, Running Slope is >8%, Cross Slope is >2%	Reconstruct curb, gutter, and curb ramp with this Project	New ADA curb ramp will be installed	
1383464	20.6' Lt Ramp D Sta 0+65.18	162.48	In FIS Database	No Detectable Warnings, Running Slope is >8%, Cross Slope is >2%	Reconstruct curb, gutter, and curb ramp with this Project	New ADA curb ramp will be installed	
1383466	14' Rt Ramp C Sta 0+63.21	162.48	In FIS Database	No Detectable Warnings, Running Slope is >8%, Cross Slope is >2%	Reconstruct curb, gutter, and curb ramp with this Project	New ADA curb ramp will be installed	
1383469	66.39' Lt Sundust Sta 17+51.76	162.48	In FIS Database	No Detectable Warnings, Running Slope is >8%, Cross Slope is >2%	Reconstruct curb, gutter, and curb ramp with this Project	New ADA compliant curb ramp will be installed	
1383472	75.35' Rt Sundust Sta 17+64.67	162.46	In FIS Database	No Detectable Warnings, Running Slope is >8%, Cross Slope is >2%, Gravel on Ramp	Reconstruct curb, gutter, and curb ramp with this Project	New ADA compliant curb ramp will be installed	
1383474	18.30' Rt Ramp A Sta 19+84.04	162.46	In FIS Database	No Detectable Warnings, Running Slope > 8%, Cross Slope >2%	Reconstruct curb, gutter, and curb ramp with this Project	New ADA compliant curb ramp will be installed	
1383476	14.26' Lt Ramp B Sta 20+09.3	162.45	In FIS Database	No Detectable Warnings, Running Slope > 8%, Cross Slope >2%, Gravel on Ramp	Reconstruct curb, gutter, and curb ramp with this Project	New ADA compliant curb ramp will be installed	

Table 7: ADA Non-Compliant Curb Ramps

Asset ID	Location	Beginning MP	Reason for Non-Compliance		Proposed Action	Final Design	Constructed
			From F0252 01L & 02L FIS Report	From Field Survey			
1383479	85' Rt WHP Sta 22+54.17	162.45	In FIS Database	Cross Slope >2%, No Detectable Warnings	Reconstruct curb, gutter, and curb ramp with this Project	New ADA compliant curb ramp will be installed	
Total:	8						

3. DRIVEWAYS

There are no driveways within the project limits.

4. ACCESSIBLE PEDESTRIAN SIGNALS (APS)

Field survey found a total of 10 APS locations throughout the project limits. All of the APS locations do not meet current ADA standards. Of these 10 locations, 9 are listed in the ADOT FIS Database.

Table 8: Summary of Proposed Accessible Pedestrian Signal Action Items summarizes the recommended action for each of their locations. More details about each specific APS location can be found in Table 9: ADA Non-Compliant Accessible Pedestrian Signals, which lists only the non-compliant locations.

Table 8: Summary of Proposed Accessible Pedestrian Signal Action Items

Proposed Action Item- APS	Total
Relocate APS	10
To Remain, No Action	0
Total	10

Table 9: ADA Non-Compliant Accessible Pedestrian Signal Action Items

Asset ID	Location	Beginning MP	Number of Buttons	Reason for Non-Compliance	Proposed Action	Final Design	Constructed
1383463	Sta 22+34.5, 67.5' Lt.	162.48	2	Edge of Access Rte >10"	Relocate APS during the reconstruction of Curb Ramp #1383462	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	
1383465	Sta 21+71, 62' Lt.	162.48	1	Edge of Access Rte >10"	Relocate APS during the reconstruction of Curb Ramp #1383464	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	
1383467	Sta 18+21.5, 63' Lt.	162.48	1	Edge of Access Rte >10"	Relocate APS during the reconstruction of Curb Ramp #1383466	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	
1383468	Sta 17+46, 71.5' Lt.	162.49	2	Edge of Access Rte >10"	Relocate APS during the reconstruction of Curb Ramp #1383469	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	

Table 9: ADA Non-Compliant Accessible Pedestrian Signal Action Items

Asset ID	Location	Beginning MP	Number of Buttons	Reason for Non-Compliance	Proposed Action	Final Design	Constructed
1383471	Sta 17+61.5, 7' Rt.	162.47	1	Edge of Access Rte >10"	Relocate APS during the reconstruction of Pedestrian Island Crossing #1383470	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	
1383473	Sta 17+60, 81' Lt.	162.46	2	Edge of Access Rte >10"	Relocate APS during the reconstruction of Curb Ramp #1383472	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	
1383475	Sta 18+21.5, 61' Rt.	162.46	1	Edge of Access Rte >10"	Relocate APS during the reconstruction of Curb Ramp #1383474	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	
1383478	Sta 22+23, 52' Rt.	162.46	2	Edge of Access Rte >10"	Relocate APS during the reconstruction of Pedestrian Island Crossing #1383477	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	

Table 9: ADA Non-Compliant Accessible Pedestrian Signal Action Items

Asset ID	Location	Beginning MP	Number of Buttons	Reason for Non-Compliance	Proposed Action	Final Design	Constructed
1383481	Sta 22+25, 11' Rt.	162.46	1	Edge of Access Rte >10"	Relocate APS during the reconstruction of Pedestrian Island Crossing #1383480	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	
APS1383479	Sta 21+78, 59' Rt.	162.46	1	Edge of Access Rte >10"	Relocate APS during the reconstruction of Curb Ramp #1383479	The APS pole will need to be relocated or the new curb ramp/ island will need to be adjusted around the current APS pole.	
Total:	10						

5. RAILING

There are no railings within the project limits.

6. PEDESTRIAN ISLAND CROSSING

Field survey found a total of 3 pedestrian island locations throughout the project limits. All of the pedestrian island locations do not meet current ADA standards. All 3 can be found in the ADOT FIS database.

Table 10: Summary of Proposed Pedestrian Island Crossing Action Items summarizes the recommended action for each of the pedestrian island locations. More details about each specific pedestrian island location can be found in Table 11: ADA Non-Compliant Pedestrian Island Crossings, which lists the non-compliant pedestrian island crossing locations.

Table 10: Summary of Proposed Pedestrian Island Crossing Action Items

Proposed Action Item- Pedestrian Island Crossing	Total
Add Truncated Domes	3
To Remain, No Action	0
Total	3

Table 11: ADA Non-Compliant Pedestrian Island Crossings

Asset ID	Location	Beginning MP	Reason for Non-Compliance		Proposed Action	Final Design	Constructed
			From F0252 01L & 02L FIS Report	From Field Survey			
1376870	Sta 17+63.54, 19.09' Lt.	162.47	Incorrect Drainage – Ponding	Gravel on island crossing, No Detectable Warnings, Broken Curb	Reconstruct the pedestrian island crossing	New ADA compliant pedestrian island crossing will be installed	
1383477	Sta 20+00, 36.1' Rt.	162.46		No Detectable Warnings	Add Truncated Domes	ADA truncated domes will be installed	
1383480	Sta 22+30.3, 19.24' Rt.	162.46		No Detectable Warnings	Add Truncated Domes	ADA truncated domes will be installed	
Total:	3						

7. PEDESTRIAN OVERPASS/UNDERPASS CROSSING

There are no Pedestrian Overpass/Underpass Crossings within the project limits.

8. OBSTRUCTIONS & ADA FEATURES NEEDED

There are no obstructions and ADA features within the project limits.

9. CROSSWALKS

Field survey found a total of 9 crosswalk locations throughout the project limits. All of the crosswalk locations meet current ADA standards. All 9 are not found in the ADOT FIS database.

Table 12: Summary of Proposed Crosswalk Action Items summarizes the recommended action for each of the crosswalk locations. More details about each specific crosswalk location can be found in Table 13: ADA Compliant Crosswalks, which lists the compliant crosswalk locations.

Table 12: Summary of Proposed Crosswalk Action Items

Proposed Action Item- Pedestrian Island Crossing	Total
To Remain, No Action	9
Total	9

Table 13: ADA Compliant Crosswalks

Asset ID	Location	Beginning MP	Reason for Non-Compliance		Proposed Action	Final Design	Constructed
			From F0252 01L & 02L FIS Report	From Field Survey			
CW479	85' Rt WHP Sta 22+54.17	162.45	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	
CW477	Sta 20+00, 36.1' Rt.	162.46	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	
CW476	14.26' Lt Ramp B Sta 20+09.3	162.45	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	
CW480	Sta 22+30.3, 19.24' Rt.	162.46	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	

Table 13: ADA Compliant Crosswalks

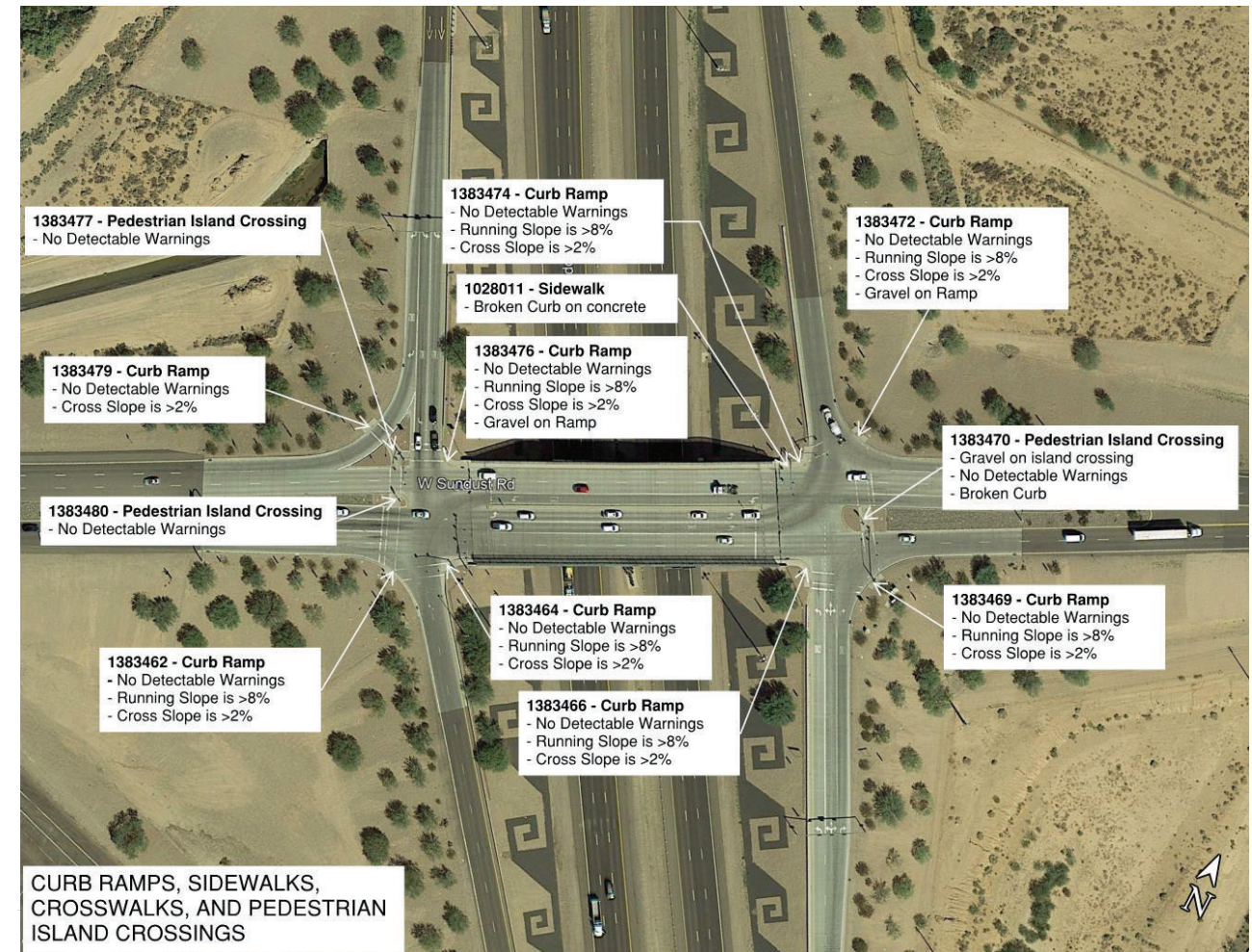
Asset ID	Location	Beginning MP	Reason for Non-Compliance		Proposed Action	Final Design	Constructed
			From F0252 01L & 02L FIS Report	From Field Survey			
CW462	61.52' Lt WHP Sta 22+30.23	162.48	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	
CW474	18.30' Rt Ramp A Sta 19+84.04	162.46	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	
CW466	14' Rt Ramp C Sta 0+63.21	162.48	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	
CW472	75.35' Rt Sundust Sta 17+64.67	162.46	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	
CW469	66.39' Lt Sundust Sta 17+51.76	162.48	Not in FIS Report	Compliant	To Remain, No Action	ADA compliant crosswalk will remain	
Total:	9						

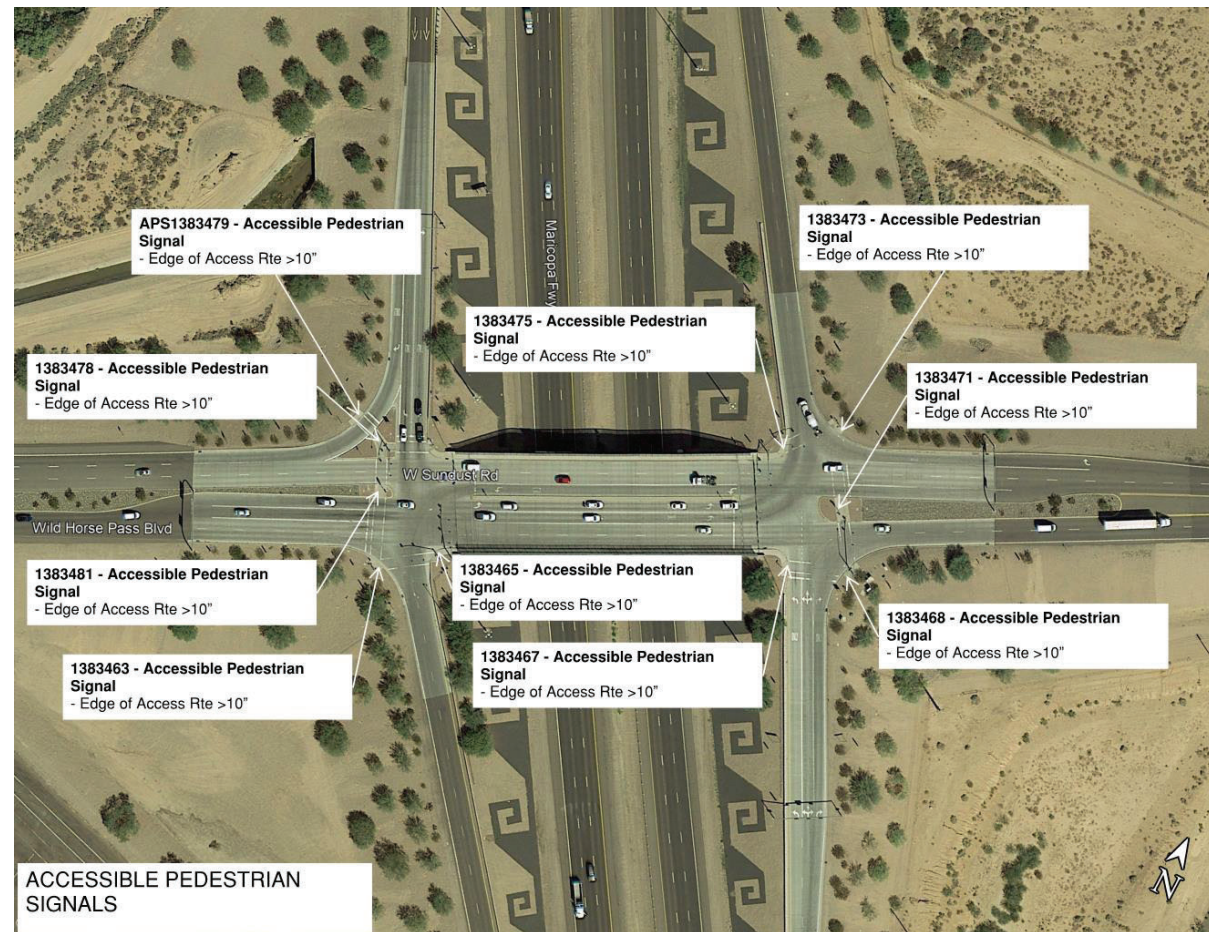
APPENDICES

Appendix A: ADA Feature Location Map (Non-Compliant Only) Appendix A-1

Appendix B: Wild Horse Pass Overpass Field Survey Photos (Non-Compliant Only) Appendix B-1

APPENDIX A – ADA FEATURE LOCATION MAP
(Non-Compliant Only)





Appendix A- ADA Feature Location Map (Non-Compliant Only)

APPENDIX B – WILD HORSE PASS SURVEY PHOTOS
(Non-Compliant Only)



1028011
Sidwalk
Broken Concrete



1383462
Curb Ramp
No Truncated Domes



1383464
Curb Ramp
No Truncated Domes



1383469
Curb Ramp
No Truncated Domes



1383472
Curb Ramp
Gravel on Ramp



1383474
Curb Ramp
No Truncated Domes



1383476
Curb Ramp
Gravel on Ramp



1383479
Curb Ramp
No Truncated Domes



1383470
Traffic Island
Cracked Concrete

Appendix E. Traffic Data

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I-10 | LOOP 202 TO SR-387 WILD HORSE PASS CORRIDOR

I-10; SR 202L to SR 387
Project Number F0252 01L and 02L
Federal ID No.: 010-C(222)S

DRAFT TRAFFIC ANALYSIS MEMORANDUM

DRAFT
August 2021



Introduction

This memorandum focuses on establishing an understanding of the current and future travel conditions along Interstate 10 (I-10) within a study area between SR 202 (Loop 202) and SR 387 (Pinal Ave). The analyses performed addressed the existing level of service (LOS) of the mainline and key traffic interchanges (TIs), as well as the potential of the roadway and key TIs to support future traffic based on travel demand forecasts and buildout conditions.

Existing Conditions

Existing traffic levels along the I-10 mainline were based on Year 2019 calibrated volumes extracted from the regional travel demand model (TDM) maintained by Maricopa Association of Governments (MAG). **Figure 1** presents the existing daily traffic along the I-10 mainline as reflected in the model. Traffic along major roadways which cross over I-10 was based on 2019 annual average daily traffic (AADT) data, reported by Arizona Department of Transportation (ADOT), refer to **Appendix A** for detailed cross street AADT.

To assess the existing operations at each of the TI's, a Level of Service (LOS) analysis was conducted for the AM and PM peak hours. Existing turning movement volumes for the analysis were established using count data from previous traffic reports¹ where applicable as well as turning volumes derived from the existing AADT's and stakeholder input from the Gila River Indian Community (GRIC) and City of Casa Grande. **Figures 2 – 6** present the existing turning movement counts used to analyze the current traffic operations at each of the TI's.

Depending on the existing configuration of each TI and the potential for major reconfiguration in future years, TI's were broken down into two categories for LOS analysis defined by software evaluation capabilities: Synchro or VISSIM. To maintain consistency between analysis tools for each TI, all analysis years were modeled and analyzed using the same software, respectively. TI's were categorized based on the scope of the future alternatives to be evaluated. TI's with a proposed unique alternative configuration were modeled in VISSIM software and TI's with a proposed traditional configuration were modeled in Synchro. The categorization of each TI is as follows:

VISSIM

Wild Horse Pass TI
Queen Creek (SR 347) TI
Casa Blanca (SR 587) TI

Synchro

Riggs Rd. TI
Seed Farm Rd. TI (buildout 2035)
Pinal Ave. (SR 387) TI

Existing conditions LOS results for each of the TI's is presented in **Table 1**.

¹ Kimley-Horn & Associates Inc., CallisonRTKL. (2019) *Wild Horse Pass Master Plan Update Traffic Impact and Parking Analysis Gila River Indian Community, Arizona*.

U.S. Department of Transportation, Federal Highway Administration. (2019) *SR 587 and WB I-10 ramps / Casa Blanca Road Signal Warrant Analysis*.



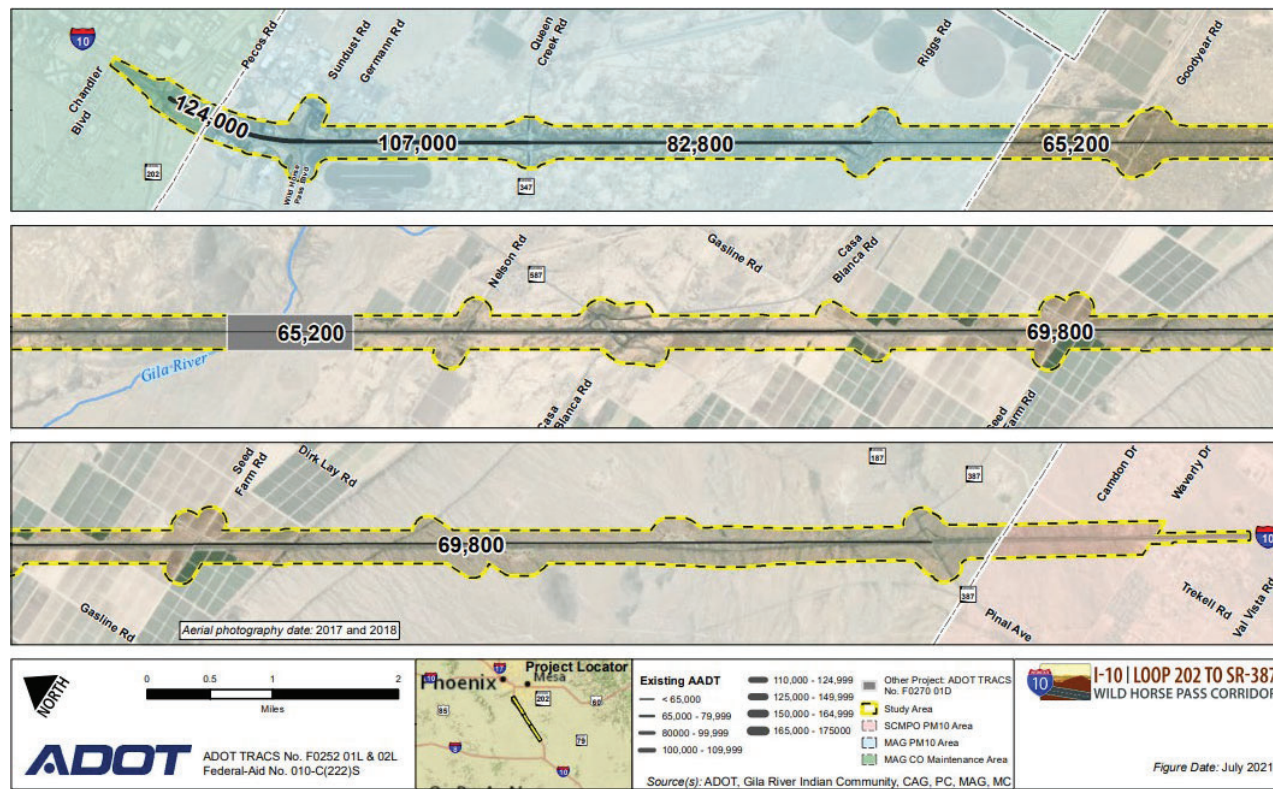


Figure 1: Existing AADT

I-10 | LOOP 202 TO SR-387 WILD HORSE PASS CORRIDOR

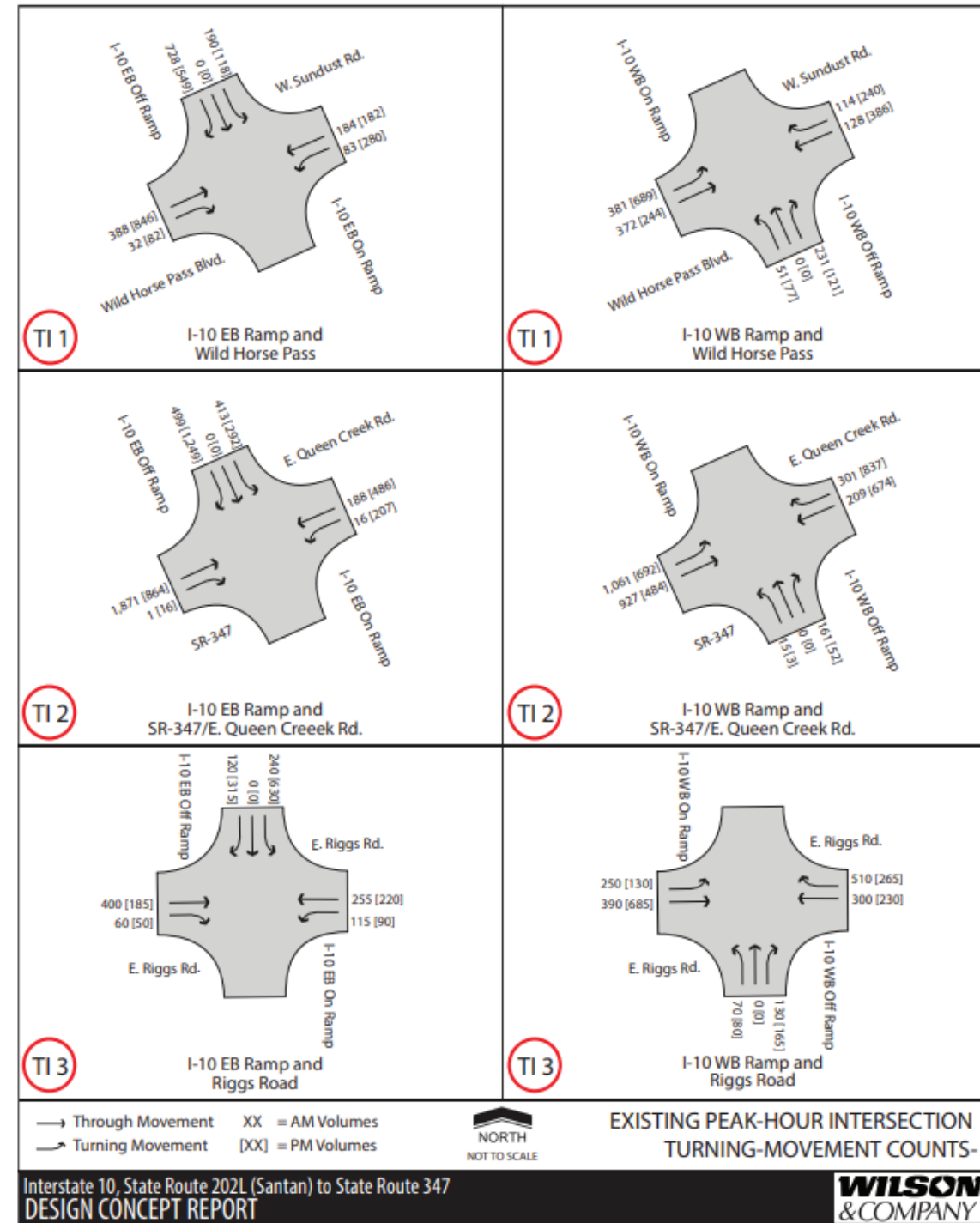


Figure 2: Existing Turning Movement Counts

I-10 | LOOP 202 TO SR-387
WILD HORSE PASS CORRIDOR

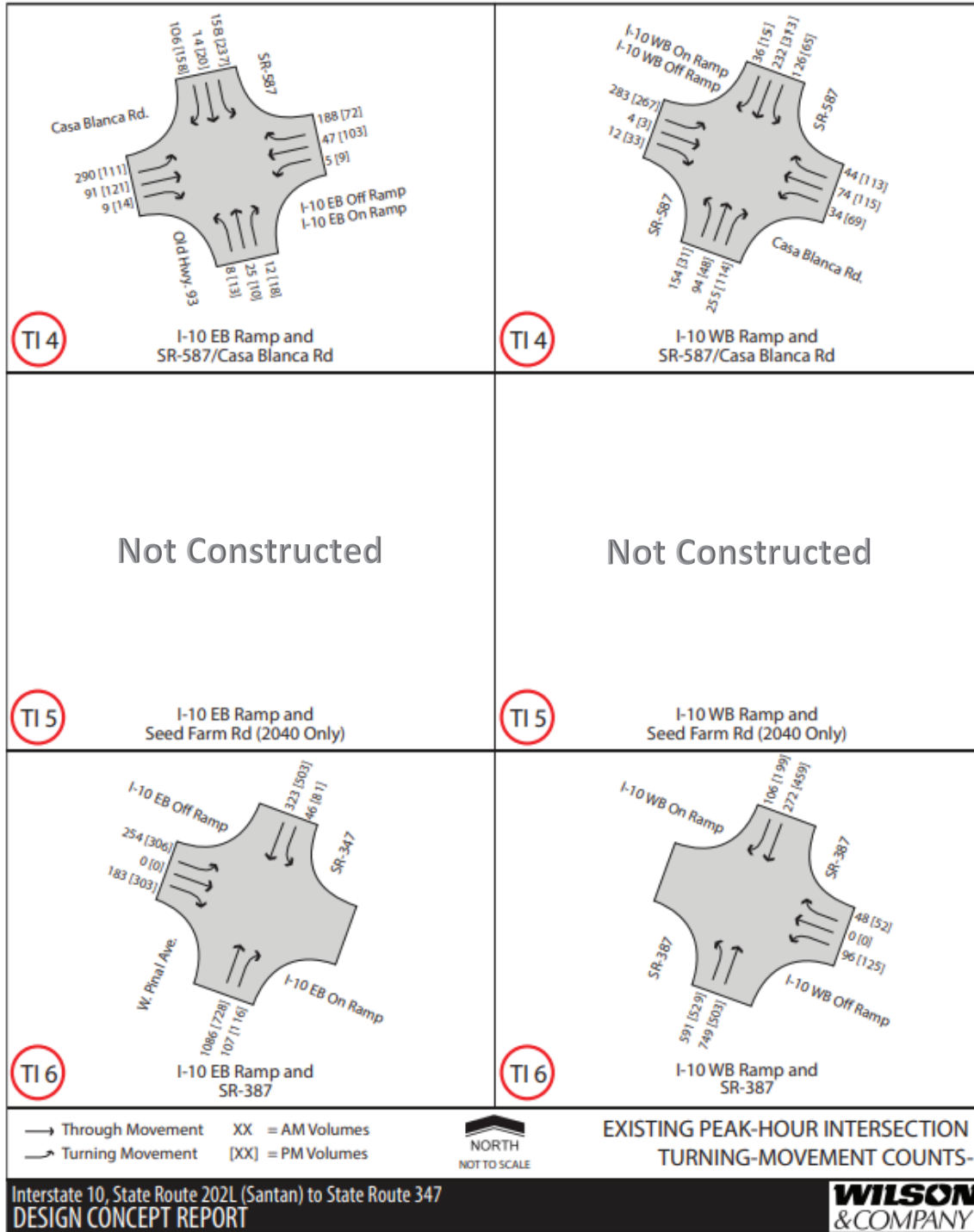


Figure 3: Existing Turning Movement Counts Continued

Table 1: LOS Analysis Results for Existing Conditions

		Wild Horse Pass 2018 - Existing AM Peak Hour Level of Service				Wild Horse Pass 2018 - Existing PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	16.0	-	12.0	24.0	22.0	-	9.0	29.0
	Approach LOS	B	-	B	C	C	-	A	C
	Intersection Delay (Sec)	16.0				17.0			
	Intersection LOS	B				B			
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	10.0	14.0	9.0	-	9.0	17.0	19.0
	Approach LOS	-	A	B	A	-	A	B	B
	Intersection Delay (Sec)	11.0				15.0			
	Intersection LOS	B				B			
		Queen Creek 2018 - Existing AM Peak Hour Level of Service				Queen Creek 2018 - Existing PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	51.0	-	4.0	27.0	41.0	-	23.0	41.0
	Approach LOS	D	-	A	C	D	-	C	D
	Intersection Delay (Sec)	11.0				33.0			
	Intersection LOS	B				C			
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	23.0	27.0	10.0	-	60.0	21.0	19.0
	Approach LOS	-	C	C	A	-	E	C	B
	Intersection Delay (Sec)	24.0				40.0			
	Intersection LOS	C				D			
		I-10 & Riggs Rd 2018 - Existing AM Peak Hour Level of Service				I-10 & Riggs Rd 2018 - Existing PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	23.1	-	19.7	14.3	16.4	-	28.9	18.1
	Approach LOS	C	-	B	B	B	-	C	B
	Intersection Delay (Sec)	17.4				23.5			
	Intersection LOS	B				C			
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	14.4	25.9	27.7	-	9.7	35.3	37.5
	Approach LOS	-	B	C	C	-	A	D	D
	Intersection Delay (Sec)	23.0				19.5			
	Intersection LOS	C				B			
		Casa Blanca Existing AM Peak Hour Level of Service				Casa Blanca Existing PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	77.1	69.7	48.1	13.9	10.4	47.3	25.1	17.3
	Approach LOS	F	F	E	B	B	E	D	C
	Intersection Delay (Sec)	61.0				28.0			
	Intersection LOS	F				D			
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	15.4	13.3	70.6	19.4	7.9	36.0	13.9	13.3
	Approach LOS	C	B	F	C	A	E	B	B
	Intersection Delay (Sec)	38.0				23.0			
	Intersection LOS	E				C			

Table 1: LOS Analysis Results for Existing Conditions (cont.)

		I-10 & SR 387/Pinal Ave 2018 - Existing AM Peak Hour Level of Service				I-10 & SR 387/Pinal Ave 2018 - Existing PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	5.3	0.0	-	3099.0	8.3	0.0	-	4032.4
	Approach LOS	A	A	-	F	A	A	-	F
	Intersection Delay (Sec)	243.5				386.5			
	Intersection LOS	F				F			
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	0.0	1.5	984.6	-	0.0	1.5	1034.7	-
	Approach LOS	A	A	F	-	A	A	F	-
	Intersection Delay (Sec)	138.0				183.1			
	Intersection LOS	F				F			

Forecast Years Traffic Conditions

Future traffic conditions were forecasted through year 2040 based on MAG TDM data and refined using localized projections based on input from GRIC and the City of Casa Grande. Projected 2040 daily traffic volumes are depicted in **Figure 7**.

Turning movement data was estimated using a combination of background growth from the MAG TDM as well as growth projections based on phased future development completed by year 2040. **Figures 8 – 13** present the turning movement counts used to analyze the 2040 traffic operations at each of the TI's. Forecasted turning movement volumes were applicable to all future traffic interchange alternative configurations with the exception of the Casa Blanca (SR 587) interchange. The turning movement volumes forecasted for the preferred alternative at the Casa Blanca interchange may be referenced in **Appendix B**.

Interim year traffic conditions were projected for Years 2025 and 2035. Traffic forecasting involved interpolation of existing year data and 2040 data. Additional adjustments to the traffic projections were made at the Wild Horse Pass TI and Queen Creek Rd (SR 347) TI to account for phased development within the GRIC area. Interim year daily traffic and turning movement projections can be referenced in **Appendix B**.

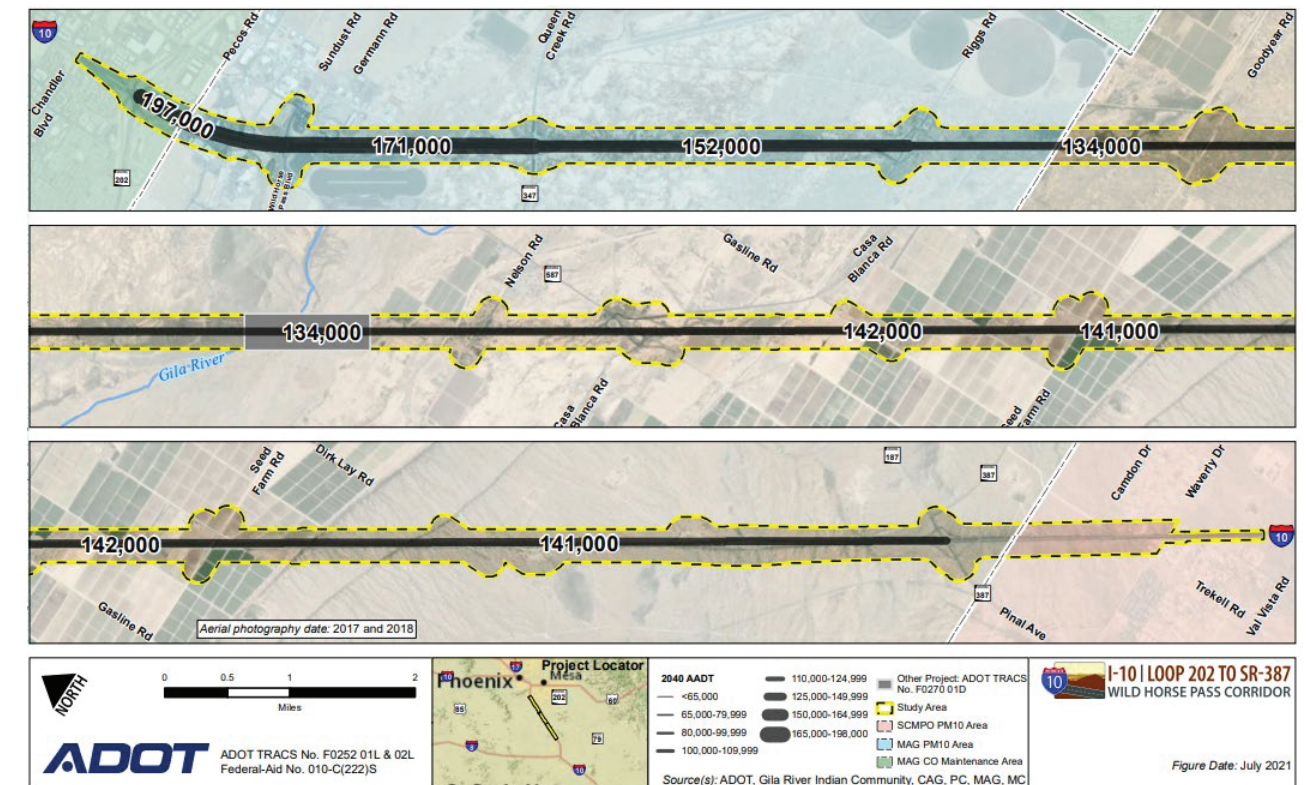


Figure 4: Projected 2040 AADT

I-10 | LOOP 202 TO SR-387
WILD HORSE PASS CORRIDOR

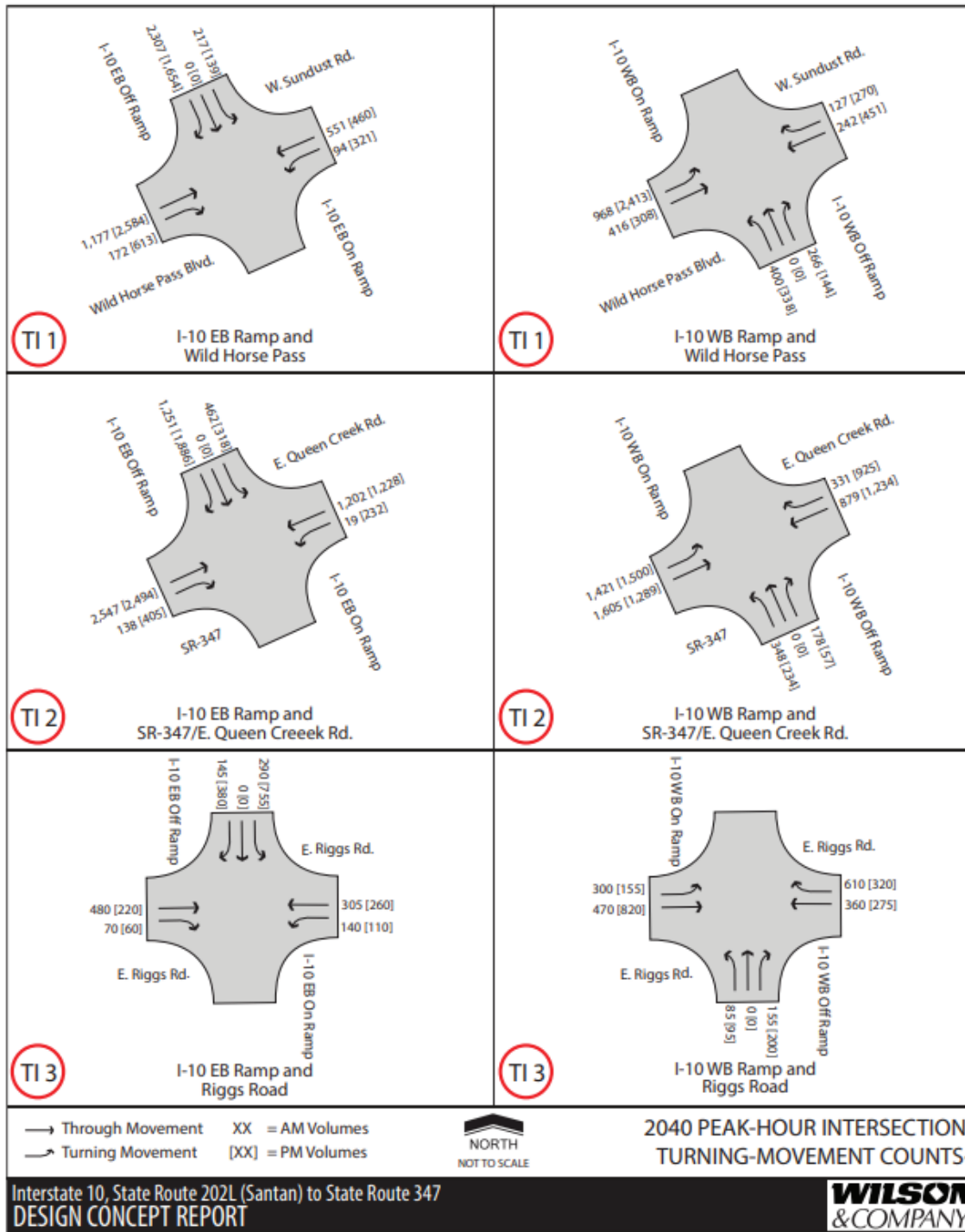


Figure 5: 2040 Turning Movement Counts

I-10 | LOOP 202 TO SR-387
WILD HORSE PASS CORRIDOR

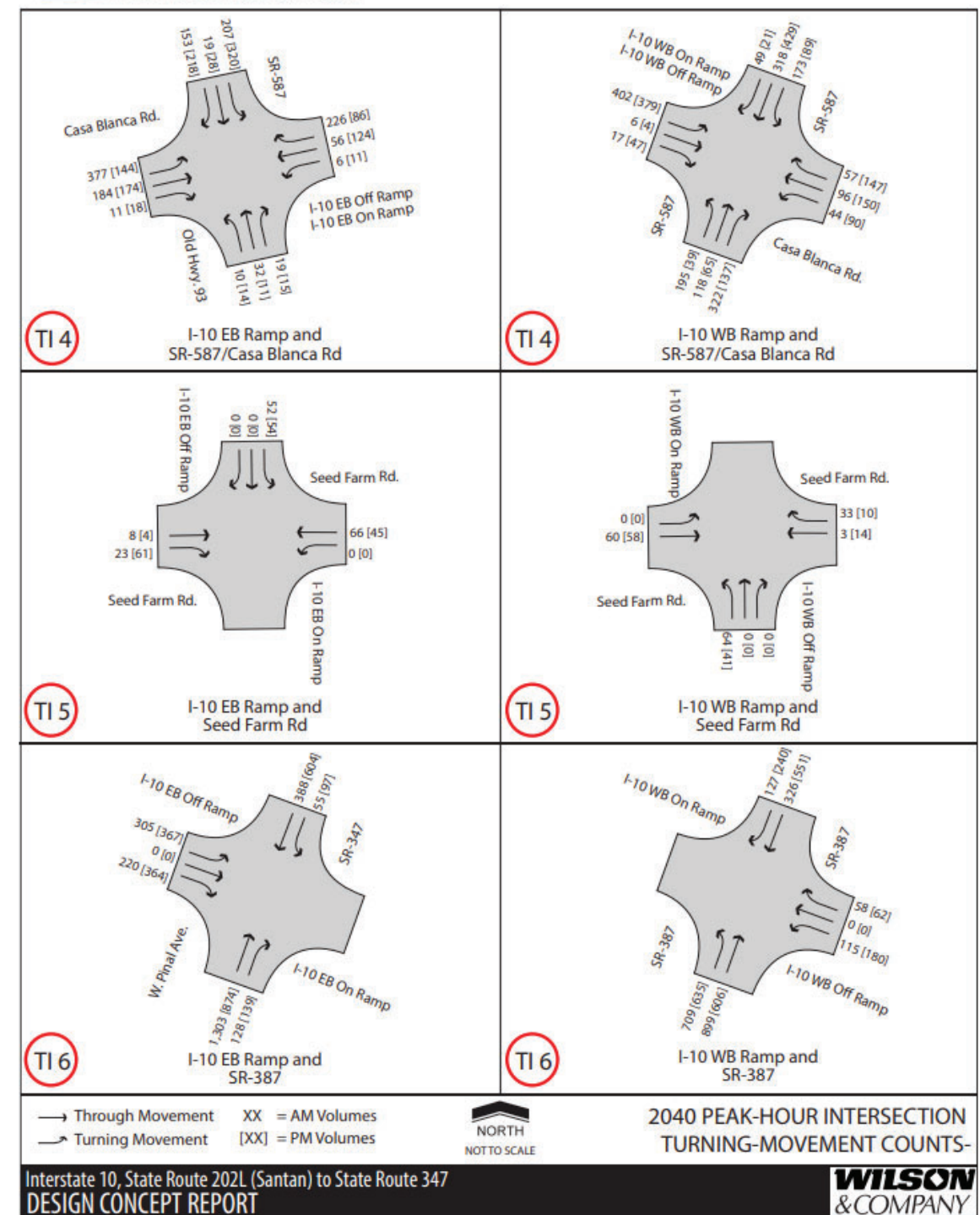


Figure 6: 2040 Turning Movement Counts Continued

Alternatives Analysis

The TI's were analyzed using future traffic forecasts under two scenarios: (1) no improvements are made through Year 2040 ("no build") and (2) the ultimate 2040 preferred alternative is fully functional by the analysis year ("future build"). Both scenarios were analyzed for all years to develop an understanding of the future traffic operations if no improvements were made and the impact of the preferred alternative. The following descriptions represent the ultimate 2040 preferred alternative at each TI.

Wild Horse Pass Traffic Interchange 2040

The preferred alternative for the traffic interchange at Wild Horse Pass involves reconstructing the standard diamond interchange at I-10 to create a Diverging Diamond Interchange (DDI). A DDI moves the cross-street traffic to the left side of the roadway between the signalized ramp intersections. The left-turn signal phase at the ramp terminals is eliminated. Vehicles on the cross street wanting to turn left are allowed to continue to the ramps without conflicting with opposing through traffic and without stopping. DDIs appear to be most applicable where there are heavy left turns onto the ramps or moderate to heavy left turns from the ramps (ADOT 2012). Improvements along Wild Horse Pass Blvd/Sundust Rd would include widening west and east of the I-10 TI to accommodate the DDI configuration. **Figure 14** presents the DDI concept modeled at the Wild Horse Pass location.

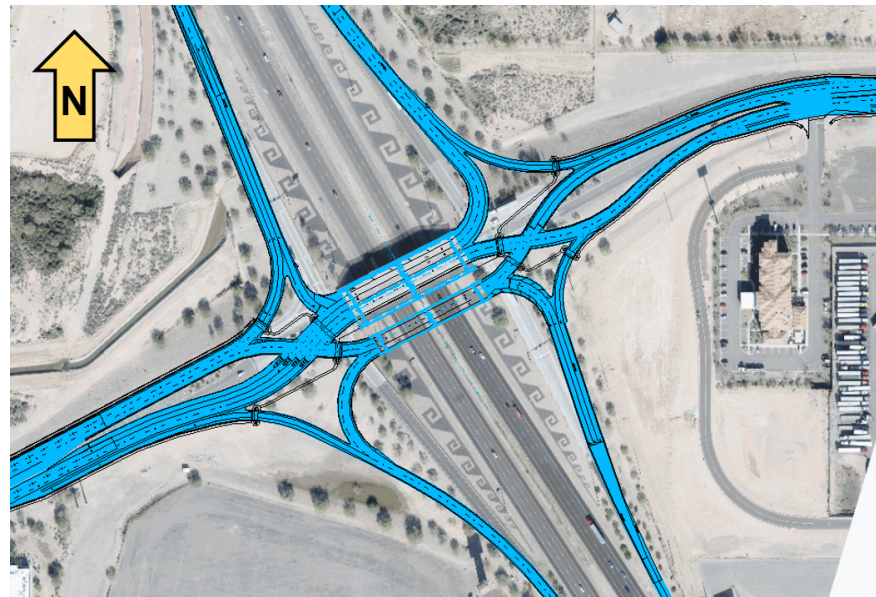


Figure 7: 2040 DDI at Wild Horse Pass Boulevard

Queen Creek (SR 347) Traffic Interchange 2040

The preferred alternative for the traffic interchange at Queen Creek (SR 347) mirrors the reconstruction of the Wild Horse Pass standard diamond interchange into a Diverging Diamond Interchange (DDI). Improvements along Queen Creek Rd/SR 347 would include widening west and east of the I-10 TI to accommodate the DDI configuration. **Figure 15** presents the DDI concept modeled at the Queen Creek (SR 347) location.

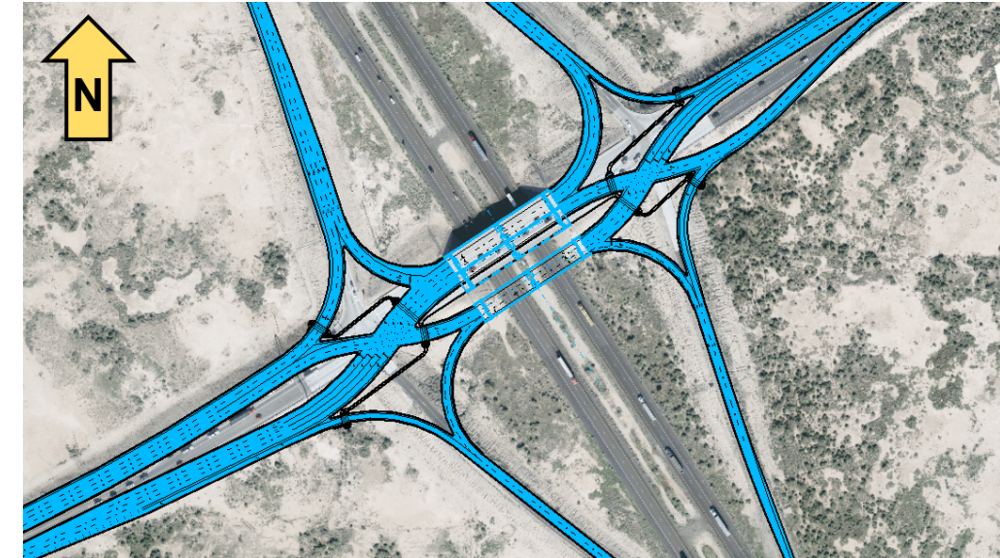


Figure 8: 2040 DDI at Queen Creek Road

Casa Blanca (SR 587) Traffic Interchange 2040

The preferred alternative for the traffic interchange at Casa Blanca (SR 587) involves a complete reconstruction of the partial cloverleaf interchange at I-10 to create a standard diamond interchange controlled by roundabouts at the ramp junctions. A key element of this design concept involves the construction of a new bridge over the I-10, south of the existing TI, to accommodate traffic along Casa Blanca Rd. The second bridge will provide a bypass route for travel along Casa Blanca Rd and will provide connectivity to the TI from the eastbound ramp junction controlled by a roundabout. **Figure 16** presents the TI concept modeled at the Casa Blanca (SR 587) location.



Figure 9: 2040 TI at Casa Blanca Road

The TI's at Riggs Rd, Seed Farm Rd, and Pinal Ave (SR 387) were all modeled in Synchro as standard diamond interchanges. The preferred alternative for the TI's at Riggs Rd, Seed Farm Road, and Pinal Ave (SR 387) have ultimate 2040 configurations as outlined below:

Riggs Road Traffic Interchange 2040

The preferred alternative for the traffic interchange at Riggs Rd includes the following improvements:

- adding an eastbound lane from the western ramp junction over the bridge and through the TI
- adding dual southbound left turn lanes with 300 feet of storage at the eastbound ramp junction
- adding a dedicated southbound right turn lane with 300 feet of storage at the eastbound ramp junction
- adding dual eastbound left turn lanes with 200 feet of storage at the westbound ramp junction

Seed Farm Road Traffic Interchange 2040

The preferred alternative for the new traffic interchange at Seed Farm Rd includes the following:

- single lanes across the bridge with no turn lanes at the ramp terminals
- single lane ramps
- stop controlled ramp terminals with free-flow east-west movements.

Pinal Avenue (SR 387) Traffic Interchange 2040

The preferred alternative for the traffic interchange at Pinal Ave (SR 387) closely mirrors the ultimate configuration at Riggs Rd including the following improvements:

- signaling the ramp junctions
- converting the eastbound right-turn drop-lane into a shared thru-/right-turn lane at the eastbound ramp junction and adding an eastbound lane over the bridge and through the TI
- adding dual southbound left turn lanes with 250 feet of storage at the eastbound ramp junction (maintaining the dedicated southbound right free-flow lane)
- adding dual eastbound left turn lanes with 250 feet of storage at the westbound ramp junction
- adding a westbound lane, east of the TI, which acts as a right turn drop-lane at the westbound ramp junction
- adding a northbound left turn lane with 200 feet of storage at the westbound ramp junction

The LOS analysis results for all study TI's under both scenarios, "no-build" and "build," are presented by year in **Tables 2-4**.

Table 2: 2025 No Build and Build LOS Analysis Results

		Wild Horse Pass 2025 – No Build AM Peak Hour Level of Service				Wild Horse Pass 2025 – DDI AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	20.0	-	11.0	27.0	24.0	-	4.0	15.0
	Approach LOS	B	-	B	C	C	-	A	B
	Intersection Delay (Sec)	16.0				10.0			
	Intersection LOS	B				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	9.0	14.0	10.0	-	14.0	7.0	14.0
	Approach LOS	-	A	B	A	-	B	A	B
	Intersection Delay (Sec)	11.0				12.0			
	Intersection LOS	B				B			
		Wild Horse Pass 2025 – No Build PM Peak Hour Level of Service				Wild Horse Pass 2025 – DDI PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	25.0	-	8.0	41.0	19.0	-	4.0	15.0
	Approach LOS	C	-	A	D	B	-	A	B
	Intersection Delay (Sec)	20.0				9.0			
	Intersection LOS	B				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	7.0	27.0	26.0	-	12.0	6.0	15.0
	Approach LOS	-	A	C	C	-	B	A	B
	Intersection Delay (Sec)	20.0				10.0			
	Intersection LOS	B				A			

Table 2: 2025 No Build and Build LOS Analysis Results (cont.)

		Queen Creek 2025 – No Build AM Peak Hour Level of Service				Queen Creek 2025 – DDI (free-flow SBR) AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	52.0	-	6.0	37.0	20.6	-	6.4	22.2
	Approach LOS	D	-	A	D	C	-	A	C
	Intersection Delay (Sec)	16.0				11			
	Intersection LOS	B				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	25.0	29.0	9.0	-	12.8	26.8	13.2
	Approach LOS	-	C	C	A	-	B	C	B
	Intersection Delay (Sec)	25.0				20.0			
	Intersection LOS	C				B			
		Queen Creek 2025 – No Build PM Peak Hour Level of Service				Queen Creek 2025 – DDI (free-flow SBR) PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	39.0	-	51.0	61.0	17.5	-	8.8	22.3
	Approach LOS	D	-	D	E	B	-	A	C
	Intersection Delay (Sec)	55.0				16.0			
	Intersection LOS	D				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	138.0	41.0	13.0	-	6.7	24.9	10.5
	Approach LOS	-	F	D	B	-	A	C	B
	Intersection Delay (Sec)	78.0				14.0			
	Intersection LOS	E				B			

Table 2: 2025 No Build and Build LOS Analysis Results (cont.)

		I-10 & Riggs Rd 2025 - No Build AM Peak Hour Level of Service				I-10 & Riggs Rd Year 2025 AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	23.3	-	15.6	26.6	19.5	-	13.9	21.5
	Approach LOS	C	-	B	C	B	-	B	C
	Intersection Delay (Sec)	21.9				18.3			
	Intersection LOS	C				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	14.5	25.4	10.9	-	13.7	20.1	7.9
	Approach LOS	-	B	C	B	-	B	C	A
	Intersection Delay (Sec)	17.6				14.4			
	Intersection LOS	B				B			
		I-10 & Riggs Rd 2025 - No Build PM Peak Hour Level of Service				I-10 & Riggs Rd - Year 2025 PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	14.5	-	20.4	19.7	10.3	-	17.0	26.7
	Approach LOS	B	-	C	B	B	-	B	C
	Intersection Delay (Sec)	19.3				19.0			
	Intersection LOS	B				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	13.1	14.6	15.3	-	7.6	14.6	15.3
	Approach LOS	-	B	B	B	-	A	B	B
	Intersection Delay (Sec)	13.8				10.3			
	Intersection LOS	B				B			

Table 2: 2025 No Build and Build LOS Analysis Results (cont.)

		I-10 & Casa Blanca Rd 2025 - No Build AM Peak Hour Level of Service				I-10 & Casa Blanca Rd - Year 2025 AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	77.1	91.2	86.3	26.6	4.4	5.6	-	3.9
	Approach LOS	F	F	F	C	A	A	-	A
	Intersection Delay (Sec)	76.0				5.0			
	Intersection LOS	F				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	25.2	17.1	185.3	69.1	3.8	2.7	5.3	-
	Approach LOS	D	C	F	F	A	A	A	-
	Intersection Delay (Sec)	85.0				4.0			
	Intersection LOS	F				A			
		I-10 & Casa Blanca Rd 2025 - No Build PM Peak Hour Level of Service				I-10 & Casa Blanca Rd - Year 2025 PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	10.6	70.3	119.4	23.9	3.5	4.5	-	3.6
	Approach LOS	B	F	F	C	A	A	-	A
	Intersection Delay (Sec)	85.0				4.0			
	Intersection LOS	F				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	8.4	65.5	15.0	13.3	3.0	2.5	5.5	-
	Approach LOS	B	F	C	B	A	A	A	-
	Intersection Delay (Sec)	37.0				4.0			
	Intersection LOS	E				A			

Table 2: 2025 No Build and Build LOS Analysis Results (cont.)

I-10 & SR 387/Pinal Ave 2025 - No Build AM Peak Hour Level of Service					I-10 & SR 387/Pinal Ave - Year 2025 AM Peak Hour Level of Service				
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	5.8	0.0	-	4693.1	13.1	21.9	-	24.5
	Approach LOS	A	A	-	F	B	C	-	C
	Intersection Delay (Sec)	366.6				15.7			
	Intersection LOS	F				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	0.0	1.6	1331.7	-	10.5	3.6	27.3	-
	Approach LOS	A	A	F	-	A	A	A	-
	Intersection Delay (Sec)	186.3				11.5			
	Intersection LOS	F				B			
I-10 & SR 387/Pinal Ave 2025 - No Build PM Peak Hour Level of Service					I-10 & SR 387/Pinal Ave - Year 2025 PM Peak Hour Level of Service				
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	9.8	0.0	-	6645.1	18.3	25.7	-	31.0
	Approach LOS	A	A	-	F	B	C	-	C
	Intersection Delay (Sec)	633.8				22.1			
	Intersection LOS	F				C			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	0.0	1.5	1392.7	-	4.5	5.2	24.3	-
	Approach LOS	A	A	F	-	A	A	C	-
	Intersection Delay (Sec)	246.1				8.2			
	Intersection LOS	F				A			

Table 3: 2035 No Build and Build LOS Analysis Results

Wild Horse Pass 2035 - No Build AM Peak Hour Level of Service					Wild Horse Pass 2035 - DDI AM Peak Hour Level of Service				
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	29.0	-	9.0	30.0	20.0	-	3.0	15.0
	Approach LOS	C	-	A	C	B	-	A	B
	Intersection Delay (Sec)	18.0				9.0			
	Intersection LOS	B				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	151.0	17.0	18.0	-	15.0	8.0	20.0
	Approach LOS	-	F	B	B	-	B	A	B
	Intersection Delay (Sec)	84.0				14.0			
	Intersection LOS	F				B			
Wild Horse Pass 2035 - No Build PM Peak Hour Level of Service					Wild Horse Pass 2035 - DDI PM Peak Hour Level of Service				
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	41.0	-	9.0	94.0	17.0	-	6.0	16.0
	Approach LOS	D	-	A	F	B	-	A	B
	Intersection Delay (Sec)	38.0				9.0			
	Intersection LOS	D				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	14.0	58.0	26.0	-	12.0	11.0	21.0
	Approach LOS	-	B	E	C	-	B	B	C
	Intersection Delay (Sec)	33.0				13.0			
	Intersection LOS	C				B			

Table 3: 2035 No Build and Build LOS Analysis Results (cont.)

		Queen Creek 2035 - No Build AM Peak Hour Level of Service				Queen Creek 2035 - DDI (free-flow SBR) AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	100.0	-	7.0	152.0	18.4	-	6.3	31.3
	Approach LOS	F	-	A	F	B	-	A	C
	Intersection Delay (Sec)	53.0				14			
	Intersection LOS	D				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	51.0	50.0	8.0	-	11.4	28.9	28.7
	Approach LOS	-	D	D	A	-	B	C	C
	Intersection Delay (Sec)	42.0				23.0			
	Intersection LOS	D				C			
		Queen Creek 2035 - No Build PM Peak Hour Level of Service				Queen Creek 2035 - DDI (free-flow SBR) PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	58.0	-	68.0	53.0	16.3	-	7.2	29.0
	Approach LOS	E	-	E	D	B	-	A	C
	Intersection Delay (Sec)	60.0				17.0			
	Intersection LOS	E				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	210.0	93.0	10.0	-	6.5	30.4	19.6
	Approach LOS	-	F	F	A	-	A	C	B
	Intersection Delay (Sec)	113.0				20.0			
	Intersection LOS	F				B			

Table 3: 2035 No Build and Build LOS Analysis Results (cont.)

		I-10 & Riggs Rd 2035 - No Build AM Peak Hour Level of Service				I-10 & Riggs Rd TI - Year 2035 AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	29.8	-	15.3	29.8	21.6	-	13.6	22.4
	Approach LOS	C	-	B	C	C	-	B	C
	Intersection Delay (Sec)	24.2				18.9			
	Intersection LOS	C				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	15.6	31.1	10.8	-	14.9	21.0	7.5
	Approach LOS	-	B	C	B	-	B	C	A
	Intersection Delay (Sec)	20.1				14.9			
	Intersection LOS	C				B			
		I-10 & Riggs Rd - Year 2035 - No Build PM Peak Hour Level of Service				I-10 & Riggs Rd TI - Year 2035 PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	16.5	-	19.9	18.9	11.2	-	16.6	27.7
	Approach LOS	B	-	B	B	B	-	B	C
	Intersection Delay (Sec)	19.0				19.3			
	Intersection LOS	B				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	18.3	14.1	14.9	-	8.7	14.1	14.9
	Approach LOS	-	B	B	B	-	A	B	B
	Intersection Delay (Sec)	16.9				10.8			
	Intersection LOS	B				B			

Table 3: 2035 No Build and Build LOS Analysis Results (cont.)

		I-10 & Casa Blanca Rd 2035 - No Build AM Peak Hour Level of Service				I-10 & Casa Blanca Rd - Year 2035 AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	76.7	107.1	142.3	15.8	4.7	6.6	-	4.3
	Approach LOS	F	F	F	C	A	A	-	A
	Intersection Delay (Sec)	93.0				5.0			
	Intersection LOS	F				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	29.3	15.9	235.8	140.4	4.8	3.0	6.0	-
	Approach LOS	D	C	F	F	A	A	A	-
	Intersection Delay (Sec)	120.0				5.0			
	Intersection LOS	F				A			
		I-10 & Casa Blanca Rd 2035 - No Build PM Peak Hour Level of Service				I-10 & Casa Blanca Rd - Year 2035 PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	11.5	96.9	29.3	47.1	3.8	5.3	-	4.3
	Approach LOS	B	F	F	E	A	A	-	A
	Intersection Delay (Sec)	78.0				5.0			
	Intersection LOS	F				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	8.5	86.1	18.1	14.2	3.0	2.5	5.5	-
	Approach LOS	A	F	C	B	A	A	A	-
	Intersection Delay (Sec)	46.0				4.0			
	Intersection LOS	E				A			

Table 3: 2035 No Build and Build LOS Analysis Results (cont.)

		I-10 & SR 387/Pinal Ave 2035 - No Build AM Peak Hour Level of Service				I-10 & SR 387/Pinal Ave - Year 2035 AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	6.6	0.0	-	9433.2	13.8	22.8	-	24.9
	Approach LOS	A	A	-	F	B	C	-	C
	Intersection Delay (Sec)	737.5				16.5			
	Intersection LOS	F				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	0.0	1.8	1994.1	-	12.4	4.0	27.1	-
	Approach LOS	A	A	F	-	B	A	C	-
	Intersection Delay (Sec)	279.1				12.7			
	Intersection LOS	F				B			
		I-10 & SR 387/Pinal Ave 2035 - No Build PM Peak Hour Level of Service				I-10 & SR 387/Pinal Ave - Year 2035 PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	13.8	0.0	-	17380.3	19.3	28.2	-	31.6
	Approach LOS	B	A	-	F	B	C	-	C
	Intersection Delay (Sec)	1649.9				23.6			
	Intersection LOS	F				C			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	0.0	1.6	2062.8	-	5.1	5.9	24.1	-
	Approach LOS	A	A	F	-	A	A	C	-
	Intersection Delay (Sec)	364.3				8.7			
	Intersection LOS	F				A			

Table 4: 2040 No Build and Build LOS Analysis Results

		Wild Horse Pass 2040 - No Build AM Peak Hour Level of Service				Wild Horse Pass 2040 - DDI AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	29.0	-	9.0	31.0	23.0	-	3.0	15.0
	Approach LOS	C	-	A	C	C	-	A	B
	Intersection Delay (Sec)	18.0				10.0			
	Intersection LOS	B				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	164.0	29.0	13.0	-	18.0	8.0	22.0
	Approach LOS	-	F	C	B	-	B	A	C
	Intersection Delay (Sec)	88.0				16.0			
	Intersection LOS	F				B			
		Wild Horse Pass 2040 - No Build PM Peak Hour Level of Service				Wild Horse Pass 2040 - DDI PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	45.0	-	9.0	120.0	18.0	-	8.0	17.0
	Approach LOS	D	-	A	F	B	-	A	B
	Intersection Delay (Sec)	45.0				11.0			
	Intersection LOS	D				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	75.0	55.0	26.0	-	13.0	20.0	22.0
	Approach LOS	-	E	D	C	-	B	B	C
	Intersection Delay (Sec)	58.0				18.0			
	Intersection LOS	E				B			

Table 4: 2040 No Build and Build LOS Analysis Results (cont.)

		Queen Creek 2040 - No Build AM Peak Hour Level of Service				Queen Creek 2040 - DDI (free-flow SBR) AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	370.0	-	6.0	165.0	27.2	-	6.1	37.4
	Approach LOS	F	-	A	F	C	-	A	D
	Intersection Delay (Sec)	83.0				16.0			
	Intersection LOS	F				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	153.0	51.0	8.0	-	11.0	34.1	36.2
	Approach LOS	-	F	D	A	-	B	C	D
	Intersection Delay (Sec)	78.0				28.0			
	Intersection LOS	E				C			
		Queen Creek 2040 - No Build PM Peak Hour Level of Service				Queen Creek 2040 - DDI (free-flow SBR) PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	97.0	-	66.0	51.0	19.3	-	8.0	33.9
	Approach LOS	F	-	E	D	B	-	A	C
	Intersection Delay (Sec)	61.0				19.0			
	Intersection LOS	E				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	217.0	91.0	9.0	-	7.8	37.3	23.9
	Approach LOS	-	F	F	A	-	A	D	C
	Intersection Delay (Sec)	111.0				24.0			
	Intersection LOS	F				C			

Table 4: 2040 No Build and Build LOS Analysis Results (cont.)

		I-10 & Riggs Rd 2040 - No Build AM Peak Hour Level of Service				I-10 & Riggs Rd TI - Year 2040 AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	34.0	-	15.5	34.8	23.2	-	13.4	23.1
	Approach LOS	C	-	B	C	C	-	B	C
	Intersection Delay (Sec)	27.2				19.4			
	Intersection LOS	C				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	17.1	25.8	10.1	-	15.4	21.5	7.3
	Approach LOS	-	B	C	B	-	B	C	A
	Intersection Delay (Sec)	18.3				15.3			
	Intersection LOS	B				B			
		I-10 & Riggs Rd - Year 2040 - No Build PM Peak Hour Level of Service				I-10 & Riggs Rd TI - Year 2040 PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	17.5	-	19.7	18.5	11.7	-	16.4	28.2
	Approach LOS	B	-	B	B	B	-	B	C
	Intersection Delay (Sec)	19.0				19.4			
	Intersection LOS	B				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	-	23.2	13.8	14.7	-	9.2	13.8	14.7
	Approach LOS	-	C	B	B	-	A	B	B
	Intersection Delay (Sec)	19.9				11.1			
	Intersection LOS	B				B			

Table 4: 2040 No Build and Build LOS Analysis Results (cont.)

		I-10 & Casa Blanca Rd 2040 - No Build AM Peak Hour Level of Service				I-10 & Casa Blanca Rd - Year 2040 AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	77.3	107.2	144.3	17.0	5.2	7.2	-	5.1
	Approach LOS	F	F	F	C	A	A	-	A
	Intersection Delay (Sec)	93.0				6.0			
	Intersection LOS	F				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	34.0	19.0	233.5	144.9	5.8	3.3	6.5	-
	Approach LOS	D	C	F	F	A	A	A	-
	Intersection Delay (Sec)	122.0				6.0			
	Intersection LOS	F				A			
		I-10 & Casa Blanca Rd 2040 - No Build PM Peak Hour Level of Service				I-10 & Casa Blanca Rd - Year 2040 PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	11.6	99.1	132.7	74.4	4.2	5.8	-	4.7
	Approach LOS	B	F	F	F	A	A	-	A
	Intersection Delay (Sec)	85.0				5.0			
	Intersection LOS	F				A			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	8.4	89.4	20.5	14.8	4.4	2.9	6.1	-
	Approach LOS	A	F	C	B	A	A	A	-
	Intersection Delay (Sec)	47.0				5.0			
	Intersection LOS	E				A			

Table 4: 2040 No Build and Build LOS Analysis Results (cont.)

		I-10 & SR 387/Pinal Ave 2040 - No Build AM Peak Hour Level of Service				I-10 & SR 387/Pinal Ave - Year 2040 AM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	7.3	0.0	-	14852.0	14.2	23.3	-	25.1
	Approach LOS	A	A	-	F	B	C	-	C
	Intersection Delay (Sec)	1155.0				16..9			
	Intersection LOS	F				B			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	0.0	1.8	2461.0	-	13.5	4.3	-	-
	Approach LOS	A	A	F	-	B	A	-	-
	Intersection Delay (Sec)	344.9				13.5			
	Intersection LOS	F				B			
		I-10 & SR 387/Pinal Ave 2040 - No Build PM Peak Hour Level of Service				I-10 & SR 387/Pinal Ave - Year 2040 PM Peak Hour Level of Service			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 WB ON/OFF RAMPS	Approach Delay (Sec)	17.2	0.0	-	36495.6	20.0	29.9	-	31.9
	Approach LOS	B	A	-	F	B	C	-	C
	Intersection Delay (Sec)	3457.4				24.6			
	Intersection LOS	F				C			
Name	Performance Measure	NB	SB	EB	WB	NB	SB	EB	WB
Jct I-10 EB ON/OFF RAMPS	Approach Delay (Sec)	0.0	1.6	2481.3	-	5.3	6.3	24.1	-
	Approach LOS	A	A	F	-	A	A	C	-
	Intersection Delay (Sec)	438.1				9.0			
	Intersection LOS	F				A			

Additional Data

To support the analysis of air quality, the daily traffic forecasts were used to determine the amount of traffic entering each TI for all analysis years and scenarios. In addition to the total daily traffic, the volume data was further broken down by vehicle distribution to determine the percentage of truck traffic entering the TI's and traveling along the I-10 mainline. Truck traffic included heavy and medium sized trucks often associated with commercial vehicle types. **Tables 5 and 6** present the summary of daily traffic and truck distribution prepared for air quality analysis. A condensed summary of LOS results was also prepared for air quality analysis and is depicted in **Table 7**.

Table 5: Summary of Daily Traffic Traveling within Interstate 10 Study Area

AADT and Truck Volumes		2018 Existing		2025 No-Build		2025 Build		2035 No-Build		2035 Build		2040 No-Build		2040 Build	
		AADT	Truck AADT	AADT	Truck AADT	AADT	Truck AADT	AADT	Truck AADT	AADT	Truck AADT	AADT	Truck AADT	AADT	Truck AADT
Mainline	Wild Horse Pass Blvd	123,800	19,000	142,400	25,700	148,700	28,600	163,900	34,500	181,200	37,700	162,800	39,300	197,000	43,600
	SR 347/Queen Creek Rd	107,100	18,400	126,600	24,800	133,800	27,300	146,500	33,400	164,600	36,700	137,500	37,700	171,100	42,000
	Riggs Rd	82,800	17,200	97,000	23,600	104,400	25,800	109,100	31,600	128,800	34,900	116,700	36,600	152,200	41,000
	SR 587/ Casa Blanca Rd	65,200	16,000	76,700	21,300	83,700	23,200	92,400	29,700	107,400	32,400	100,100	34,500	133,500	38,200
	Seed Farm Rd	69,800	17,200	80,900	22,400	87,000	24,500	98,900	31,500	113,500	34,400	107,500	36,600	141,500	40,600
	SR 387/ SR 187/Pinal Ave	69,800	17,200	80,900	22,400	87,000	24,500	99,100	31,300	113,700	34,200	108,100	36,300	141,100	40,400

Note: Trucks include heavy truck and medium truck. AADT at intersections include volumes on approach lanes.

Table 6: Summary of Daily Traffic Accessing Traffic Interchanges on Interstate 10 Study Area

AADT and Truck Volumes		2018 Existing		2025 No-Build		2025 Build		2035 No-Build		2035 Build		2040 No-Build		2040 Build	
		AADT	Truck (%)	AADT	Truck (%)	AADT	Truck (%)	AADT	Truck (%)	AADT	Truck (%)	AADT	Truck (%)	AADT	Truck (%)
Intersection	Wild Horse Pass Blvd & EB I-10	24,800	1,100	42,600	2,200	42,600	2,300	78,300	4,400	78,300	4,400	96,200	5,800	96,200	6,100
	Wild Horse Pass Blvd & WB I-10	19,600	1,300	34,800	3,000	34,800	3,100	65,200	6,100	65,200	6,100	80,400	6,800	80,400	7,100
	Queen Creek Rd & EB I-10	38,000	1,800	49,000	2,100	49,000	2,300	71,000	3,500	71,000	3,800	82,000	4,500	82,000	4,600
	Queen Creek Rd & WB I-10	28,000	1,500	37,400	1,900	37,400	2,000	56,100	3,000	56,100	3,300	65,500	3,900	65,500	4,000
	Riggs Rd & EB I-10	14,200	1,500	16,200	1,600	16,200	1,400	20,300	1,700	20,300	1,900	22,300	2,200	22,300	2,500
	Riggs Rd & WB I-10	17,800	1,600	19,200	2,000	19,200	2,000	21,900	2,100	21,900	2,200	23,300	2,500	23,300	2,700
	Casa Blanca Rd & EB I-10	8,000	900	10,900	1,300	19,100	2,100	16,600	2,300	21,900	2,800	19,400	2,900	23,500	3,400
	Casa Blanca Rd & WB I-10	12,800	1,600	16,200	2,100	17,800	2,400	23,100	3,600	20,900	3,400	26,500	4,500	22,700	4,200
	Seed Farm Rd & EB I-10	-	-	-	-	-	-	-	-	2,200	200	-	-	2,200	200
	Seed Farm Rd & WB I-10	-	-	-	-	-	-	-	-	1,900	200	-	-	1,900	200
	Final Ave & EB I-10	20,900	2,300	24,400	3,200	24,400	3,200	31,400	4,600	31,400	5,000	34,900	5,600	34,900	5,900
	Final Ave & WB I-10	15,100	1,800	19,400	2,700	19,400	2,700	28,100	4,400	28,100	4,700	32,500	5,600	32,500	5,800

Note: Truck% include heavy truck and medium truck. AADT at intersections include volumes on approach lanes.

Table 7: Level of Service Summary

Level of Service (LOS)	2018 Existing		2025 No-Build		2025 Build		2035 No-Build		2035 Build		2040 No-Build		2040 Build																	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour																
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay																
Intersection LOS (overall, not for each link)	Wild Horse Pass Blvd & EB I-10	B	11	B	15	B	11	B	20	B	12	A	10	F	84	C	33	B	14	B	13	F	88	E	58	B	16	B	18	
	Wild Horse Pass Blvd & WB I-10	B	16	B	17	B	16	B	20	A	10	A	9	B	18	D	38	A	9	A	9	B	18	D	45	A	10	B	11	
	Queen Creek Rd & EB I-10	C	24	D	40	C	25	E	78	B	20	B	14	D	42	F	111	C	23	B	20	E	78	F	111	C	28	C	24	
	Queen Creek Rd & WB I-10	B	11	C	33	B	16	D	55	B	11	B	16	D	53	E	61	B	14	B	17	F	83	E	61	B	16	B	19	
	Riggs Rd & EB I-10	C	23	B	19.5	B	17.6	B	13.8	B	14.4	B	10.3	C	20.1	B	16.9	B	14.9	B	10.8	B	18.3	B	19.9	B	15.3	B	11.1	
	Riggs Rd & WB I-10	B	17.4	C	23.5	C	21.9	B	19.3	B	18.3	B	19	C	24.2	B	19	B	18.9	B	19.3	C	27.2	B	19	B	19.4	B	19.4	
	Casa Blanca Rd & EB I-10	E	38	C	23	F	85	E	37	A	4	A	4	F	120	E	46	A	5	A	4	F	122	E	47	A	6	A	5	
	Casa Blanca Rd & WB I-10	F	61	D	28	F	76	F	64	A	5	A	4	F	93	F	78	A	5	A	5	F	93	F	85	A	6	A	5	
	Seed Farm Rd & EB I-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	3.6	A	3.2	-	-	-	-	A	3.2	A	3
	Seed Farm Rd & WB I-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	3.4	A	3	-	-	-	-	A	3.7	A	3
	Final Ave & EB I-10	F	138.0	F	183.1	F	186.3	F	246.1	B	11.5	A	8.2	F	279.1	F	364.3	B	12.7	A	8.7	F	344.9	F	438.1	B	13.5	A	9	
	Final Ave & WB I-10	F	243.5	F	386.5	F	366.6	F	633.8	B	15.7	C	22.1	F	737.5	F	1649.9	B	16.5	C	23.6	F	1155	F	3457.4	B	16.9	C	24.6	

Appendix A: Daily Traffic Forecasts

Existing Annual Average Daily Traffic and 2040 Forecast

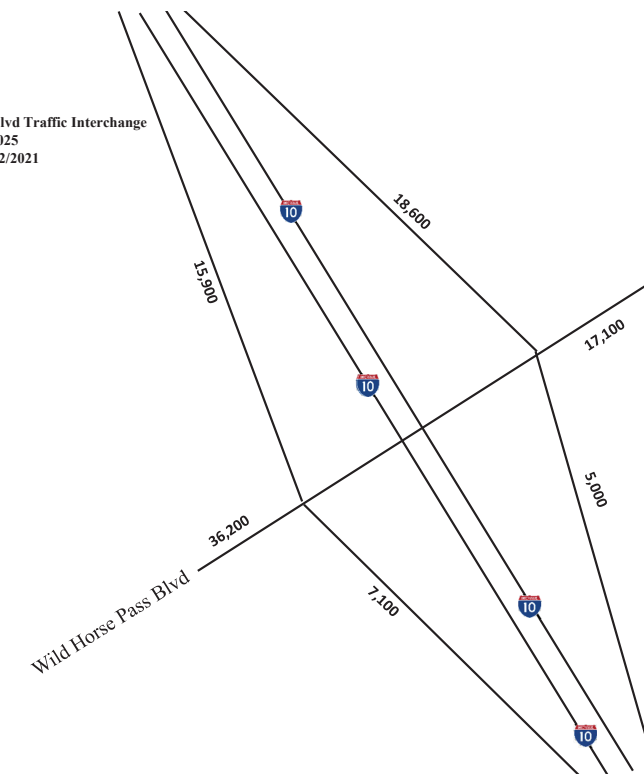
2019 ADOT Traffic Interchange Volume Counts Daily										
Traffic Interchange	I-10 Ramp Volumes				Cross Street Volumes					
	Westbound		Eastbound		West of I-10		Bridge over I-10		East of I-10	
	On	Off	On	Off	WB	EB	WB	EB	WB	EB
SR 387/Pinal Ave	5,000	1,300	1,600	6,700	15,000		13,600		13,500	
SR587/Casa Blanca	1,500	2,800	3,400	1,700	4,500		6,500		5,200	
Riggs Rd	6,400	2,200	1,700	7,100	6,800		12,800		12,800	
SR374/Queen Creek	18,000	600	700	17,800	29,100		-		19,100	
Wild Horse Pass	9,900	4,000	4,300	11,200	18,800		-		11,100	

2040 Projected Daily Traffic										
Traffic Interchange	I-10 Ramp Volumes				Cross Street Volumes					
	Westbound		Eastbound		West of I-10		Bridge over I-10		East of I-10	
	On	Off	On	Off	WB	EB	WB	EB	WB	EB
SR387	12,500	3,500	3,400	10,400	28,300		27,700		20,800	
Seed Farm	200	400	400	1,000	1,000		1,600		1,500	
SR587/Casa Blanca	3,400	7,500	8,400	3,883	19,000		15,700		18,700	
Riggs	5,900	3,700	2,100	14,200	11,500		16,800		20,200	
SR374/Queen Creek	30,300	3,600	8,000	27,600	75,200		53,100		43,800	
Wild Horse Pass	44,700	8,000	15,600	29,900	88,500		58,400		34,500	

2050 Annual Average Daily Traffic Forecast

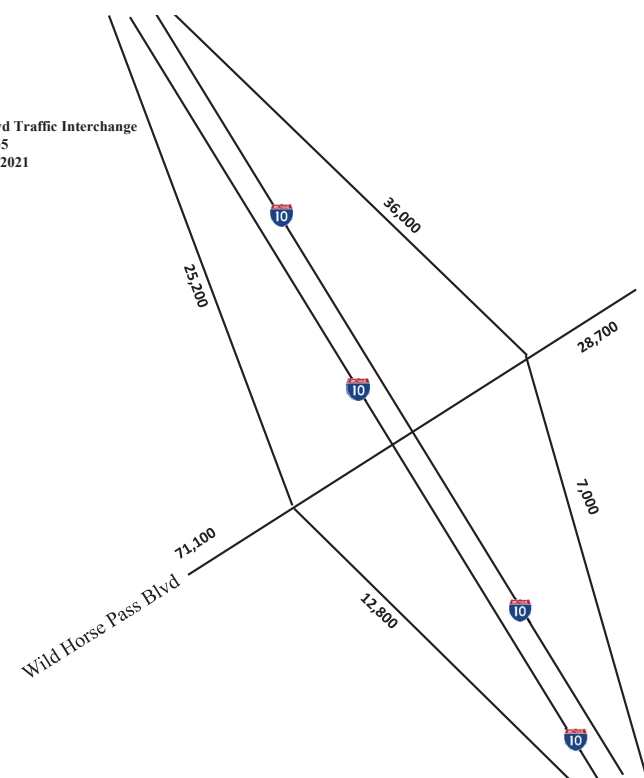
2050 Projected Daily Traffic											
Traffic Interchange	I-10 Ramp Volumes				Cross Street Volumes						
	Westbound		Eastbound		West of I-10		Bridge over I-10		East of I-10		
	On	Off	On	Off	WB	EB	WB	EB	WB	EB	
SR387	15,000	4,200	4,100	12,500	34,000		33,200		25,000		
Seed Farm	1,100	1,300	300	900	1,200		1,800		1,500		
SR587/Casa Blanca	4,100	9,000	10,100	4,700	22,800		18,800		22,400		
Riggs	6,500	4,100	2,300	15,600	12,700		18,500		22,200		
SR374/Queen Creek	31,500	4,700	9,100	28,700	85,600		61,400		49,100		
Wild Horse Pass	49,100	9,700	17,400	34,600	97,800		64,200		35,100		

Location: I-10 and Wild Horse Pass Blvd Traffic Interchange
 Analysis Year: 2025
 Date Prepared: 06/02/2021



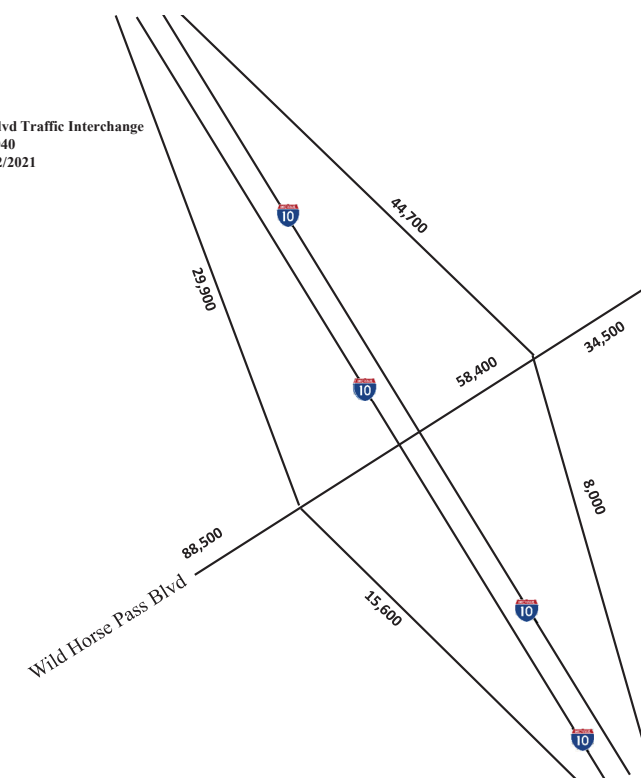
Legend
 X,XXX Approach Volume (ADT)

Location: I-10 and Wild Horse Pass Blvd Traffic Interchange
Analysis Year: 2035
Date Prepared: 06/02/2021



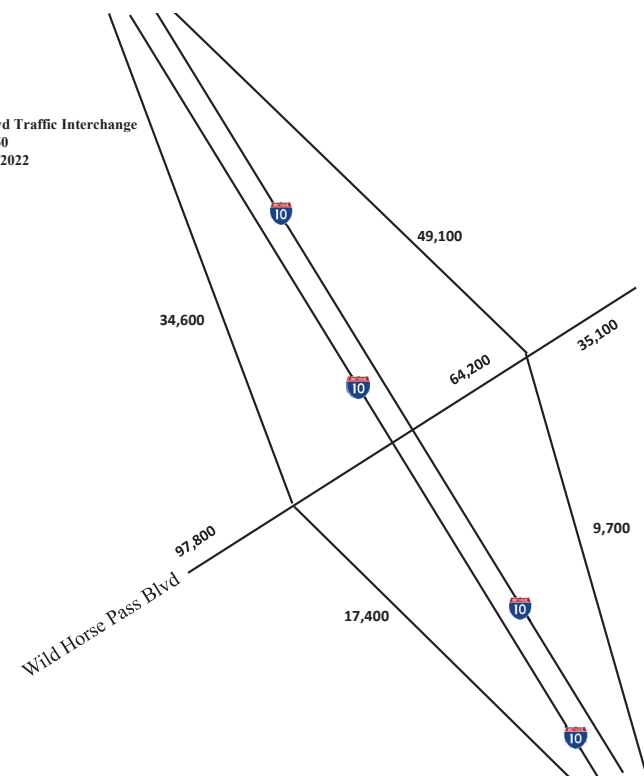
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X,XXX Approach Volume (ADT)

Location: I-10 and Wild Horse Pass Blvd Traffic Interchange
Analysis Year: 2040
Date Prepared: 06/02/2021



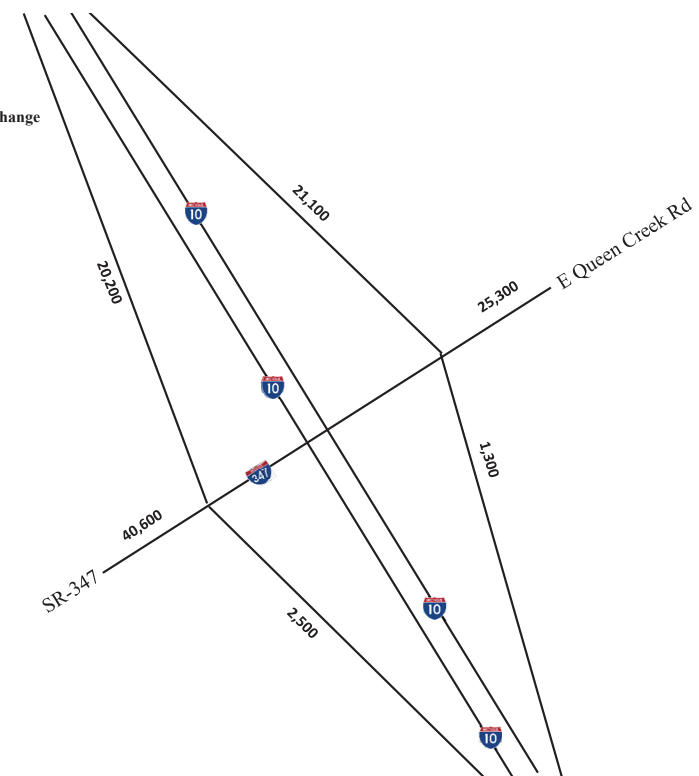
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X,XXX Approach Volume (ADT)

Location: I-10 and Wild Horse Pass Blvd Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/22/2022



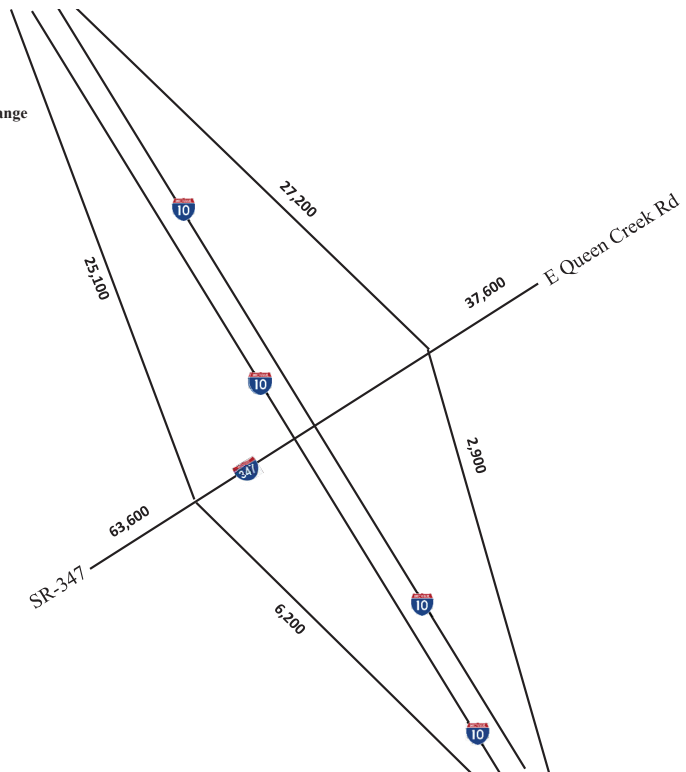
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X,XXX Approach Volume (ADT)

Location: I-10 and Queen Creek Rd Traffic Interchange
Analysis Year: 2025
Date Prepared: 06/02/2021



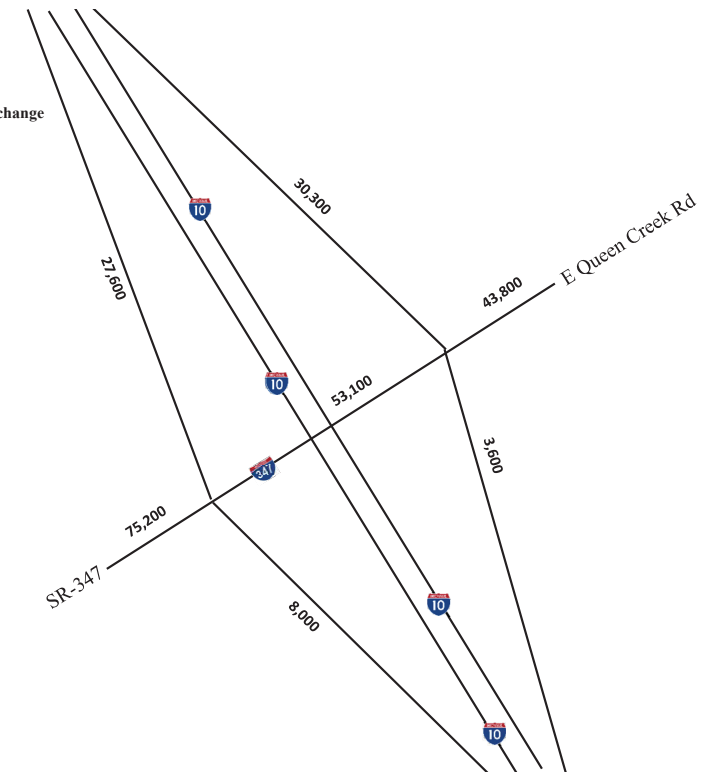
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X,XXX Approach Volume (ADT)

Location: I-10 and Queen Creek Rd Traffic Interchange
Analysis Year: 2035
Date Prepared: 06/02/2021



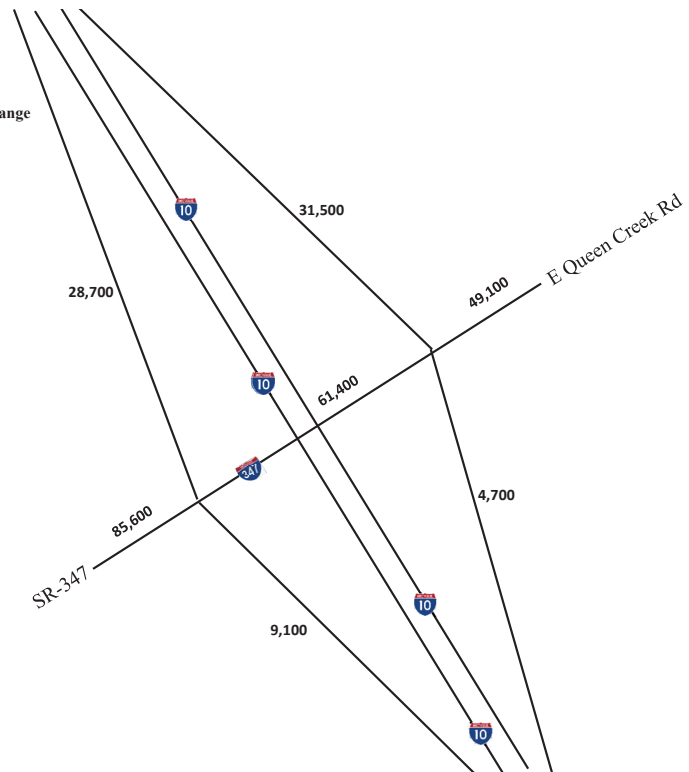
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X,XXX Approach Volume (ADT)

Location: I-10 and Queen Creek Rd Traffic Interchange
Analysis Year: 2040
Date Prepared: 06/02/2021



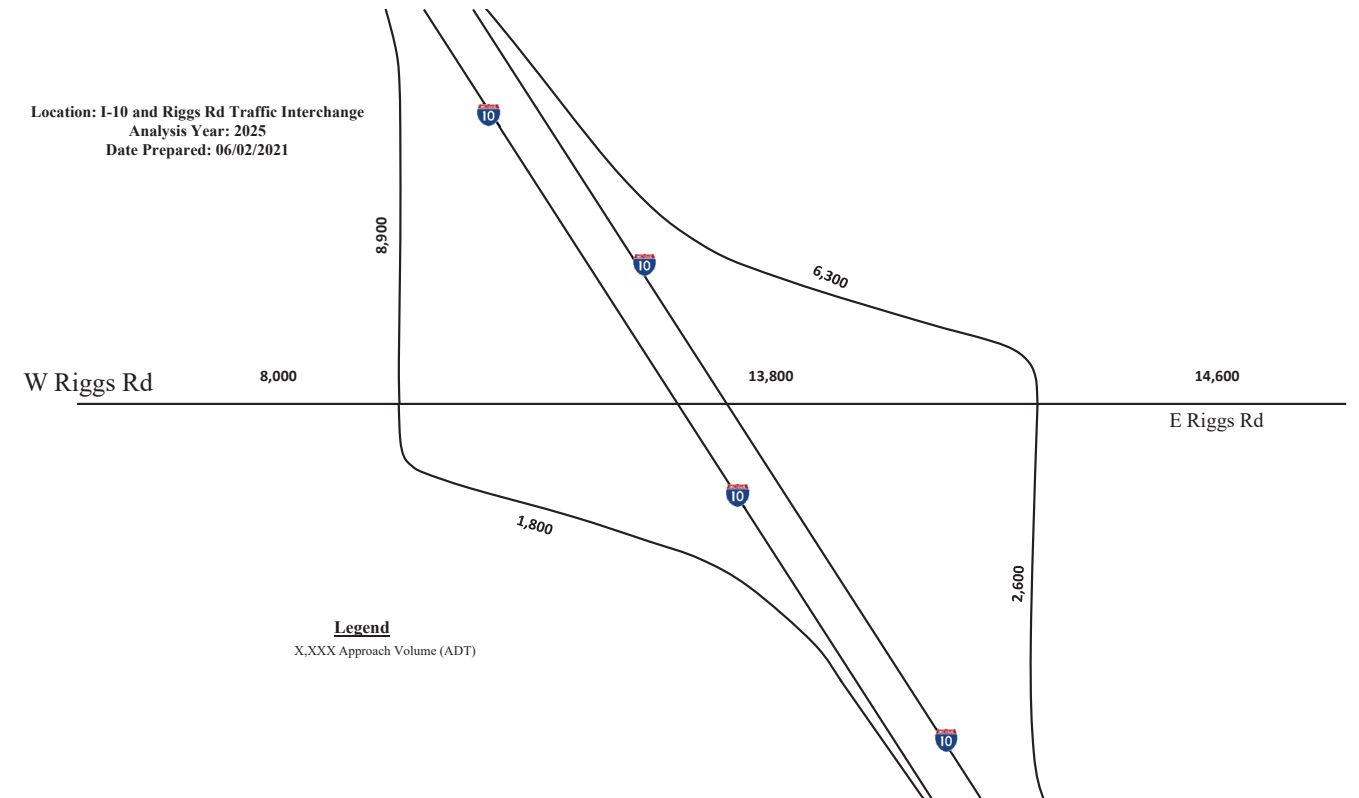
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X,XXX Approach Volume (ADT)

Location: I-10 and Queen Creek Rd Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/22/2022



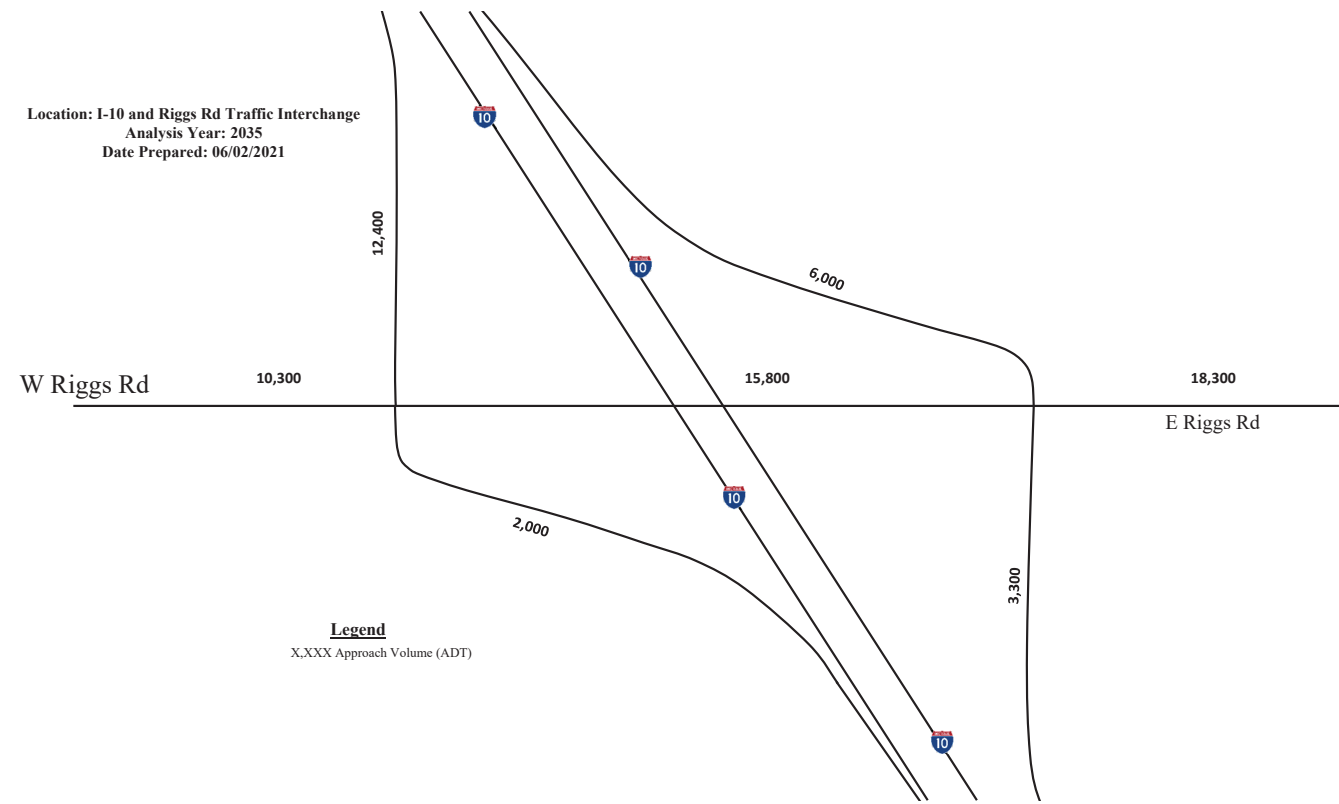
Legend
X,XXX Approach Volume (ADT)

Location: I-10 and Riggs Rd Traffic Interchange
Analysis Year: 2025
Date Prepared: 06/02/2021



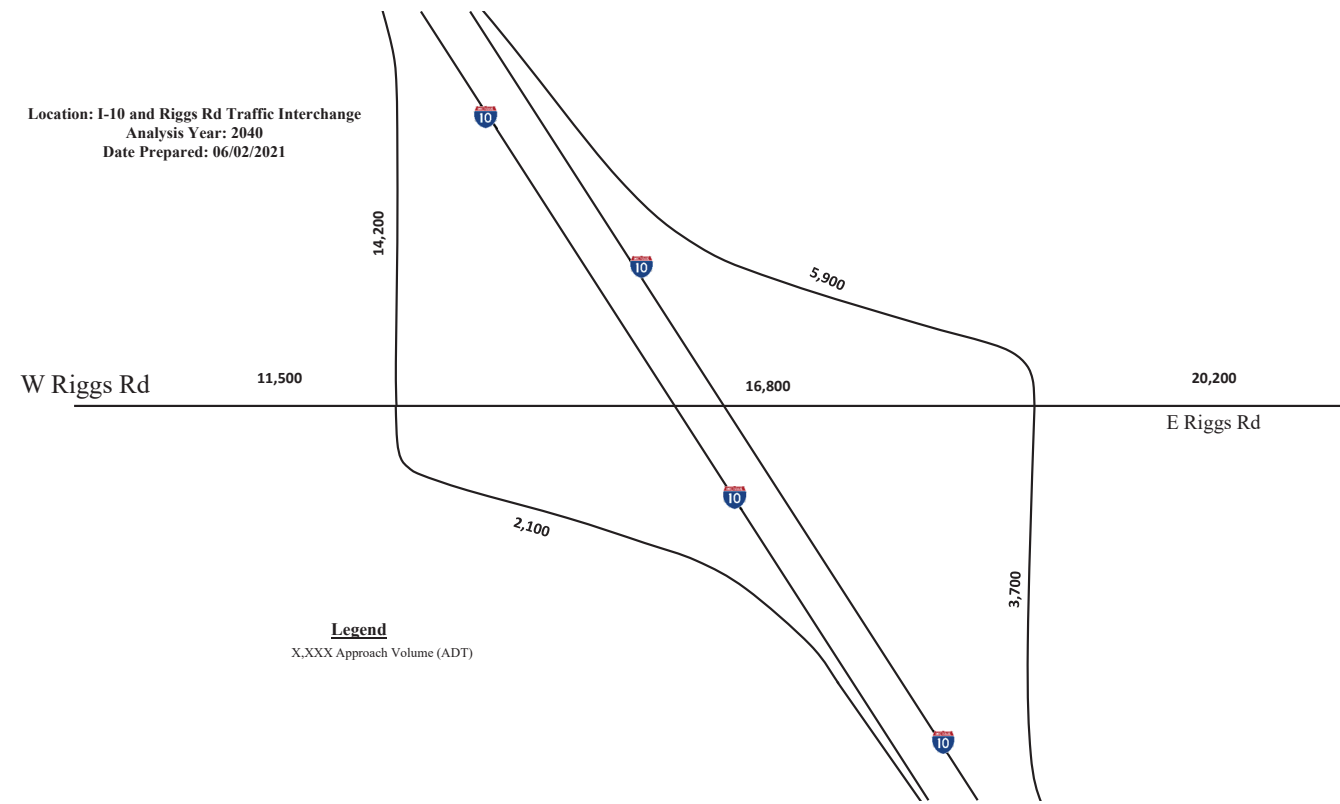
Legend
X,XXX Approach Volume (ADT)

Location: I-10 and Riggs Rd Traffic Interchange
Analysis Year: 2035
Date Prepared: 06/02/2021



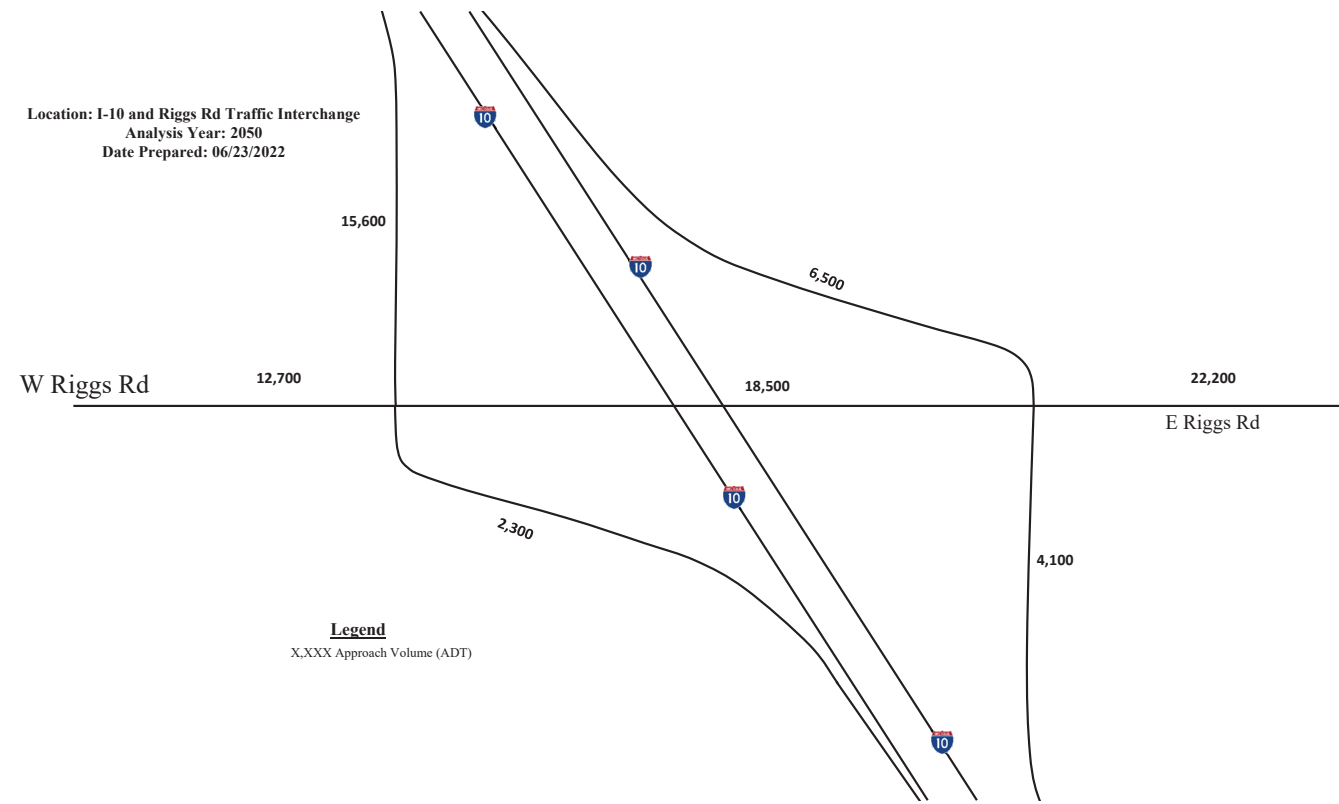
Legend
X,XXX Approach Volume (ADT)

Location: I-10 and Riggs Rd Traffic Interchange
Analysis Year: 2040
Date Prepared: 06/02/2021



Legend
X,XXX Approach Volume (ADT)

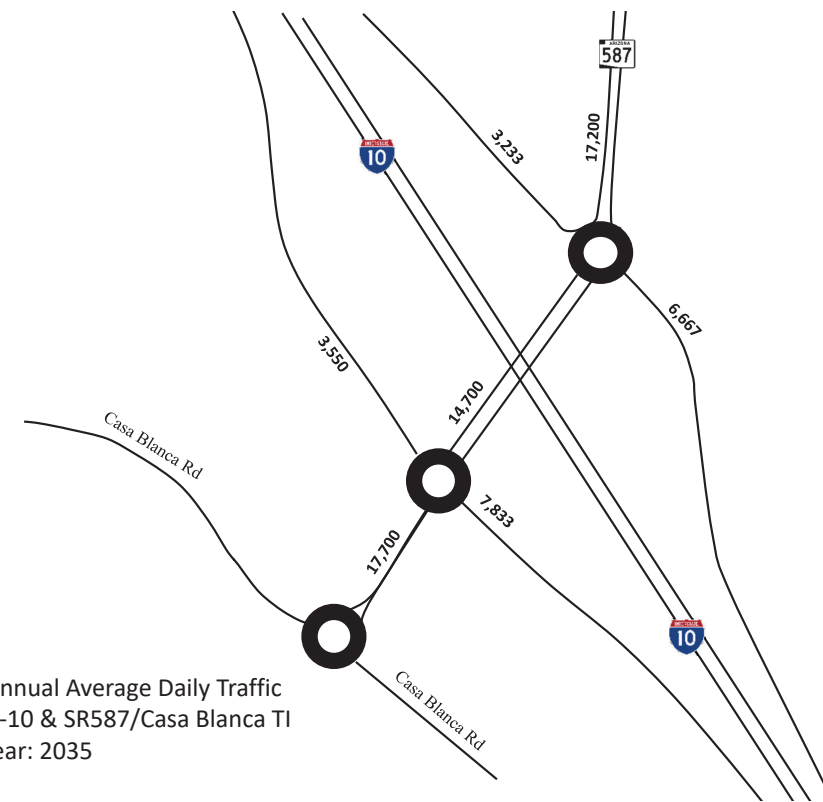
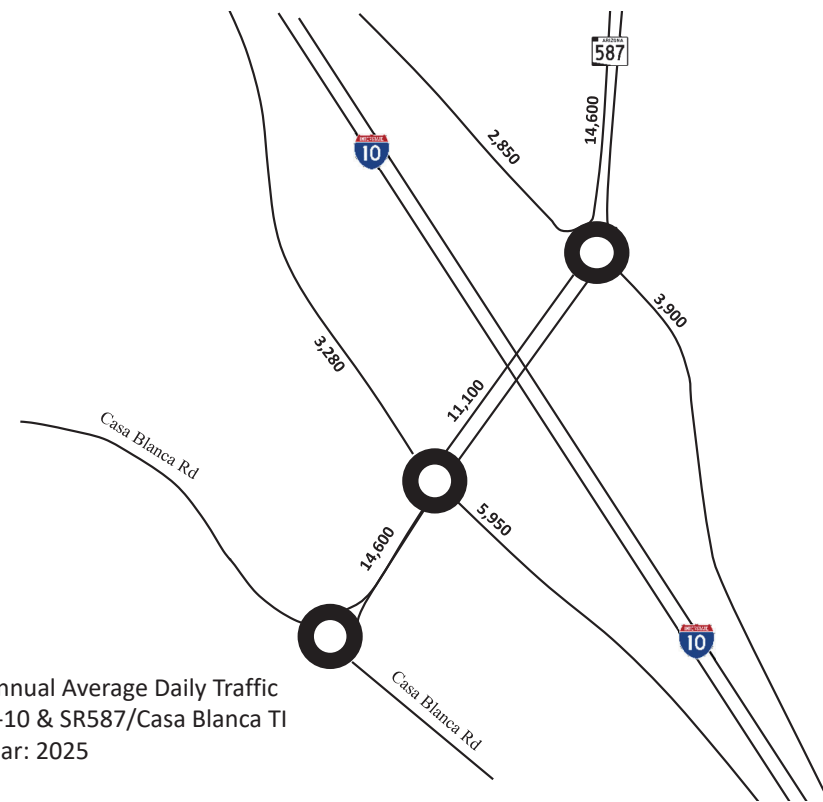
Location: I-10 and Riggs Rd Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/23/2022



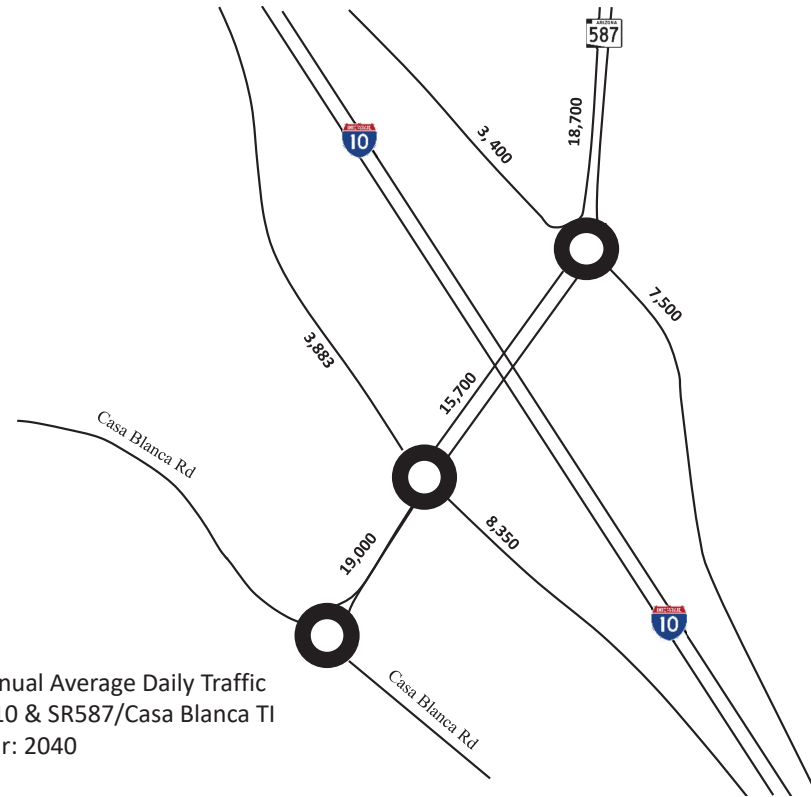
Legend
X,XXX Approach Volume (ADT)

Annual Average Daily Traffic
Location: I-10 & SR587/Casa Blanca TI
Analysis Year: Existing

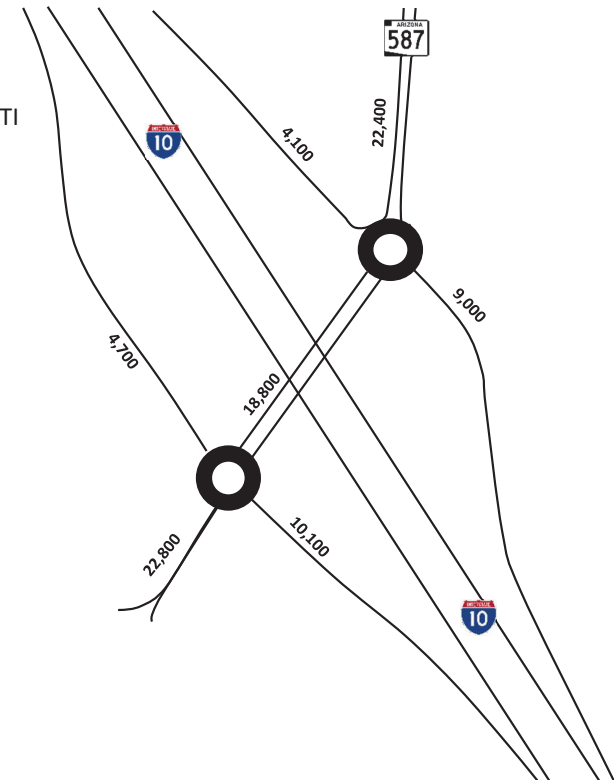




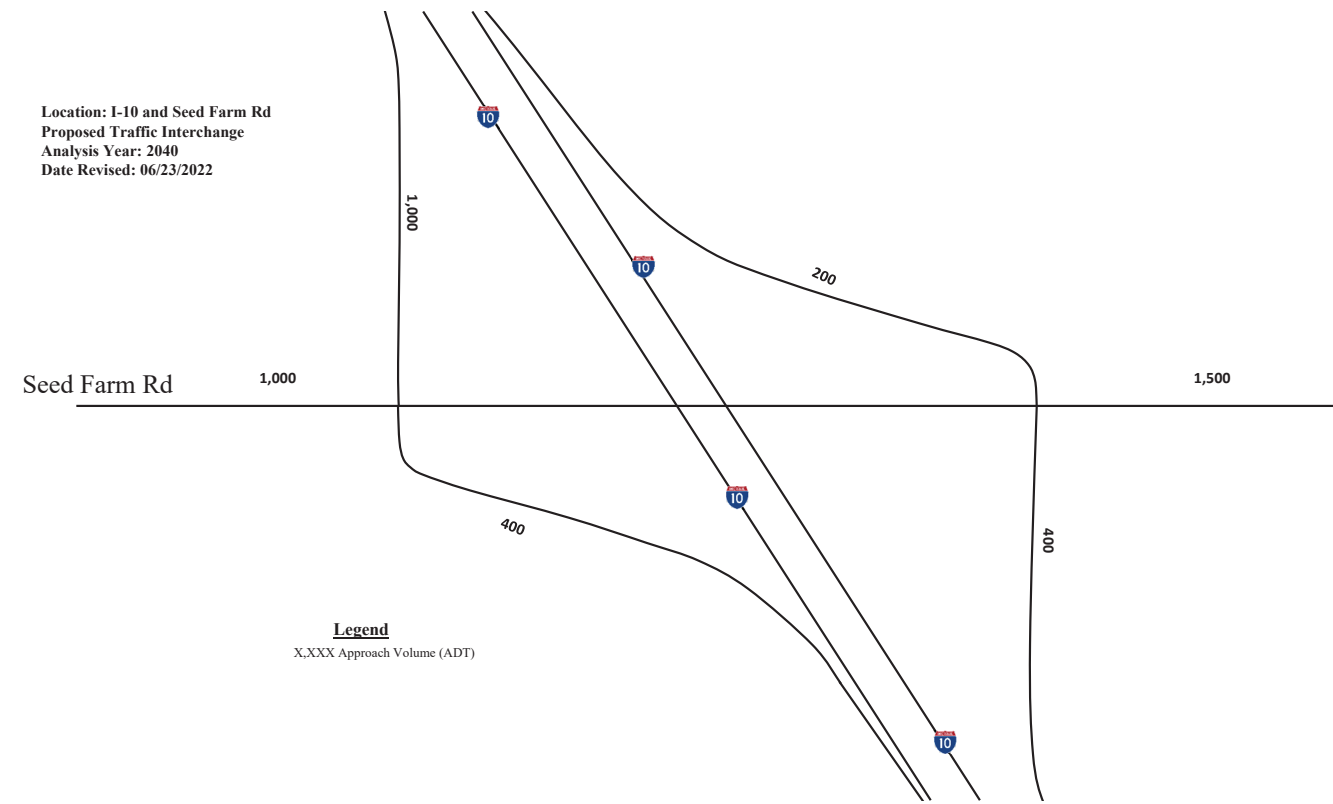
Forecast Annual Average Daily Traffic
Location: I-10 & SR587/Casa Blanca TI
Analysis Year: 2040



Location: I-10 & SR587/Casa Blanca TI
Analysis Year: 2050
Date Prepared: 06/23/2022

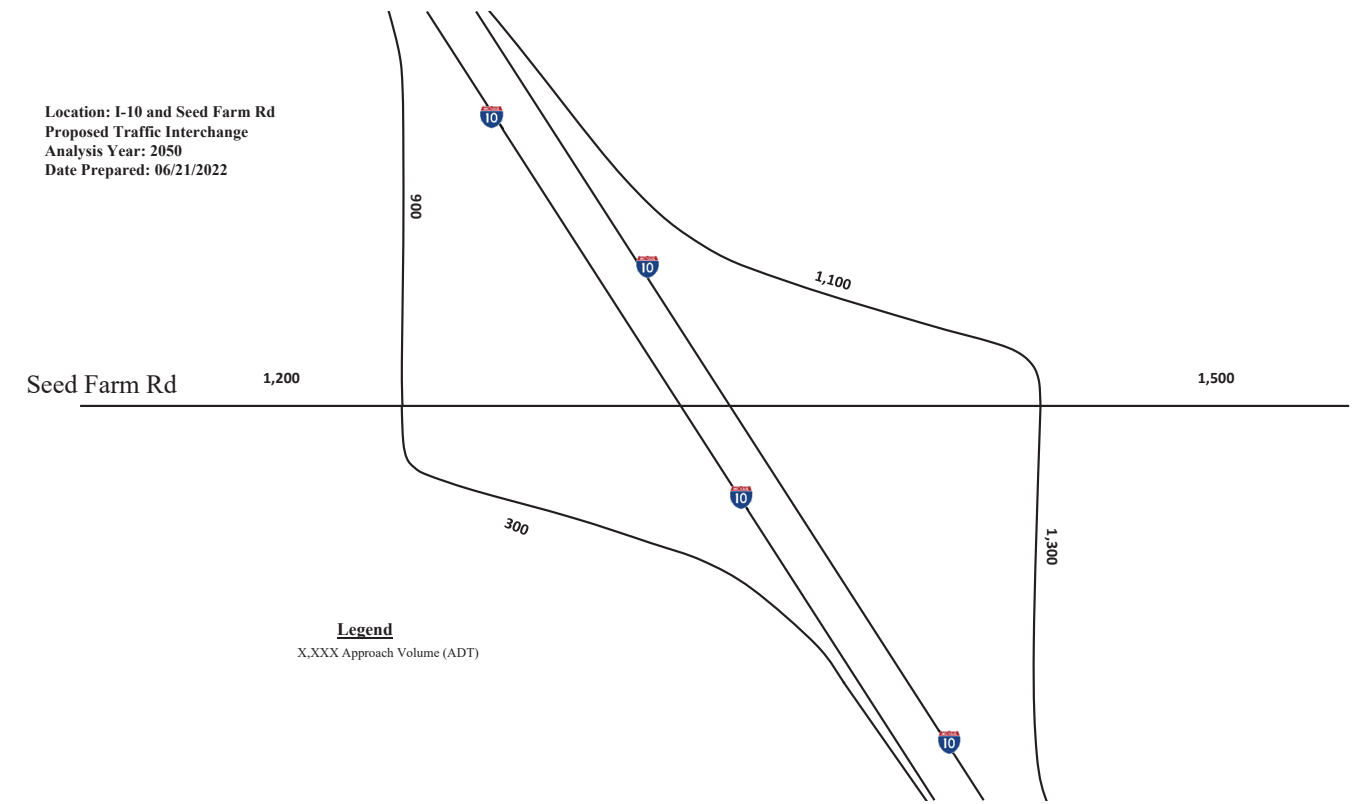


Location: I-10 and Seed Farm Rd
Proposed Traffic Interchange
Analysis Year: 2040
Date Revised: 06/23/2022



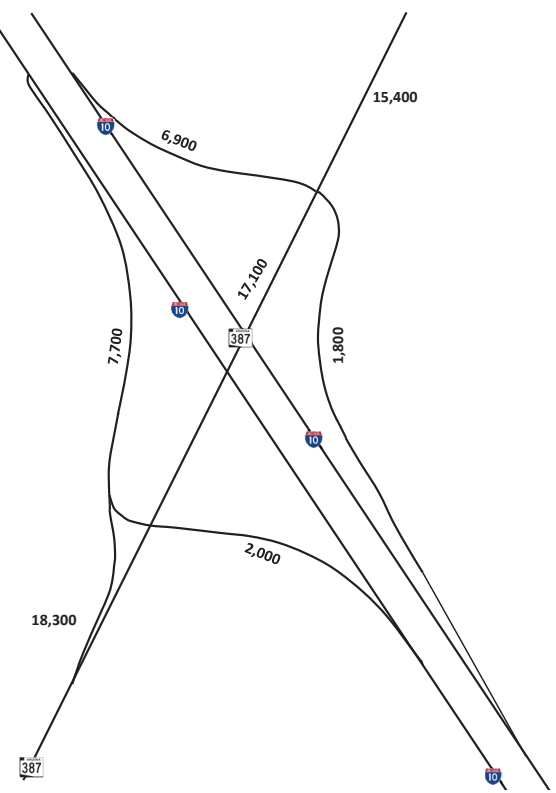
Legend
X,XXX Approach Volume (ADT)

Location: I-10 and Seed Farm Rd
Proposed Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/21/2022



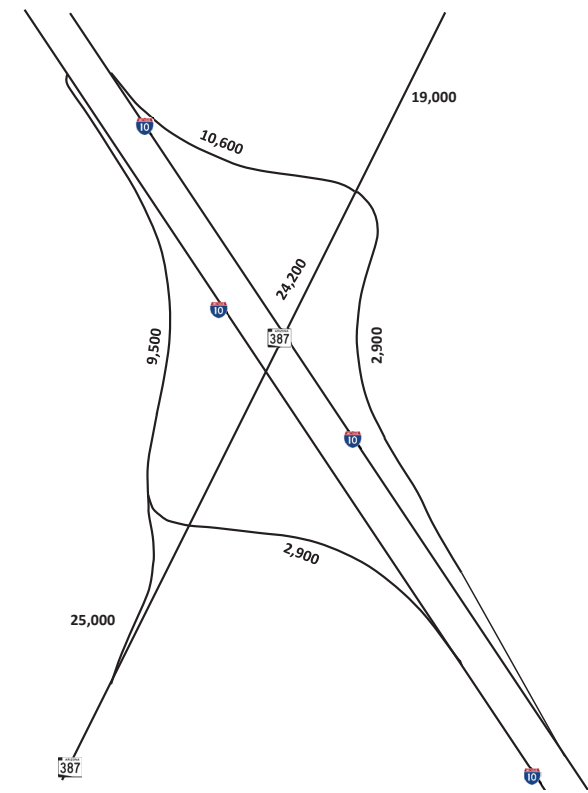
Legend
X,XXX Approach Volume (ADT)

Location: I-10 and SR-387 Traffic Interchange
Analysis Year: 2025
Date Prepared: 06/02/2021



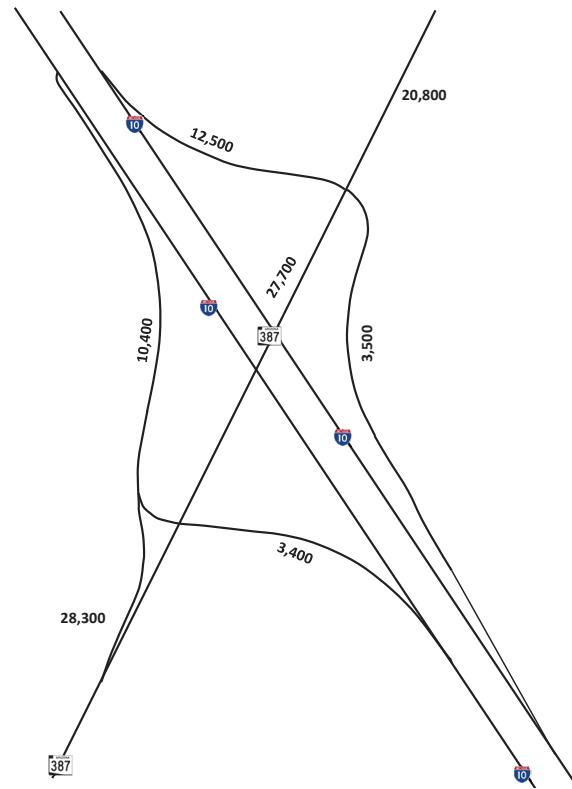
Legend
X,XXX Approach Volume (ADT)

Location: I-10 and SR-387 Traffic Interchange
Analysis Year: 2035
Date Prepared: 06/02/2021



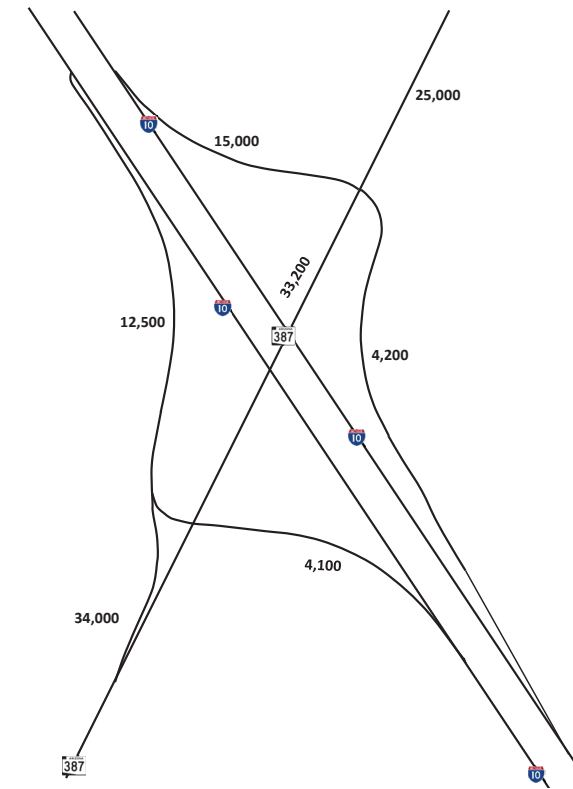
Legend
X,XXX Approach Volume (ADT)

Location: I-10 and SR-387 Traffic Interchange
Analysis Year: 2040
Date Prepared: 06/02/2021



Legend
X,XXX Approach Volume (ADT)

Location: I-10 and SR-387 Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/23/2022

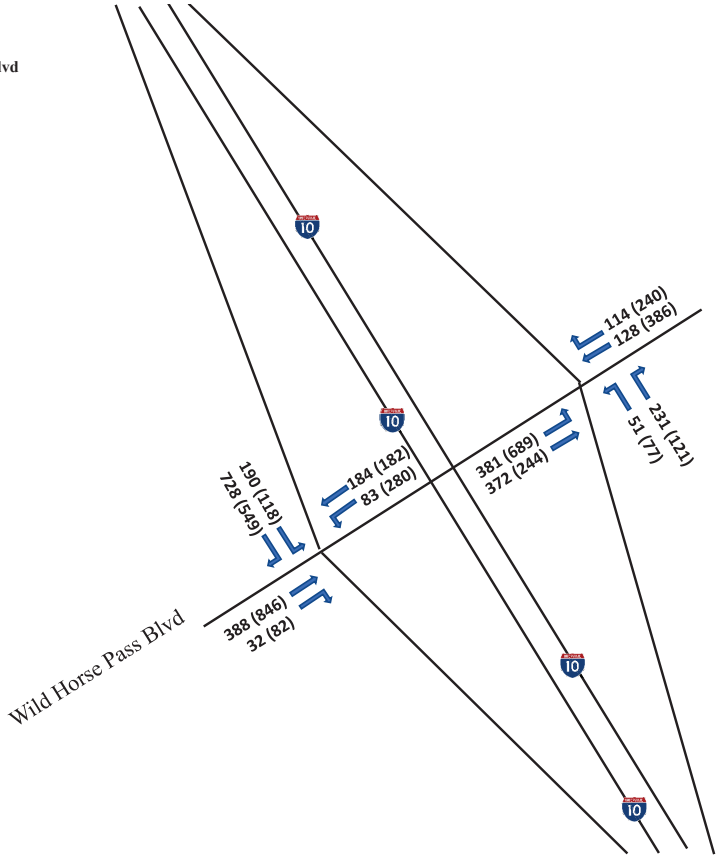


Legend
X,XXX Approach Volume (ADT)

Appendix B: Turning Movement Volumes

Location: I-10 and Wild Horse Pass Blvd
Traffic Interchange
Analysis Year: Existing (2019)
Date Prepared: 05/25/2021

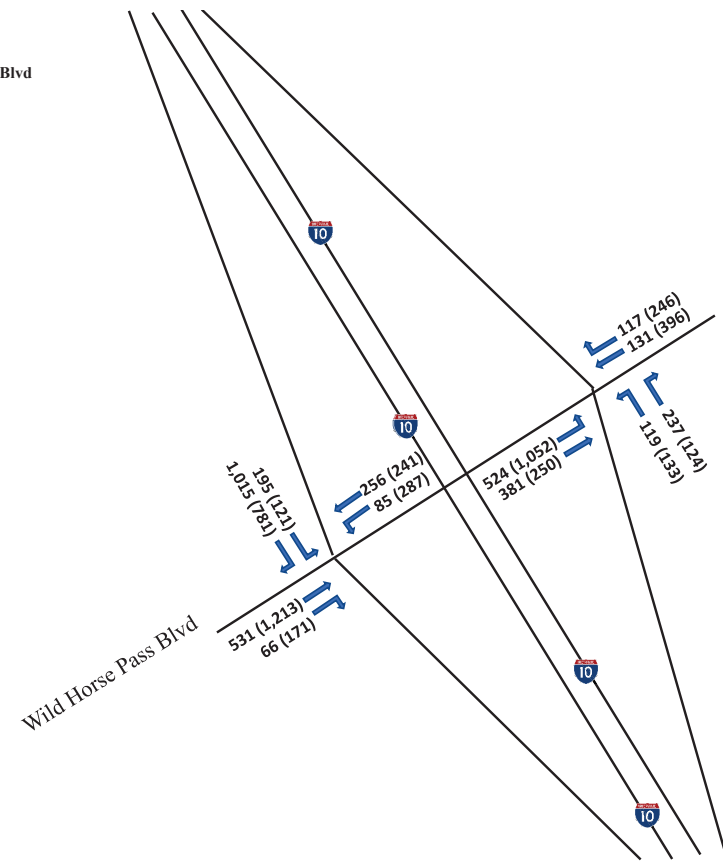
Turning Movement Volumes
AM (PM)



Location: I-10 and Wild Horse Pass Blvd
Traffic Interchange
Analysis Year: 2025
Date Prepared: 05/25/2021

Turning Movement Volumes

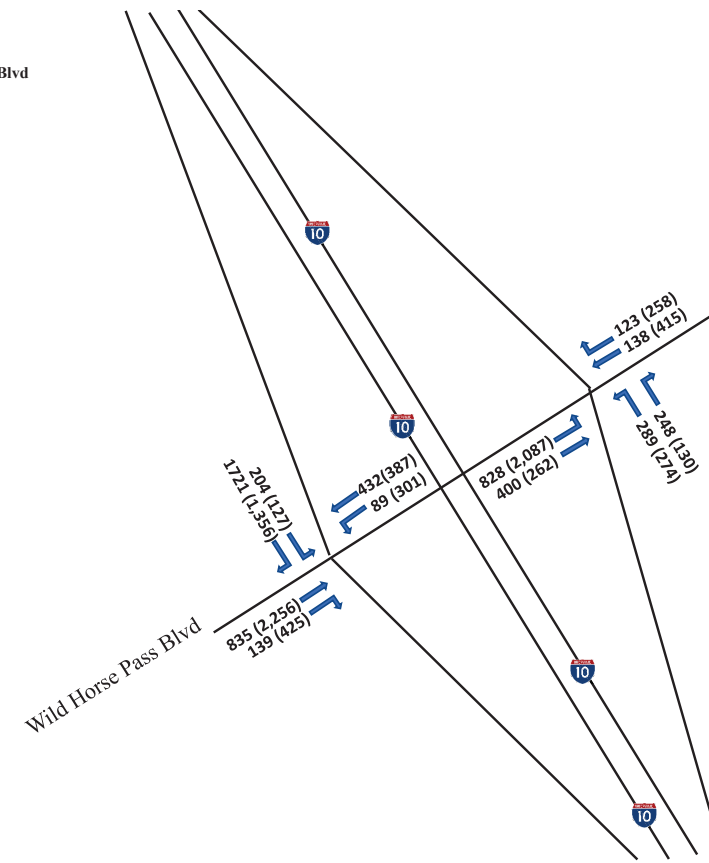
AM (PM)



Location: I-10 and Wild Horse Pass Blvd
Traffic Interchange
Analysis Year: 2035
Date Prepared: 05/25/2021

Turning Movement Volumes

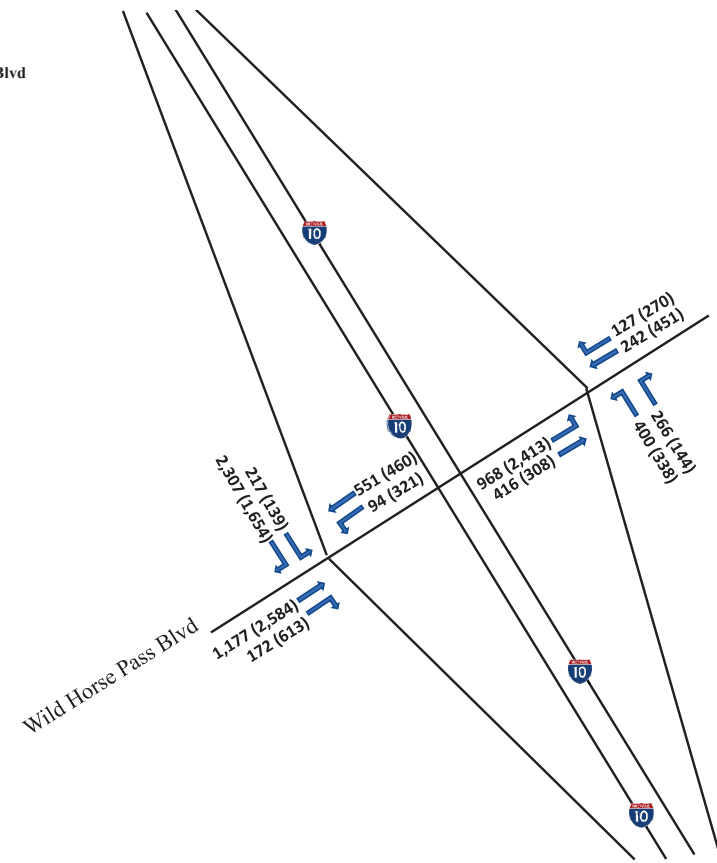
AM (PM)



Location: I-10 and Wild Horse Pass Blvd
Traffic Interchange
Analysis Year: 2040
Date Prepared: 05/25/2021

Turning Movement Volumes

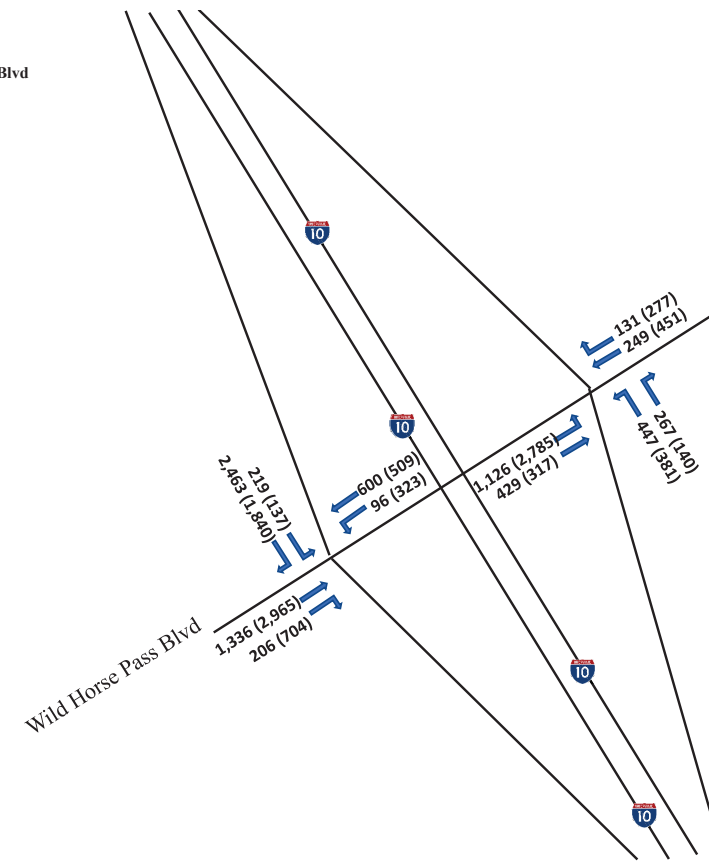
AM (PM)



Location: I-10 and Wild Horse Pass Blvd
Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/20/2022

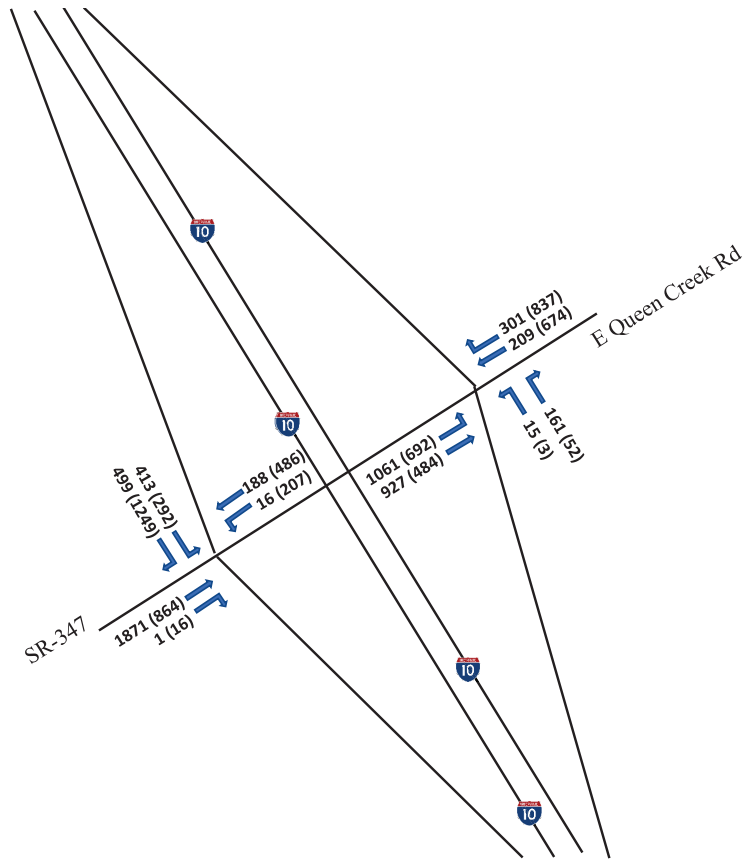
Turning Movement Volumes

AM (PM)



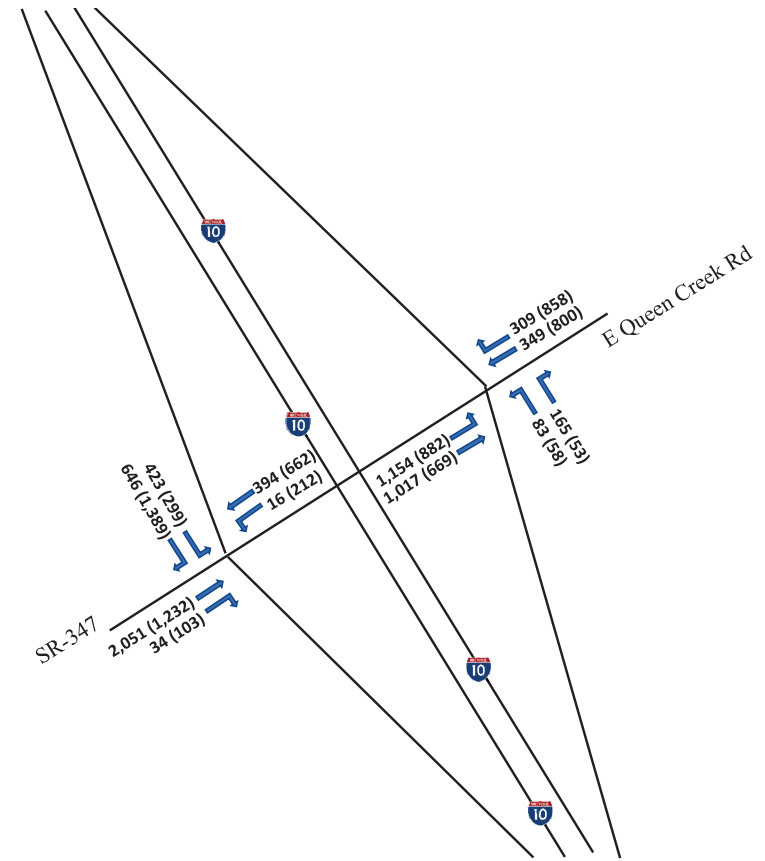
Location: I-10 and Queen Creek Rd
Traffic Interchange
Analysis Year: Existing
Date Prepared: 05/25/2021

Turning Movement Volumes
AM (PM)



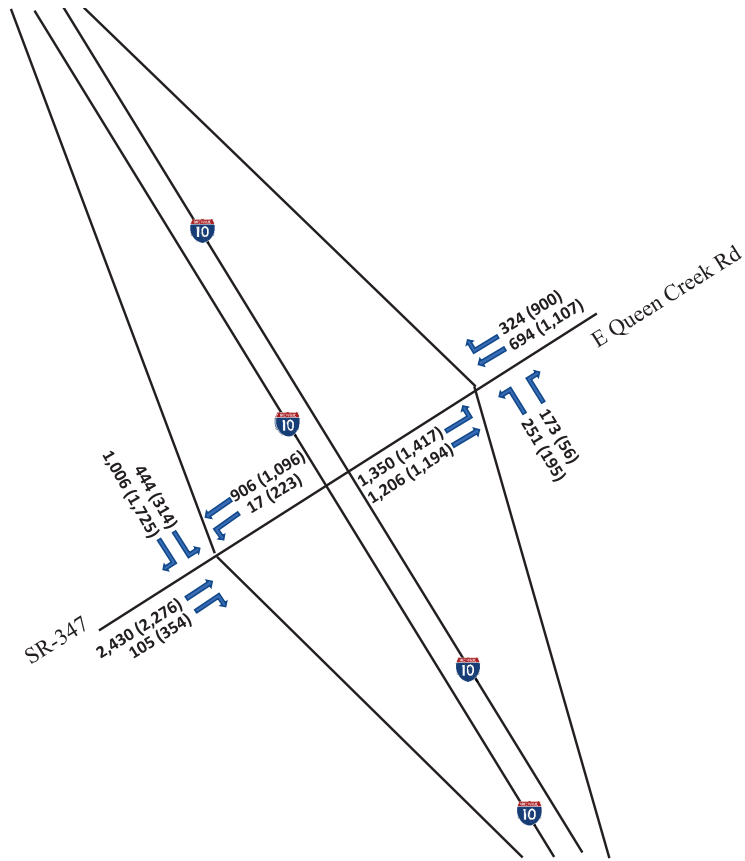
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Traffic Interchange
Analysis Year: 2025
Date Prepared: 05/25/2021

Turning Movement Volumes
AM (PM)



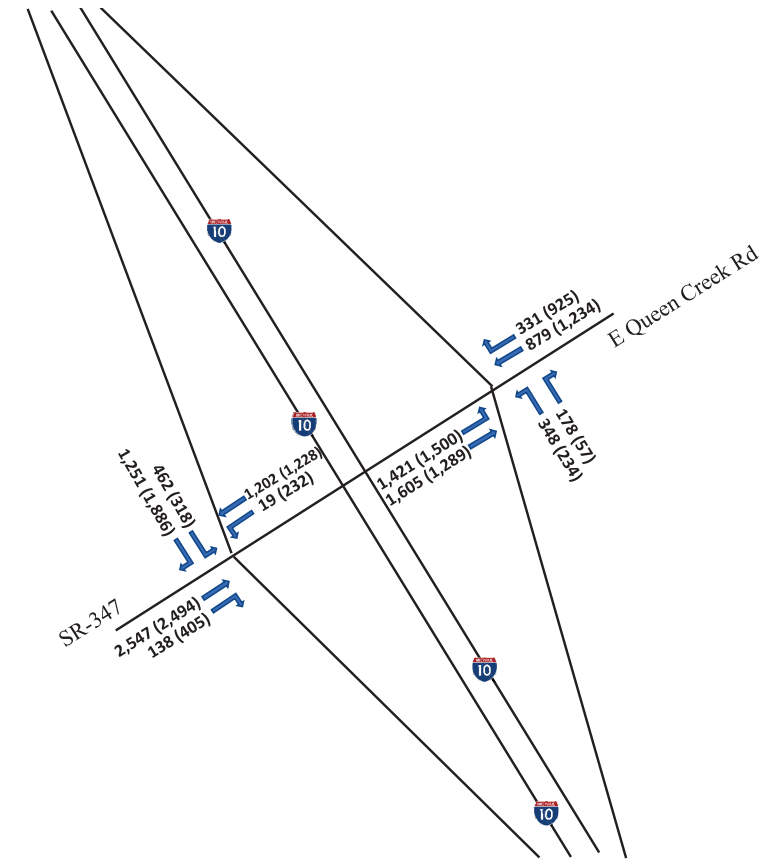
Location: I-10 and Queen Creek Rd
Traffic Interchange
Analysis Year: 2035
Date Prepared: 05/25/2021

Turning Movement Volumes
AM (PM)



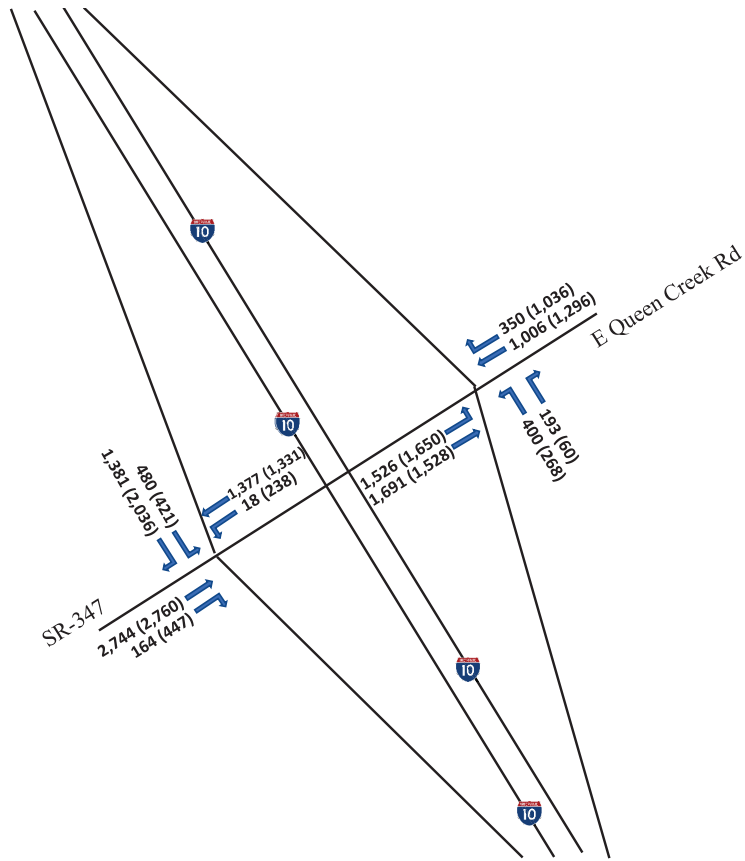
Location: I-10 and Queen Creek Rd
Traffic Interchange
Analysis Year: 2040
Date Prepared: 05/25/2021

Turning Movement Volumes
AM (PM)



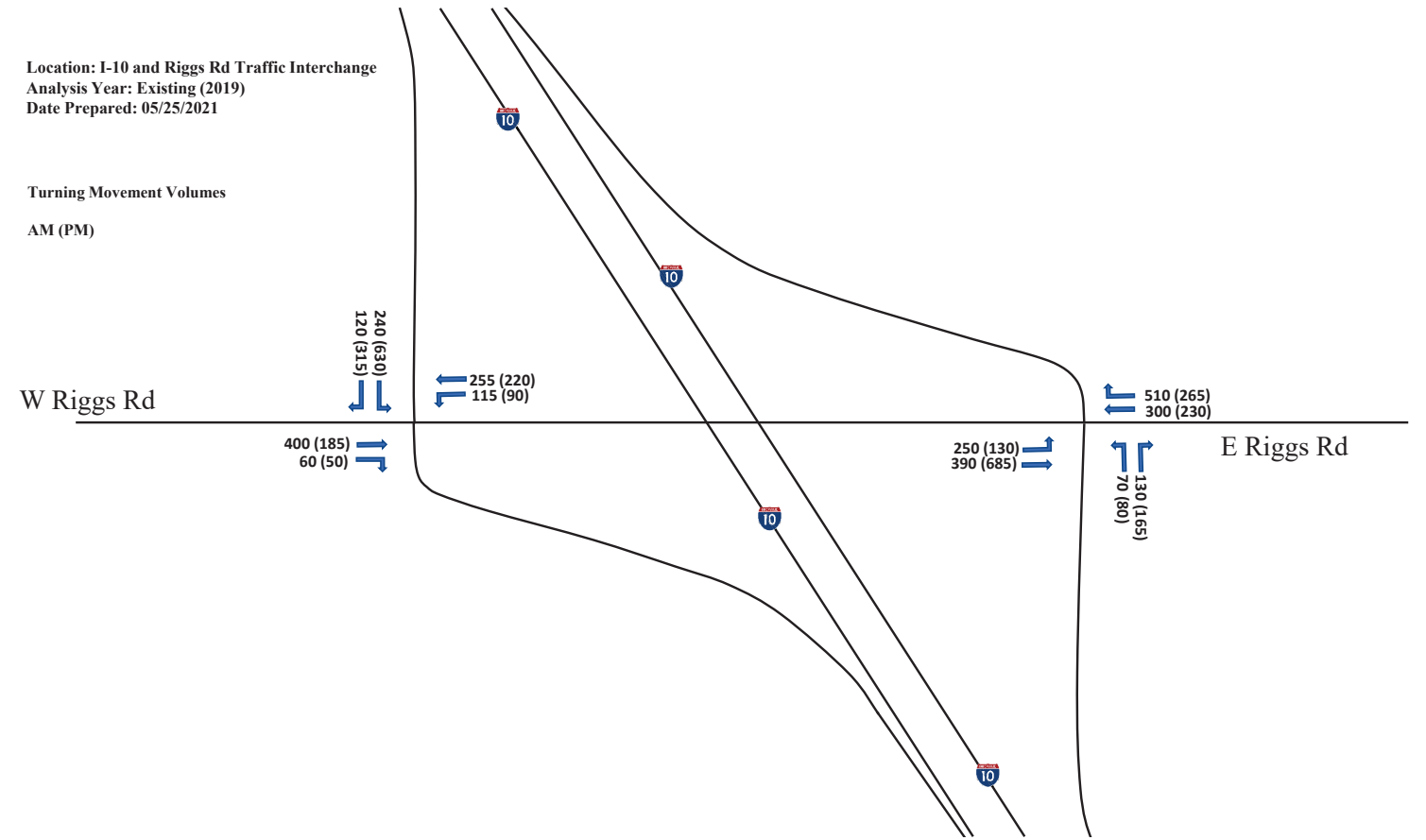
Location: I-10 and Queen Creek Rd
 Traffic Interchange
 Analysis Year: 2050
 Date Prepared: 06/23/2022

Turning Movement Volumes
 AM (PM)



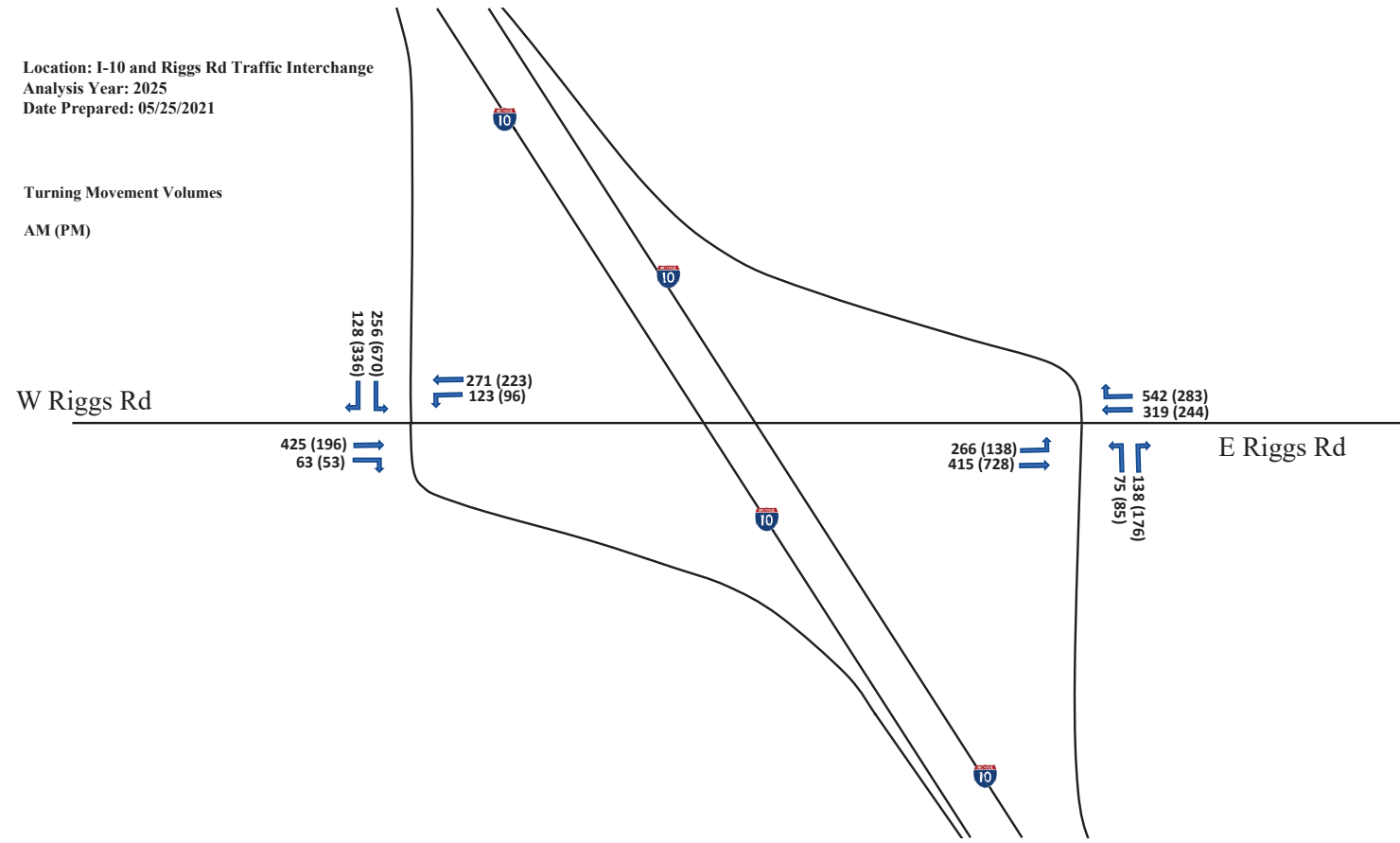
Location: I-10 and Riggs Rd Traffic Interchange
 Analysis Year: Existing (2019)
 Date Prepared: 05/25/2021

Turning Movement Volumes
 AM (PM)



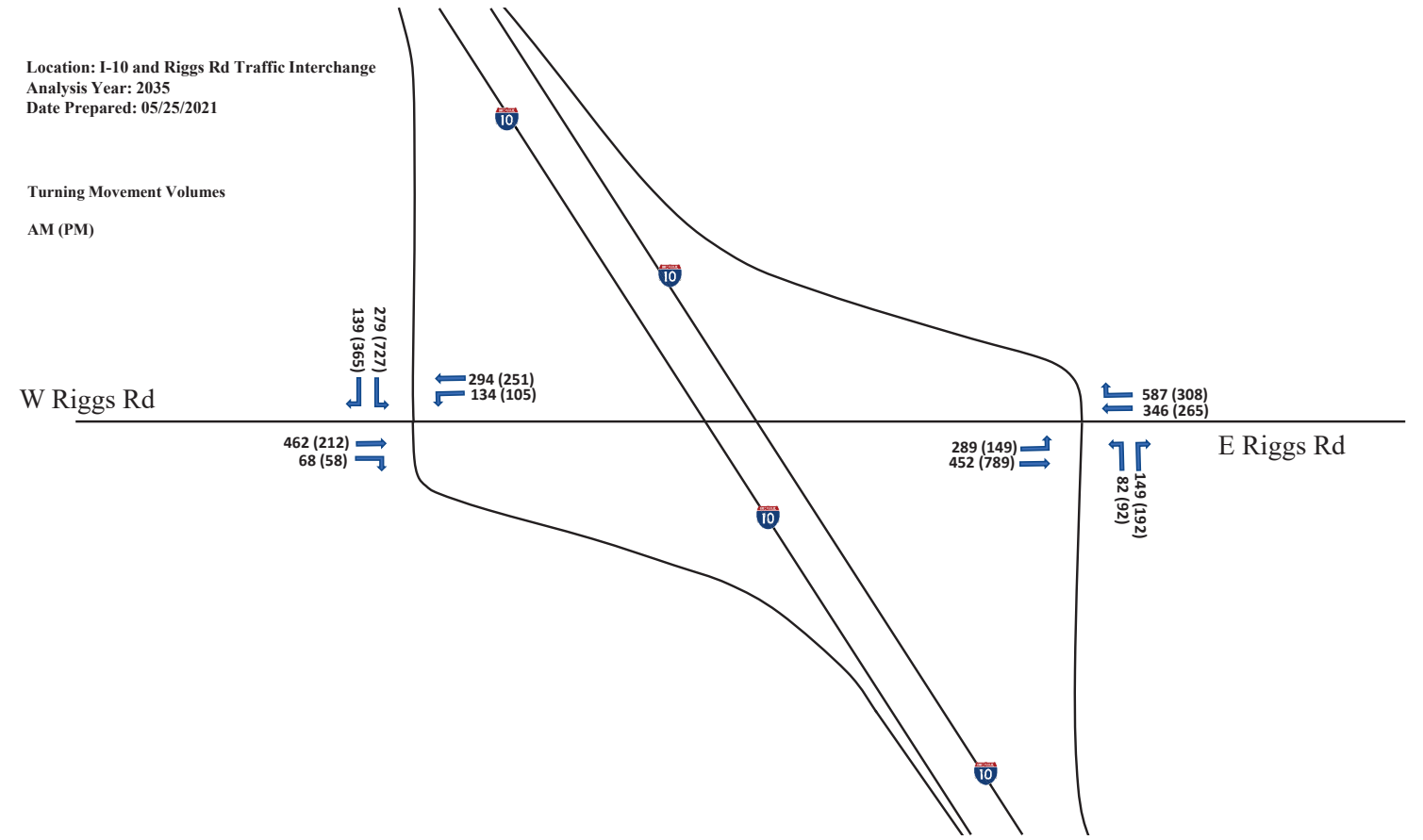
Location: I-10 and Riggs Rd Traffic Interchange
Analysis Year: 2025
Date Prepared: 05/25/2021

Turning Movement Volumes
AM (PM)



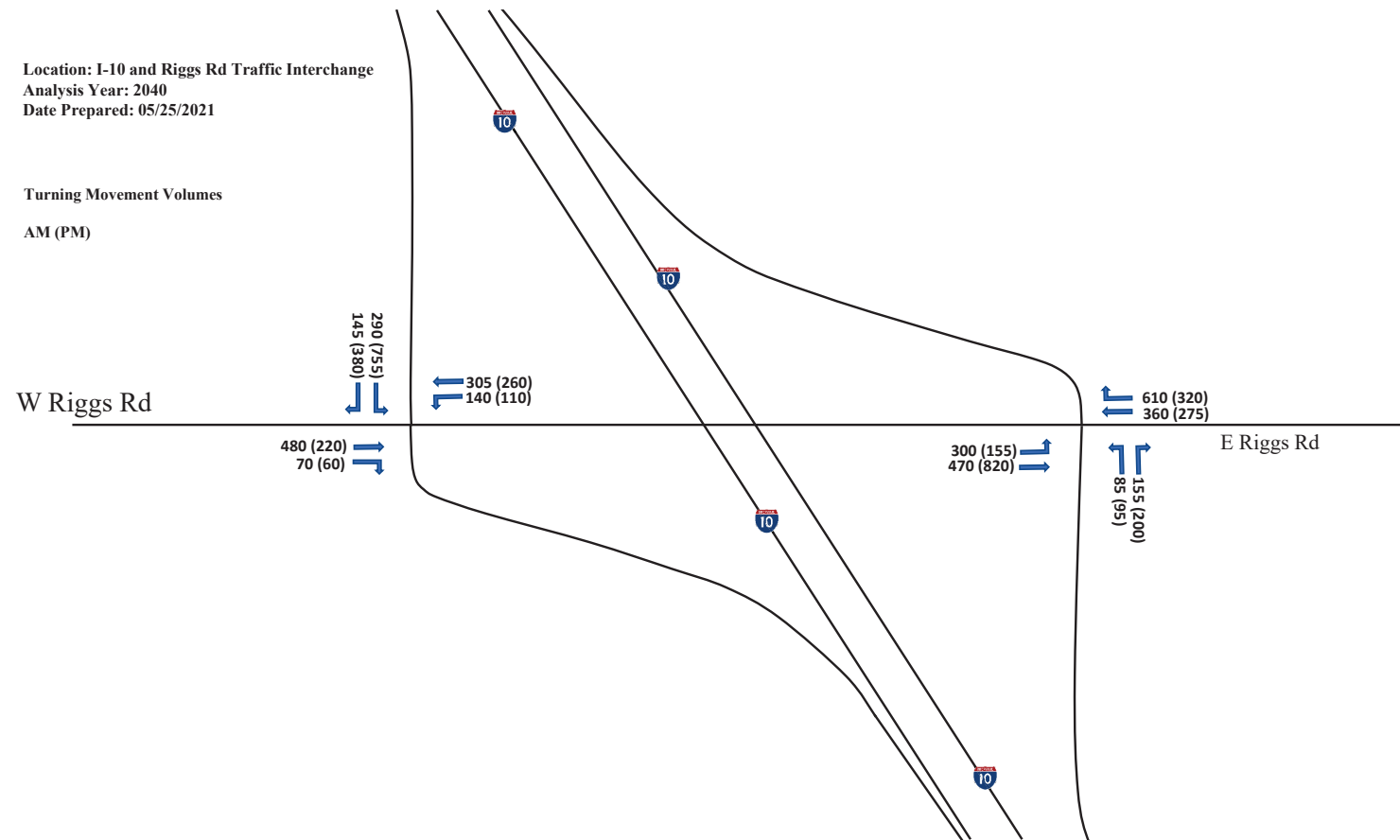
Location: I-10 and Riggs Rd Traffic Interchange
Analysis Year: 2035
Date Prepared: 05/25/2021

Turning Movement Volumes
AM (PM)



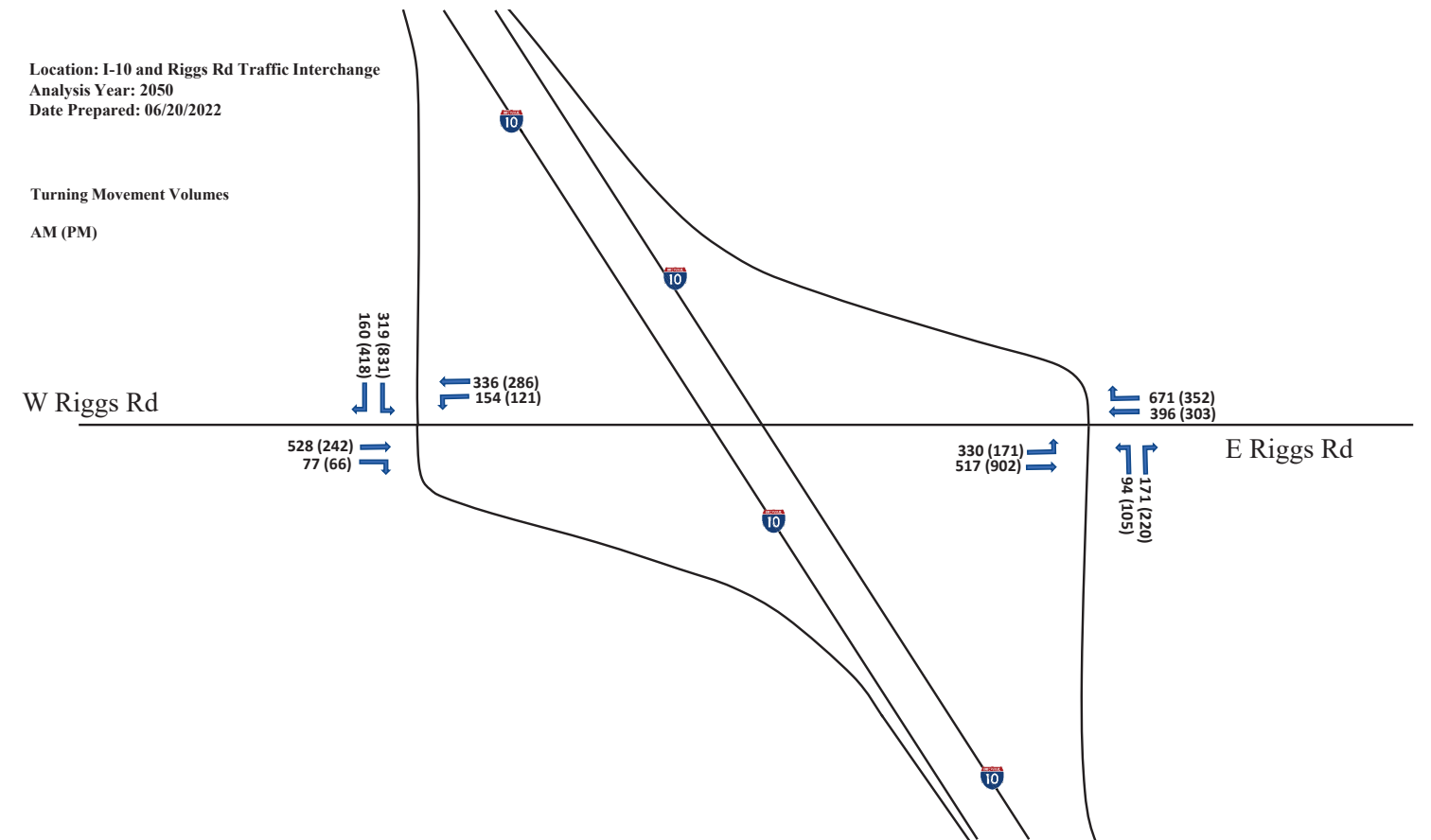
Location: I-10 and Riggs Rd Traffic Interchange
Analysis Year: 2040
Date Prepared: 05/25/2021

Turning Movement Volumes
AM (PM)



Location: I-10 and Riggs Rd Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/20/2022

Turning Movement Volumes
AM (PM)



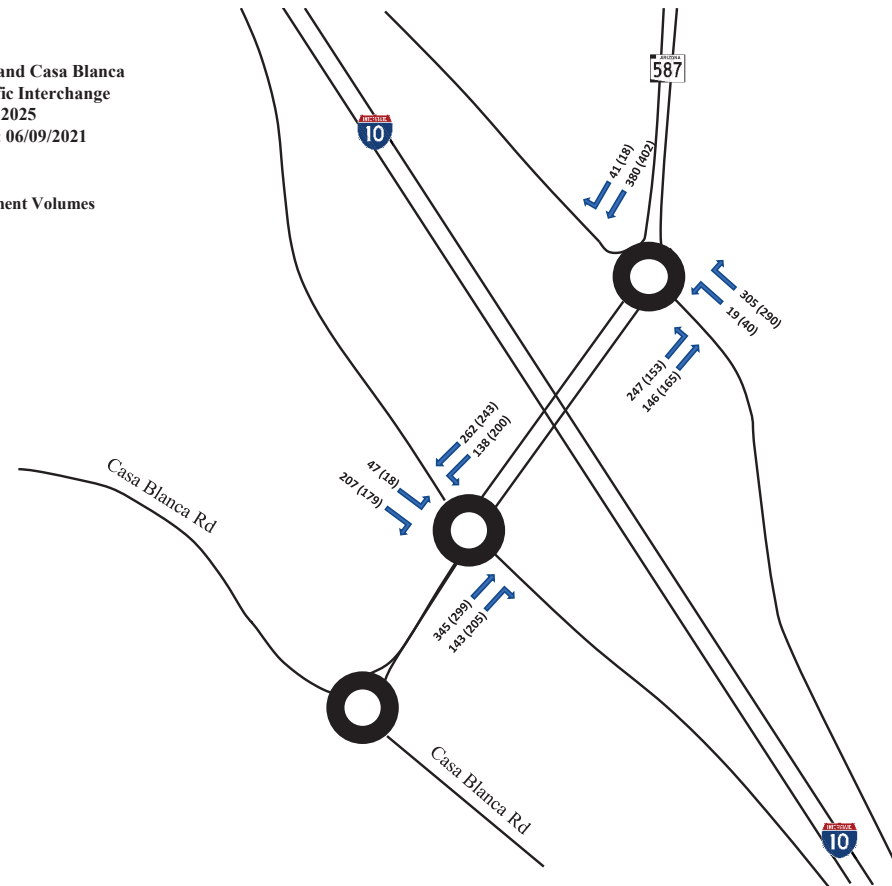
Location: I-10 and Casa Blanca
 Existing Traffic Interchange
 Analysis Year: Existing (2019)
 Date Prepared: 04/08/2021

Turning Movement Volumes
 AM (PM)



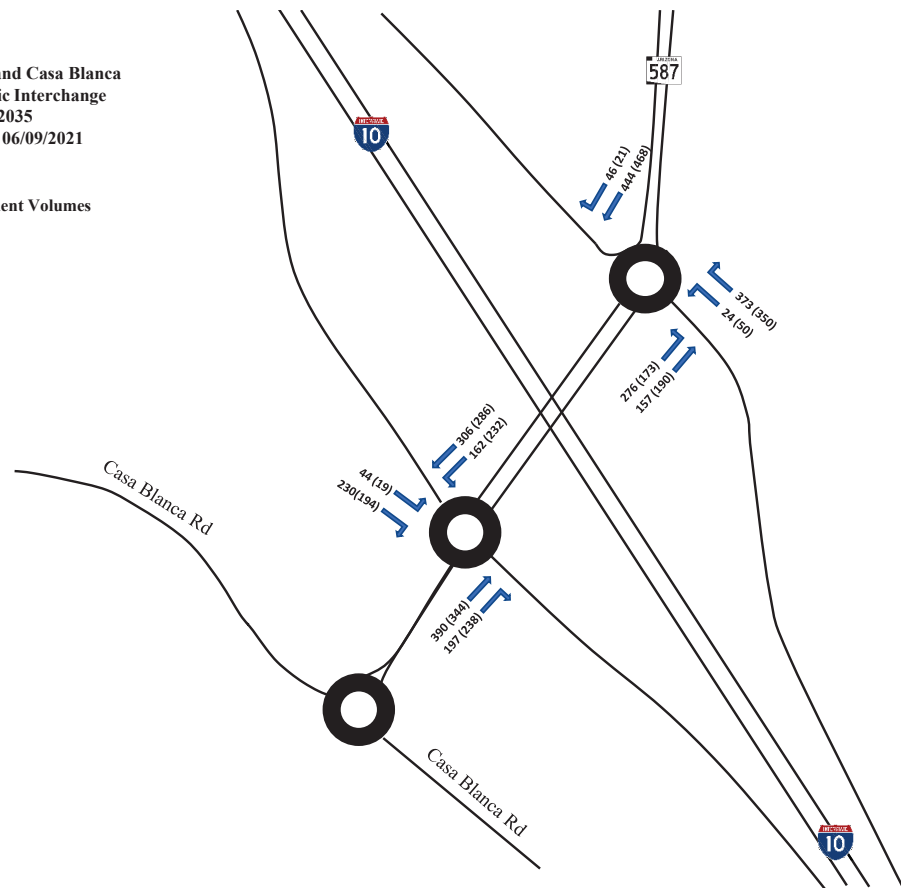
Location: I-10 and Casa Blanca
 Proposed Traffic Interchange
 Analysis Year: 2025
 Date Prepared: 06/09/2021

Turning Movement Volumes
 AM (PM)



Location: I-10 and Casa Blanca
 Proposed Traffic Interchange
 Analysis Year: 2035
 Date Prepared: 06/09/2021

Turning Movement Volumes
 AM (PM)



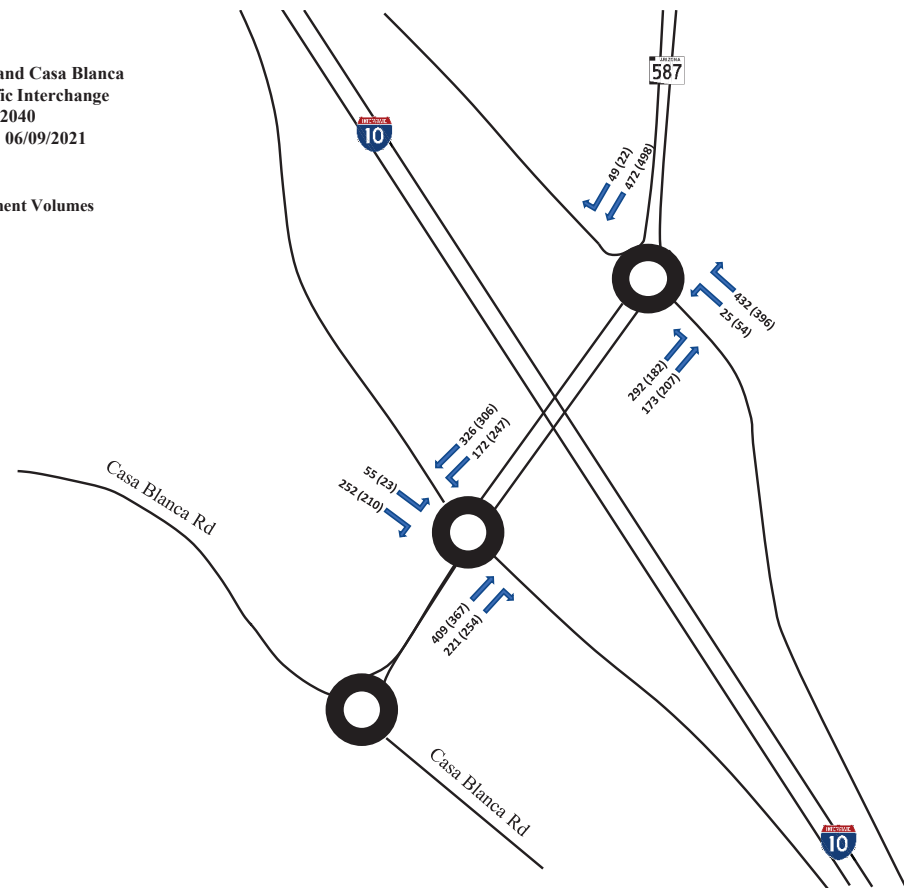
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 Existing Traffic Interchange
 Analysis Year: 2040 (No Build)
 Date Prepared: 04/08/2021

Turning Movement Volumes
 AM (PM)



Location: I-10 and Casa Blanca
 Proposed Traffic Interchange
 Analysis Year: 2040
 Date Prepared: 06/09/2021

Turning Movement Volumes
 AM (PM)



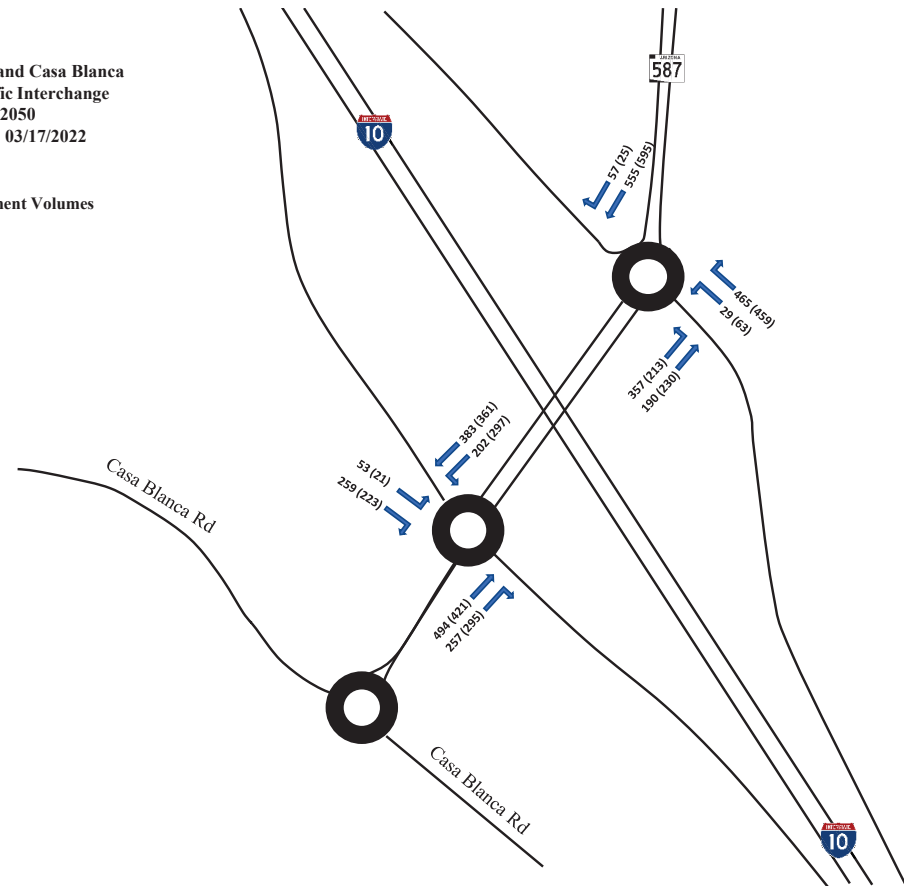
Location: I-10 and Casa Blanca
 Existing Traffic Interchange
 Analysis Year: 2050
 Date Prepared: 06/20/2022

Turning Movement Volumes
 AM (PM)



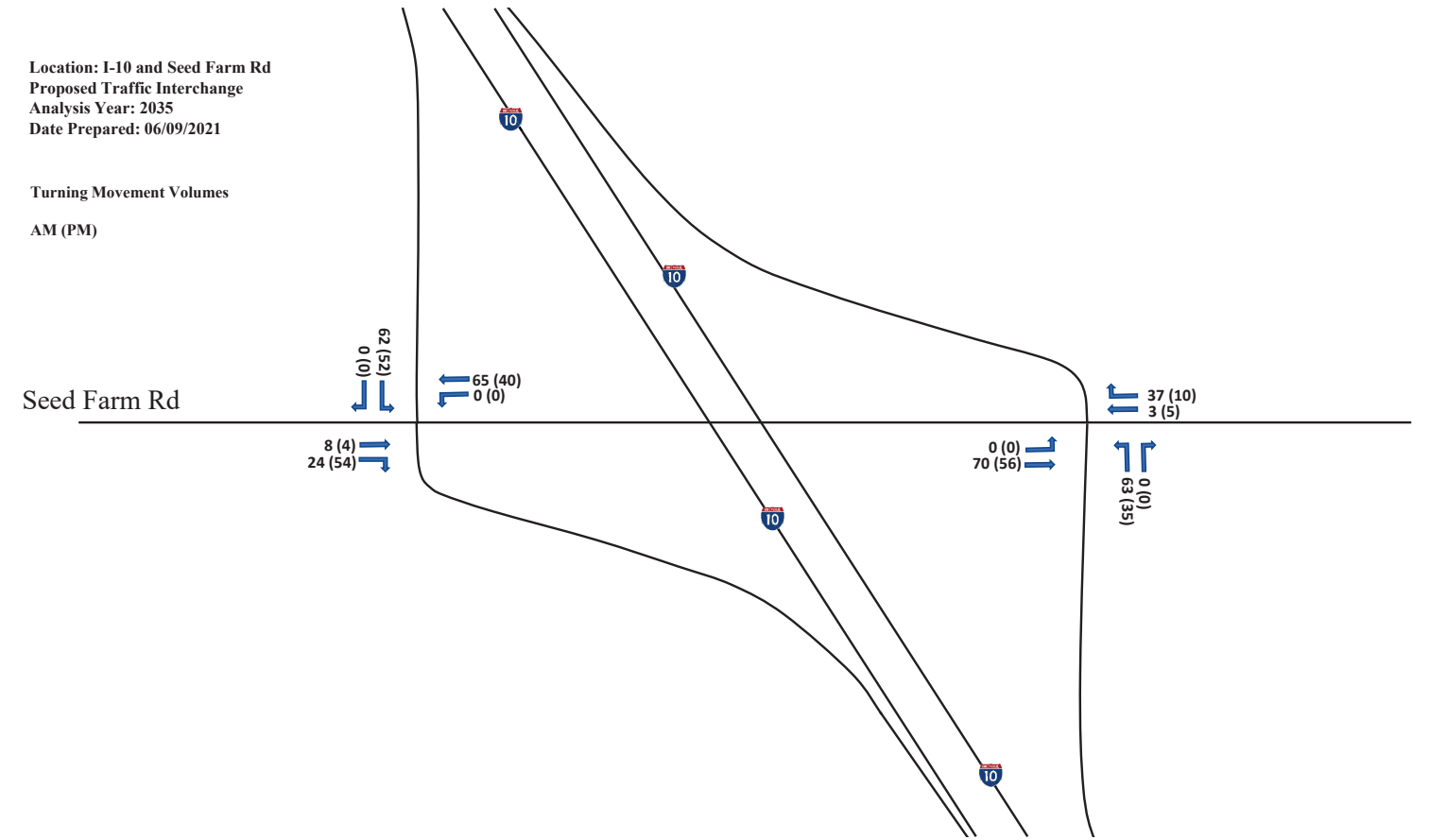
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 Proposed Traffic Interchange
 Analysis Year: 2050
 Date Prepared: 03/17/2022

Turning Movement Volumes
 AM (PM)



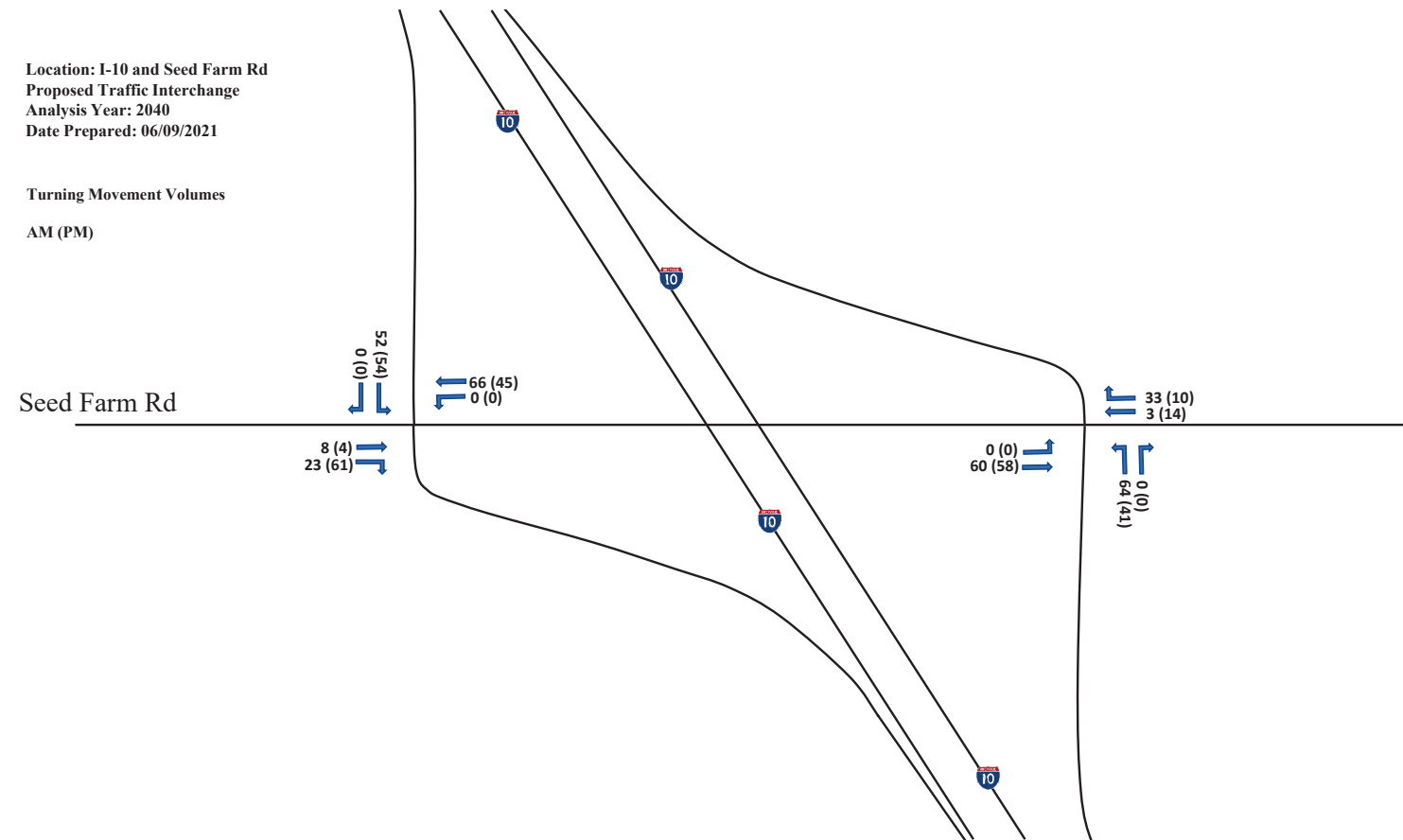
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 Proposed Traffic Interchange
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Turning Movement Volumes
 AM (PM)



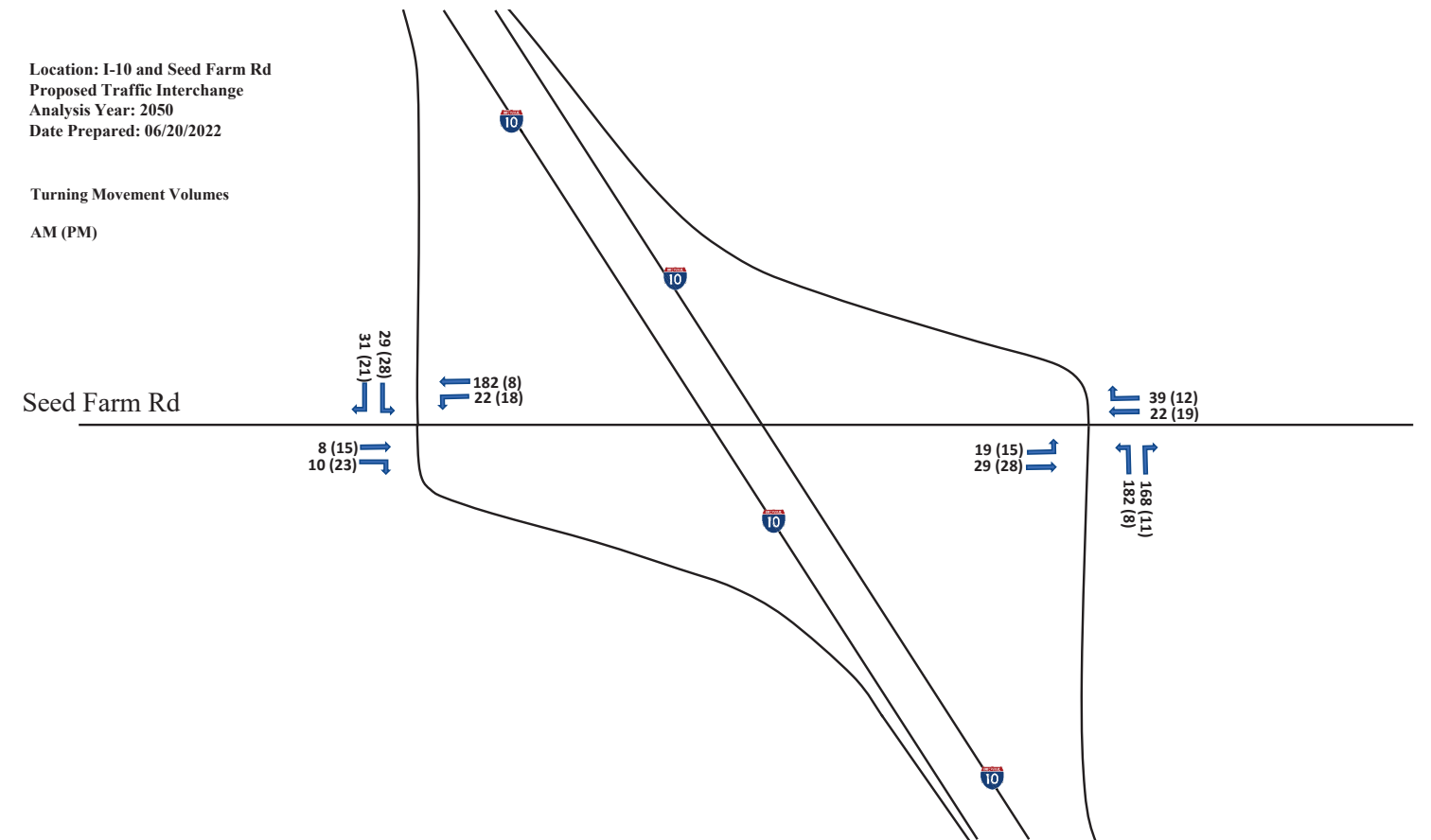
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Proposed Traffic Interchange
Analysis Year: 2040
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AM (PM)



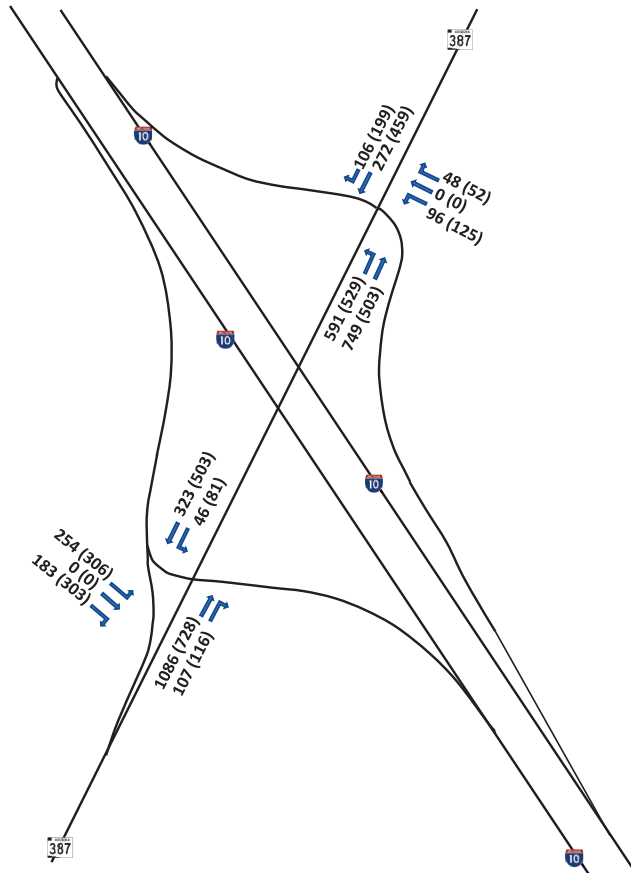
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Proposed Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/20/2022

Turning Movement Volumes
AM (PM)



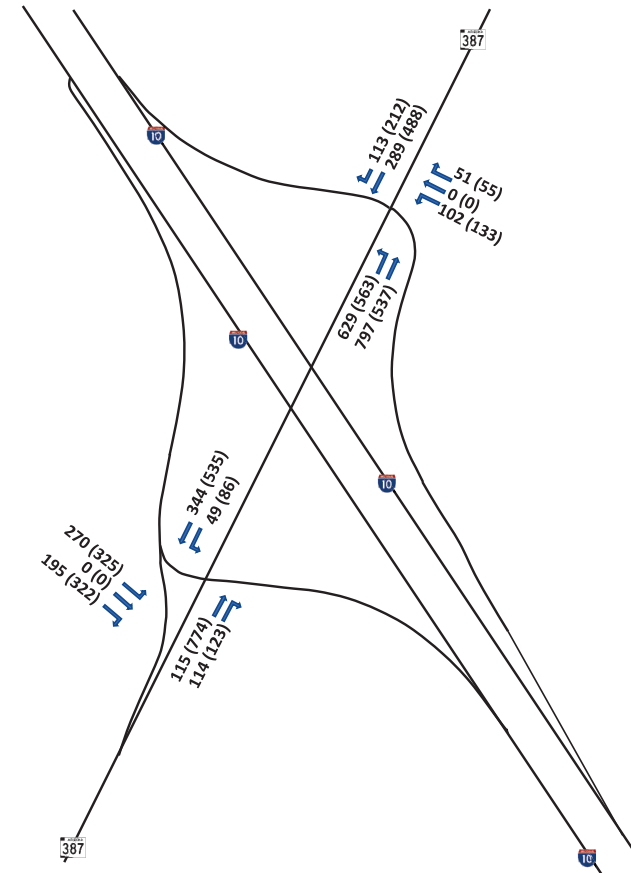
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 Analysis Year: Existing (2019)
 Date Prepared: 05/25/2021

Turning Movement Volumes
 AM (PM)



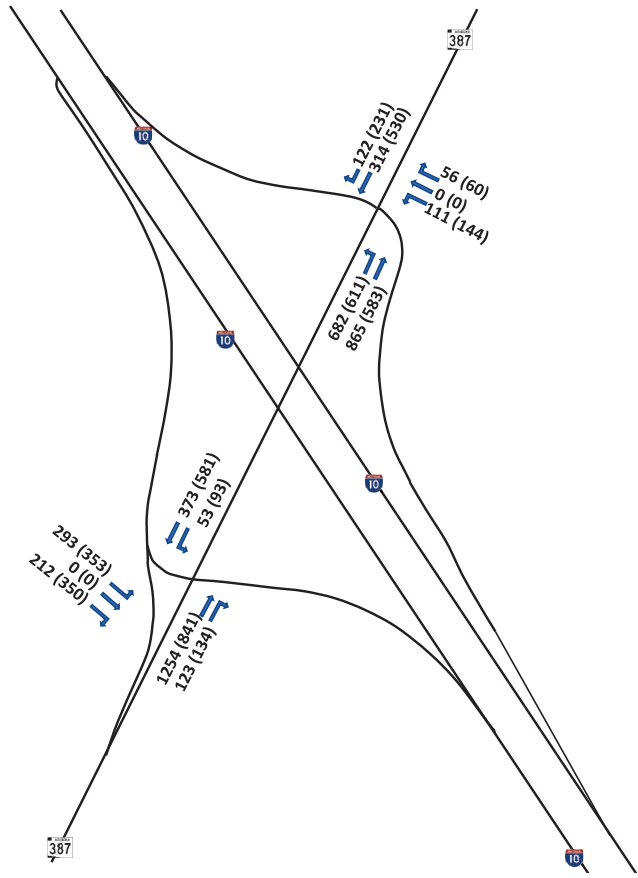
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Turning Movement Volumes
 AM (PM)



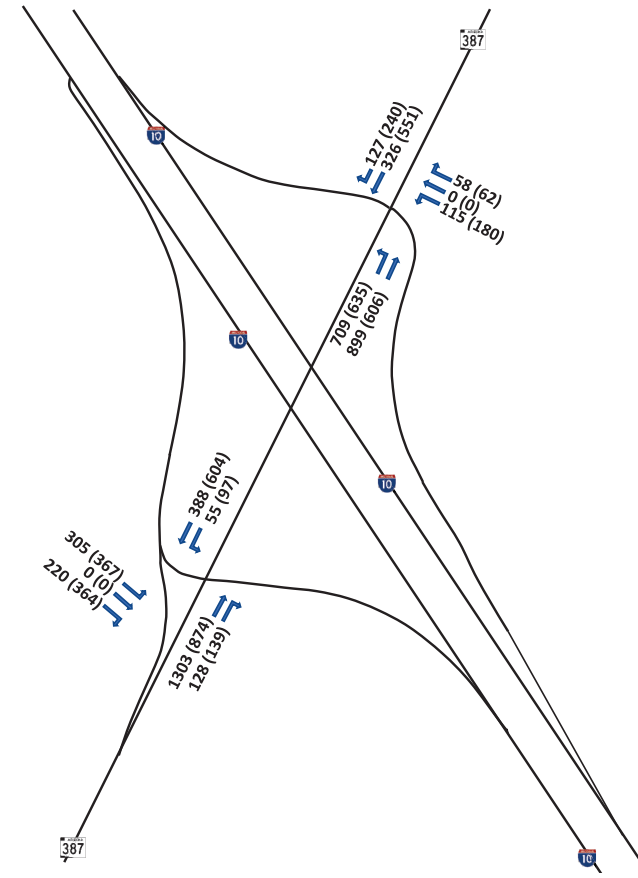
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 Analysis Year: 2035
 Date Prepared: 05/25/2021

Turning Movement Volumes
 AM (PM)



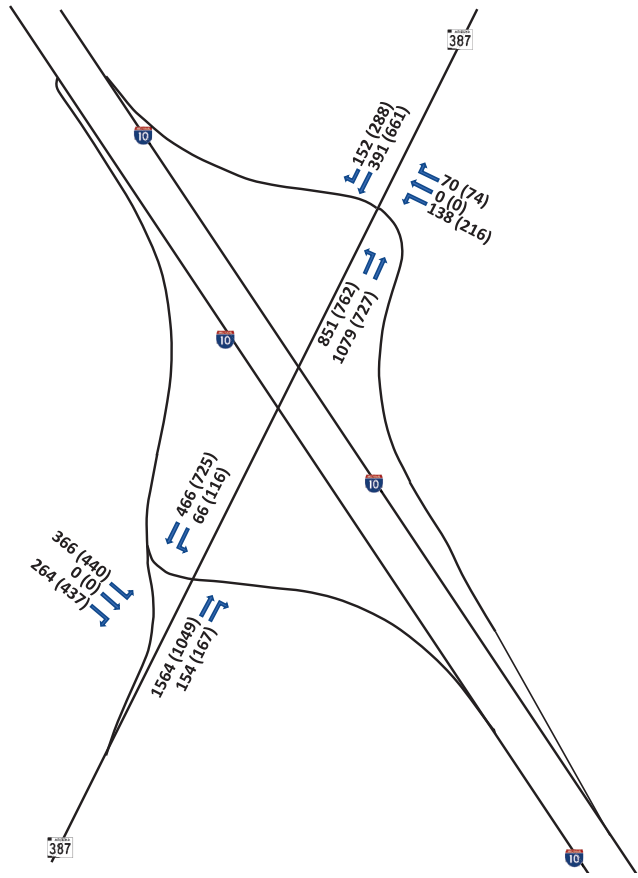
Location: I-10 and SR-387 Traffic Interchange
 Analysis Year: 2040
 Date Prepared: 05/25/2021

Turning Movement Volumes
 AM (PM)



Location: I-10 and SR-387 Traffic Interchange
Analysis Year: 2050
Date Prepared: 06/20/2022

Turning Movement Volumes
AM (PM)



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Appendix F. Safety Data

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Appendix – Safety Analysis Future Crashes

Cross Road 1	Cross Road 2	Crash Modification Factors (CMF)						Product CMF Total
		0.64	0.90				0.95	
SR 202L	Wild Horse Pass	0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
ON/OFF Ramp	OFF/OFF Ramp	0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
Wild Horse Pass	Queen Creek/SR 347	0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
ON/OFF Ramp	OFF/OFF Ramp	0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
Queen Creek/SR 347	Riggs Rd	0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
		0.64	0.90				0.95	0.547
ON/OFF Ramp	OFF/OFF Ramp	0.64	0.90			0.81		0.467
		0.64	0.90			0.81		0.467
		0.64	0.90			0.81		0.467
Riggs Rd	Casa Blanca/SR 587	0.64	0.90		1.00		0.81	0.467
		0.64	0.90		1.00		0.81	0.467
		0.64	0.90		1.00		0.81	0.467
ON/OFF Ramp	OFF/OFF Ramp	0.64	0.90		1.00	0.21	0.81	0.098
		0.64	0.90		1.00	0.21	0.81	0.098
		0.64	0.90	1.09	1.00		0.81	0.509
Casa Blanca/SR 587	Pinal Ave/SR 387	0.64	0.90	1.09	1.00		0.81	0.509
		0.64	0.90				0.81	0.509
		0.64	0.90				0.81	0.467
ON/OFF Ramp	OFF/OFF Ramp	0.64	0.90				0.81	0.467
		0.64	0.90				0.81	0.467
		0.64	0.90				0.81	0.467

Crash Comparison						
Year	Total	NO BUILD		BUILD		
		Fatal	Serious	Total	Fatal	Serious
2019	455	6	10	227	3	5
2020	467	7	10	232	3	5
2021	478	7	11	237	3	5
2022	489	7	11	242	3	5
2023	500	7	11	248	4	5
2024	512	7	11	253	4	6
2025	564	8	13	281	4	6
2026	580	8	13	289	4	6
2027	595	8	13	296	4	7
2028	611	8	14	304	4	7
2029	626	9	14	312	4	7
2030	642	9	14	319	5	7
2031	658	9	15	327	5	7
2032	673	9	15	335	5	7
2033	689	10	15	343	5	8
2034	704	10	16	350	5	8
2035	720	10	16	358	5	8
2036	749	10	17	372	5	8
2037	779	11	17	387	6	9
2038	808	11	18	401	6	9
2039	838	12	19	415	6	9
2040	868	12	19	430	6	9
2041	885	12	20	439	6	10
2042	903	12	20	447	6	10
2043	921	13	21	456	6	10
2044	939	13	21	465	7	10
2045	957	13	21	474	7	10
2046	975	13	22	482	7	11
2047	992	14	22	491	7	11
2048	1,010	14	23	500	7	11
2049	1,028	14	23	509	7	11
2050	1,046	14	23	517	7	11

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Appendix G. Drainage Data

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DRAINAGE MEMO

OFFSITE HYDROLOGIC AND HYDRAULIC ANALYSIS

I-10 - SR202L (SANTAN) TO GILA RIVER

Interstate 10 Corridor: State Route 202L to State Route 387
ADOT Project Nos. F0252 01L and F0252 02L
Federal Aid No. 010-C(222)S

Maricopa & Pinal Counties, Arizona

February, 2020

J2 Project Number: 19.1265

Prepared for:



Arizona Department of Transportation
Intermodal Transportation Division
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Prepared by: J2 Engineering and Environmental Design
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I. Hydrologic Analysis

Offsite flows were analyzed using the US Army Corps of Engineers' HEC-1 software. Models were developed according to the procedures and methodologies outlined in the ADOT publication *Highway Drainage Design Manual – Hydrology (2014)*. Offsite flows are generally from east to west, with structures conveying flow beneath I-10. The following sections summarize the HEC-1 input parameters.

Subbasin Delineation

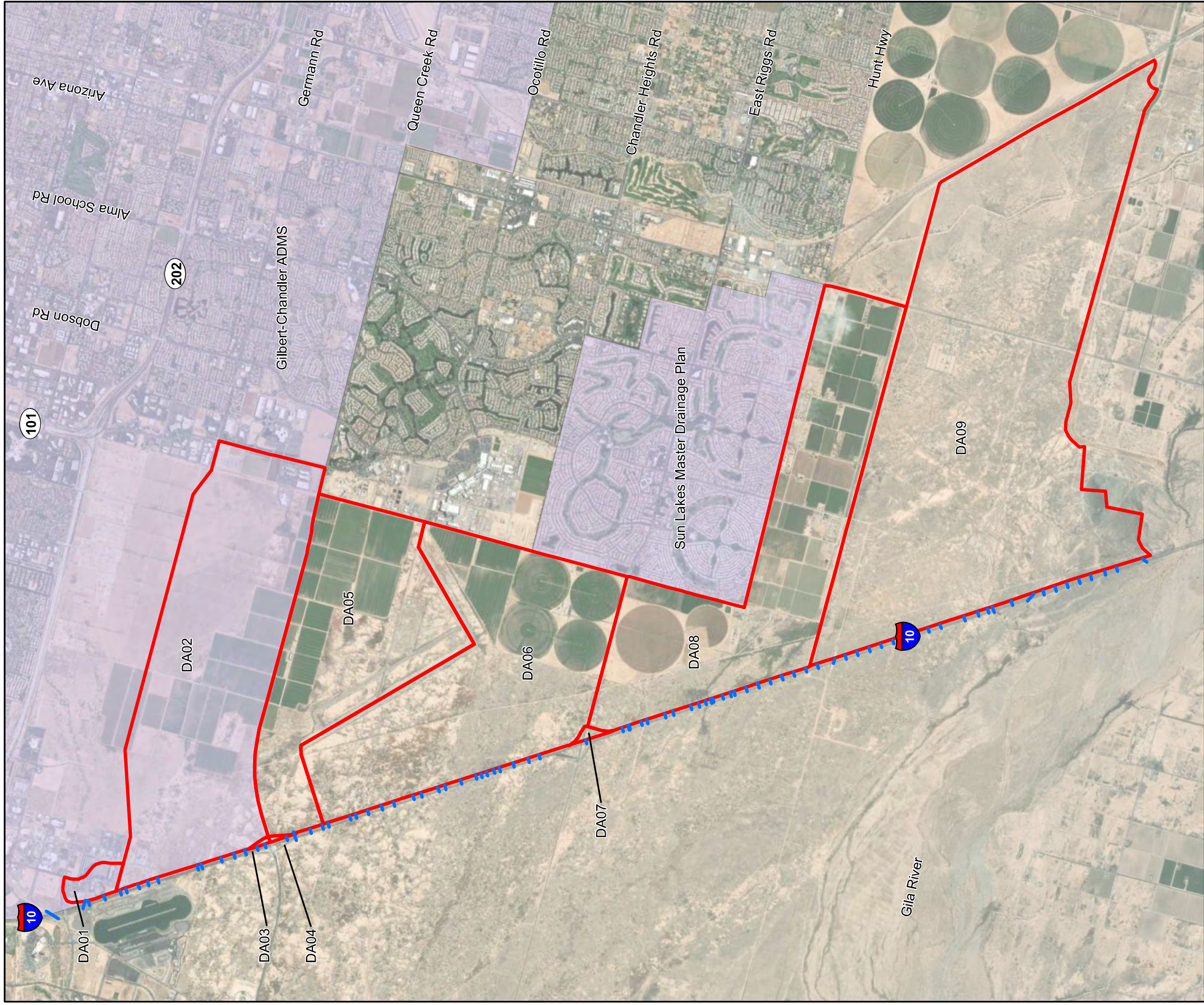
The contributing areas to the crossing structures beneath I-10 were delineated using USGS 10' contours. All subbasins were analyzed with HEC-1 modeling. Generally, I-10 acts as the western boundary. Eastern boundaries were delineated by referencing the *Gilbert-Chandler Area Drainage Master Study* (July 1993) developed by FCDMC and the *Sun Lakes Master Drainage Plan* (May 1996) developed by B&R Engineering. A total of 37 subbasins were delineated.

Due to the limited availability of topographic data, subbasins were not delineated for each individual crossing structure. There are a total of 86 structures beneath I-10 in the project area with 37 contributing areas. In the case of multiple structures per subbasin, the design flow was split evenly across all structures. Further discussion of structures can be found in Section II Hydraulics.

Refer to Figure 1 for subbasin delineations.

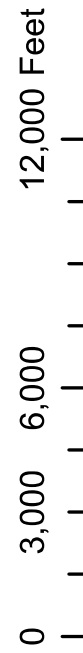


Figure 1 – Subbasin Delineation
See Next Page






I-10, SR202L (Santan) to Gila River

Exhibit A - Subbasin Delineation



Legend

-  Hydraulic Structures
-  HEC-1 Subbasins
-  Existing Study Boundaries



Time of Concentration and Storage Coefficient

The Clark Unit Hydrograph methodology was used to develop the Time of Concentration and Storage Coefficient for each subbasin, per the ADOT Hydrology Manual. Table 1 shows the main routing parameters for all subbasins.

<i>Sub Basin</i>	<i>Area (sq mi)</i>	<i>Slope (ft/mi)</i>	<i>Adj Slope (ft/mi)</i>	<i>Time of Conc. (hr)</i>	<i>Storage Coefficient (hr)</i>
DA01	0.039	9.2	9.2	0.163	0.115
DA02	0.090	9.0	9.0	0.149	0.066
DA04	2.423	8.2	8.2	2.885	2.103
DA07	1.630	8.6	8.6	2.004	1.101
DA08	1.434	8.5	8.5	2.630	2.479
DA09	0.218	8.6	8.6	1.275	1.402
DA10	5.726	8.6	8.6	3.372	1.716
DA11	0.375	273.2	252.3	0.512	0.230
DA13	1.739	8.6	8.6	2.649	2.138
DA14	0.122	6.3	6.3	1.000	1.002
DA15	0.012	10.6	10.6	0.255	0.191
DA16	0.002	3.6	3.6	0.107	0.057
DA17	0.005	6.2	6.2	0.166	0.096
DA18	0.126	6.7	6.7	0.807	0.587
DA19	0.006	3.0	3.0	0.169	0.074
DA20	2.847	8.4	8.4	2.690	1.547
DA21	0.079	8.3	8.3	0.671	0.563
DA22	0.016	0.9	0.9	0.558	0.471
DA23	0.167	7.8	7.8	0.948	0.686
DA24	0.156	7.6	7.6	0.993	0.873
DA25	0.175	11.9	11.9	0.887	0.650
DA26	0.024	12.1	12.1	0.360	0.255
DA27	0.179	14.3	14.3	0.910	0.719
DA28	0.158	15.0	15.0	0.862	0.763
DA29	0.365	15.9	15.9	1.013	0.549
DA30	1.134	10.1	10.1	1.711	0.935
DA31	0.021	6.6	6.6	0.301	0.137
DA32	0.547	7.6	7.6	1.408	0.916
DA33	0.145	8.5	8.5	1.144	1.401
DA34	0.079	7.9	7.9	1.026	1.683
DA35	0.096	7.7	7.7	1.061	1.506



<i>Sub Basin</i>	<i>Area (sq mi)</i>	<i>Slope (ft/mi)</i>	<i>Adj Slope (ft/mi)</i>	<i>Time of Conc. (hr)</i>	<i>Storage Coefficient (hr)</i>
DA36	1.453	8.9	8.9	2.689	2.724
DA37	0.034	4.1	4.1	0.612	0.591
DA38	0.059	4.2	4.2	0.719	0.615
DA39	0.020	7.4	7.4	0.308	0.189
DA40	0.033	8.4	8.4	0.455	0.341
DA41	2.329	13.5	13.5	2.073	1.134

Rainfall Loss

Green and Ampt infiltration loss parameters were used for this HEC-1 analysis per the ADOT Hydrology Manual. Parameters were developed using NRCS soils. Table 2 shows the basin rainfall loss parameters based on area-weighted values of the different soil and land use types. Figure 2 illustrates soil types within the project area and Figure 3 shows landuse classifications.

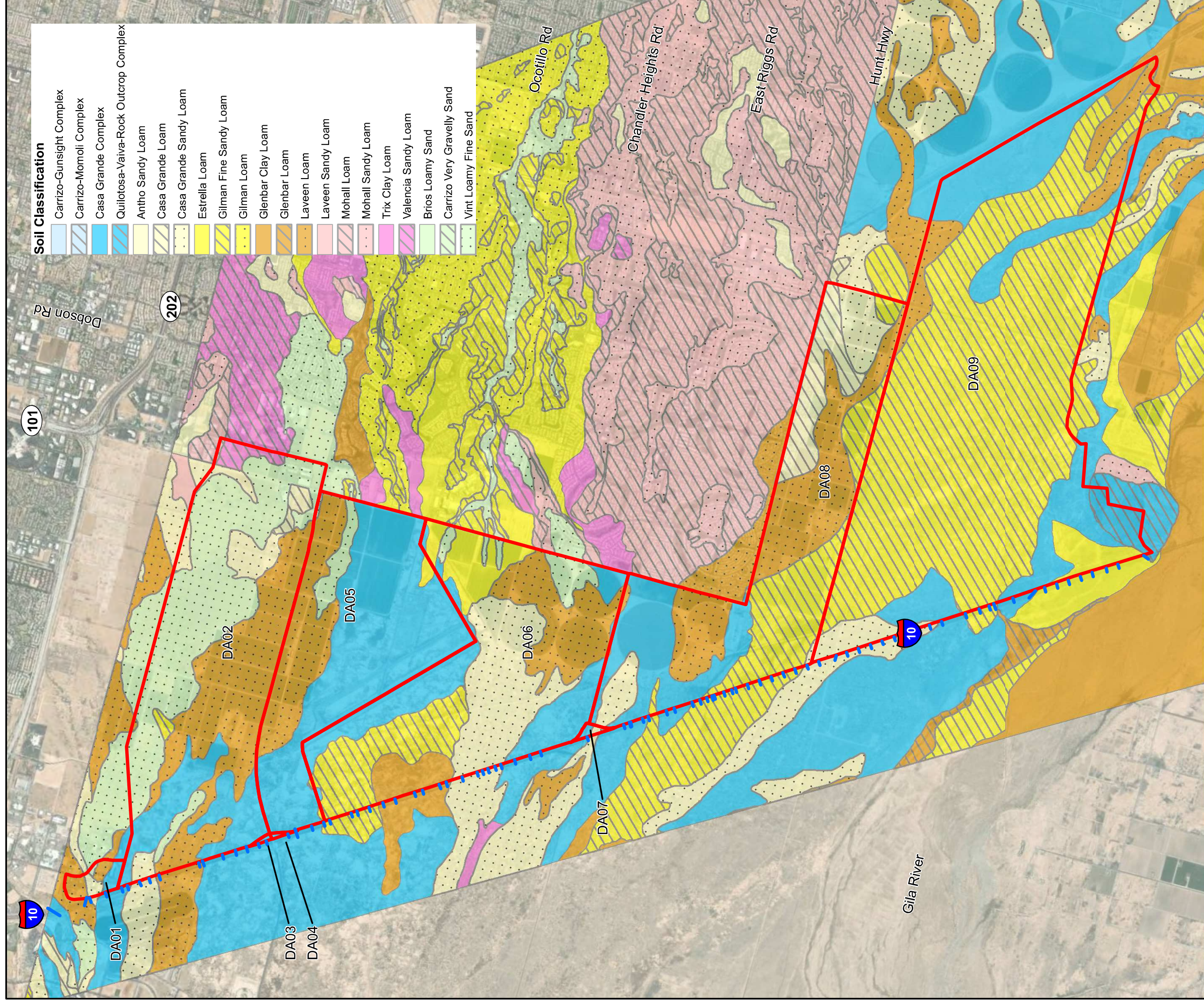
<i>Sub Basin</i>	<i>Initial Abstraction IA (in)</i>	<i>Soil Moisture Deficit DTHETA</i>	<i>Wetting Front Capillary Suction PSIF (in)</i>	<i>Hydraulic Conductivity XKSAT (in/hr)</i>	<i>Impervious Surface RTIMP (%)</i>
DA01	0.10	0.25	5.0	0.250	60
DA02	0.10	0.32	4.7	0.253	90
DA04	0.38	0.80	3.4	0.300	5
DA07	0.41	0.28	4.9	0.252	5
DA08	0.48	0.25	5.0	0.250	5
DA09	0.35	0.25	5.0	0.250	5
DA10	0.35	0.26	4.9	0.249	5
DA11	0.35	0.33	4.4	0.250	5
DA13	0.40	0.39	4.4	0.318	5
DA14	0.35	0.28	4.7	0.250	5
DA15	0.35	0.30	4.5	0.250	5
DA16	0.35	0.30	4.5	0.250	5
DA17	0.35	0.30	4.5	0.250	5
DA18	0.35	0.30	4.5	0.250	5
DA19	0.35	0.30	4.5	0.250	5
DA20	0.42	0.33	4.5	0.254	5
DA21	0.35	0.30	4.5	0.250	5



Table 2 - Rainfall Loss Parameters (Cont.)

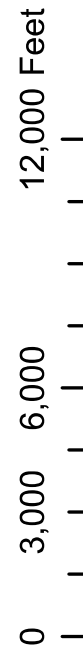
<i>Sub Basin</i>	<i>Area (sq mi)</i>	<i>Slope (ft/mi)</i>	<i>Adj Slope (ft/mi)</i>	<i>Time of Conc. (hr)</i>	<i>Storage Coefficient (hr)</i>
DA22	0.35	0.27	4.8	0.250	5
DA23	0.35	0.27	4.8	0.250	5
DA24	0.35	0.26	4.9	0.250	5
DA25	0.35	0.25	5.2	0.242	5
DA26	0.35	0.04	9.5	0.150	5
DA27	0.35	0.18	6.7	0.209	5
DA28	0.35	0.18	6.6	0.211	5
DA29	0.35	0.24	5.5	0.235	5
DA30	0.44	0.37	4.5	0.256	5
DA31	0.35	0.28	4.7	0.250	5
DA32	0.45	0.28	4.7	0.250	5
DA33	0.45	0.29	4.6	0.250	5
DA34	0.43	0.28	4.6	0.250	5
DA35	0.45	0.26	4.8	0.250	5
DA36	0.47	0.25	4.9	0.250	5
DA37	0.35	0.26	4.8	0.250	5
DA38	0.35	0.26	4.9	0.250	5
DA39	0.35	0.25	5.0	0.250	5
DA40	0.35	0.25	5.0	0.250	5
DA41	0.35	0.26	4.9	0.250	5

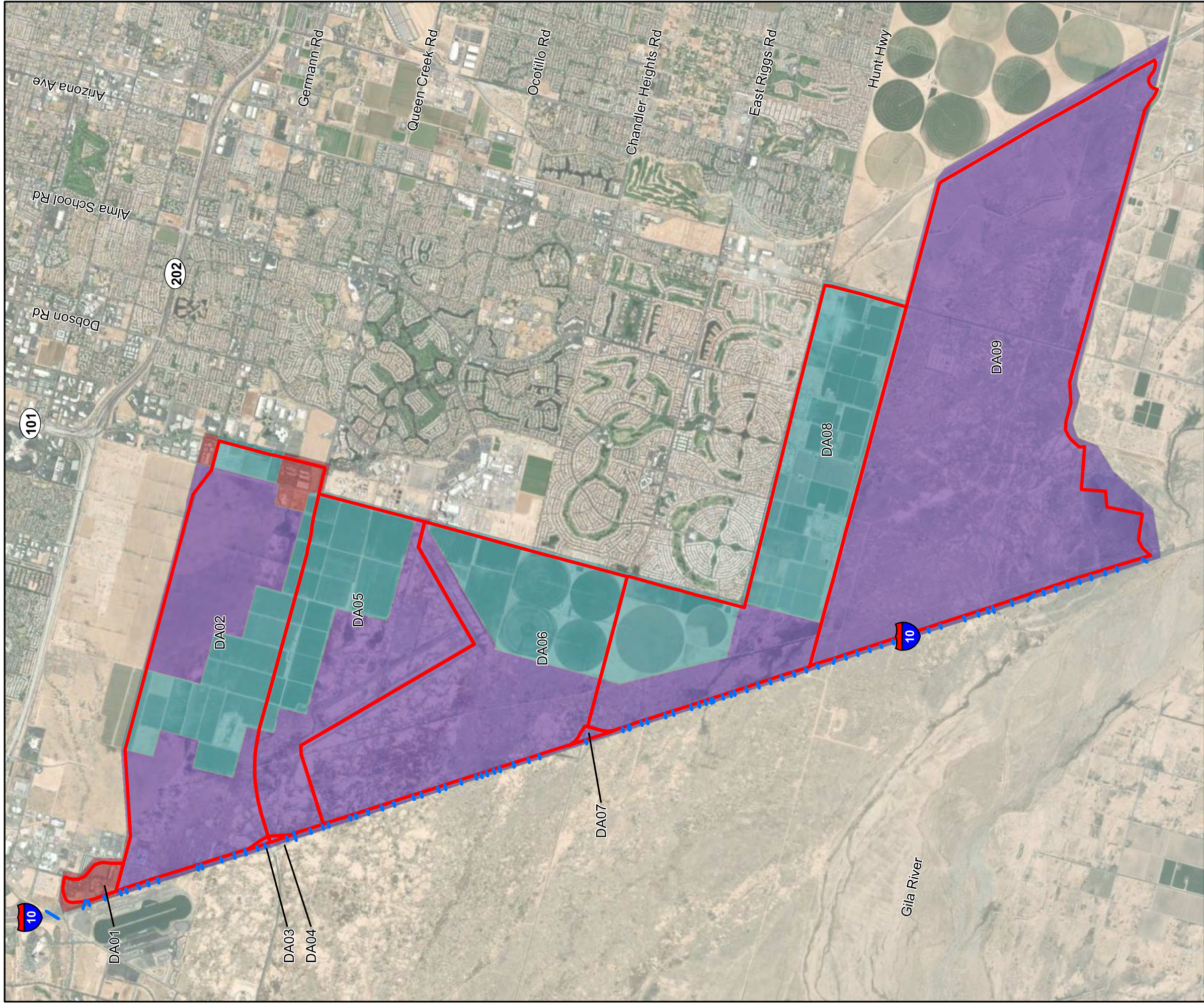
Figure 2 – Soil & Figure 3 – Landuse
See Next 2 Pages



I-10, SR202L (Santan) to Gila River

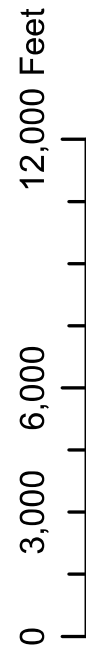
Exhibit B - Soil Classifications





I-10, SR202L (Santan) to Gila River

Exhibit C - Landuse Classifications



Landuse

- Agriculture
- Community Commercial (100,000 to 500,000 sq. ft.)
- Desert Rangeland Bare Ground



Precipitation Data

Multiple storm events were modeled as part of this analysis. Rainfall depth estimates were obtained from NOAA Atlas 14 and were determined at two locations, the I-10 & SR202L Interchange & I-10 Bridge at the Gila River. Precipitation depths were nearly identical and are summarized in Table 3. The 10, 25, 50, and 100-Yr storm events were modeled. Output HEC-1 files are included in Appendix B.

<i>Storm Event (yr)</i>	<i>10</i>	<i>25</i>	<i>50</i>	<i>100</i>
5 Min Rainfall Depth (in)	0.395	0.485	0.555	0.626
15 Min Rainfall Depth (in)	0.745	0.915	1.05	1.18
60 Min Rainfall Depth (in)	1.24	1.52	1.74	1.97
2 Hr Rainfall Depth (in)	1.41	1.71	1.95	2.20
3 Hr Rainfall Depth (in)	1.48	1.81	2.07	2.34
6 Hr Rainfall Depth (in)	1.67	2.00	2.27	2.55

Hydrologic Results

Table 4 shows the 50-year Peak Flow and Time to Peak for each subbasin in the project area. HEC-1 output files for the 10, 25, 50, and 100-Yr storm events are included in Appendix B.

<i>Sub Basin</i>	<i>Peak Flow (cfs)</i>	<i>Time to Peak (hr)</i>
DA01	88.00	3.17
DA02	255	3.17
DA04	264	5.50
DA07	396	4.67
DA08	197	5.42
DA09	60	4.17
DA10	886	5.75
DA11	364	3.42
DA13	227	5.33
DA14	44	3.92
DA15	16	3.25
DA16	5	3.17
DA17	10	3.17
DA18	67	3.75
DA19	13	3.17
DA20	487	5.25
DA21	46	3.67
DA22	11	3.50



<i>Sub Basin</i>	<i>Peak Flow (cfs)</i>	<i>Time to Peak (hr)</i>
DA23	77	3.83
DA24	62	3.92
DA25	87	3.83
DA26	33	3.33
DA27	89	3.83
DA28	77	3.83
DA29	186	3.83
DA30	298	4.42
DA31	31	3.25
DA32	172	4.25
DA33	38	4.08
DA34	19	4.00
DA35	25	4.00
DA36	189	5.50
DA37	20	3.58
DA38	32	3.67
DA39	26	3.33
DA40	29	3.42
DA41	577	4.75



II. Hydraulic Analysis

The Design flows from the HEC-1 hydrologic analysis were attributed to 85 crossing structures. As mentioned in Section 1, due to limited topographic data, subbasins were not delineated for each individual structure. Multiple structures in a subbasin were given an equal percentage of the design flow per subbasin. Table 5 summarizes structures, contributing subbasins, and hydraulic design flows.

Design Flows

Structure No.	Sta	Type	Size	Length (ft)	Sub Basin	Subbasin 50-Yr Peak Flow (cfs)	Percentage of Flow (%)	Design Flow (cfs)
0	915+16	CBC	3-12'x7'	683.00	N/A	-	-	-
5	926+57	RGRCP	1-30"	408.00	DA01	88	100%	88.00
10	929+00	CMP	1-24"	225.00	DA02	255	50%	127.50
15	937+00	CMP	1-24"	240.00	DA02	255	50%	127.50
20	945+10	CMP	1-30"	233.00	DA04	264	20%	52.80
25	948+00	CMP	1-30"	221.00	DA04	264	20%	52.80
30	954+25	CMP	1-30"	215.00	DA04	264	20%	52.80
35	959+00	CMP	1-30"	227.00	DA04	264	20%	52.80
40	964+00	CMP	1-30"	234.00	DA04	264	20%	52.80
45	984+00	CMP	1-30"	226.00	DA13	227	50%	113.50
50	986+00	CMP	1-30"	226.00	DA13	227	50%	113.50
55	996+00	CMP	1-30"	218.10	DA14	44	100%	44.00
60	1002+50	CMP	1-30"	233.20	DA15	16	100%	16.00
65	1008+10	CMP	1-30"	289.00	DA18	67	100%	67.00
70	1014+00	CMP	1-30"	198.00	DA16	5	100%	5.00
75	1018+00	CMP	1-30"	198.00	DA17	10	100%	10.00
80	1029+00	CMPA	1-36"x22"	193.00	DA19	13	100%	13.00
85	1033+00	CMP	1-30"	415.00	DA20	487	100%	487.00
90	1041+00	CMP	1-30"	210.50	DA21	46	100%	46.00
95	1047+00	CMPA	1-36"x22"	198.50	DA22	11	100%	11.00
100	1050+00	CMPA	1-36"x22"	182.00	DA23	77	100%	77.00
105	1061+00	CMP	1-30"	196.00	DA24	62	50%	31.00
110	1064+00	CMP	1-30"	194.00	DA24	62	50%	31.00
115	1070+00	CMP	1-30"	205.00	DA25	87	100%	87.00
120	1077+00	CMP	1-30"	199.00	DA26	33	100%	33.00
125	1083+00	CMP	1-30"	199.00	DA27	89	100%	89.00
130	1093+00	CMP	1-30"	197.00	DA28	77	50%	38.50
135	1097+00	CMP	1-30"	190.00	DA28	77	50%	38.50



Structure No.	Sta	Type	Size	Length (ft)	Sub Basin	Subbasin 50-Yr Peak Flow (cfs)	Percentage of Flow (%)	Design Flow (cfs)
140	1105+50	CMP	1-30"	214.00	DA29	186	50%	93.00
145	1109+00	CMPA	1-36"x22"	212.00	DA29	186	50%	93.00
150	1117+00	CMPA	1-29"x18"	197.00	DA07	396	13%	49.50
155	1124+50	CMPA	1-29"x18"	200.00	DA07	396	13%	49.50
160	1127+30	CBC	3-10'x3'	195.00	DA07	396	13%	49.50
165	1130+00	CMPA	1-29"x18"	196.00	DA07	396	13%	49.50
170	1133+50	CMPA	1-29"x18"	202.00	DA07	396	13%	49.50
175	1136+50	CMPA	1-36"x22"	205.00	DA07	396	13%	49.50
180	1143+50	CMPA	1-36"x22"	205.00	DA07	396	13%	49.50
185	1151+00	CMPA	1-36"x22"	205.00	DA07	396	13%	49.50
190	1156+56	CMP	1-30"	203.00	DA30	298	100%	298.00
200	1180+00	CMP	1-30"	185.00	DA31	31	100%	31.00
205	1198+50	CMP	1-30"	185.00	DA32	172	33%	57.33
210	1201+50	CMP	1-30"	213.00	DA32	172	33%	57.33
215	1202+02	CBC	3-10'x3'	195.00	DA32	172	33%	57.33
220	1208+00	CMP	1-30"	202.00	DA33	38	50%	19.00
225	1211+00	CMP	1-30"	202.00	DA33	38	50%	19.00
230	1220+00	CMPA	1-36"x22"	200.00	DA34	19	100%	19.00
235	1224+00	CMPA	1-36"x22"	200.00	DA35	25	100%	25.00
240	1233+00	CMPA	1-36"x22"	205.00	DA36	189	25%	47.25
245	1237+00	CMPA	1-29"x18"	200.00	DA36	189	25%	47.25
250	1240+33	CBC	3-10'x3'	195.00	DA36	189	25%	47.25
255	1243+00	CMPA	2-43"x27"	212.00	DA36	189	25%	47.25
260	1244+20	CBC	3-10'x3'	195.00	DA37	20	50%	10.00
265	1249+00	CMPA	2-43"x27"	215.00	DA37	20	50%	10.00
270	1253+00	CBC	3-10'x3'	197.00	DA38	32	33%	10.67
275	1255+00	CMPA	2-43"x27"	210.00	DA38	32	33%	10.67
280	1261+00	CMPA	2-43"x27"	210.00	DA38	32	33%	10.67
285	1273+00	CMPA	2-43"x27"	215.00	DA08	197	50%	98.50
290	1267+00	CMPA	2-43"x27"	200.00	DA08	197	50%	98.50
295	1279+00	CMPA	2-43"x27"	210.00	DA39	26	50%	13.00
300	1285+00	CMPA	2-43"x27"	210.00	DA39	26	50%	13.00
305	1291+00	CMPA	2-43"x27"	195.00	DA40	29	100%	29.00
315	1297+00	CMPA	2-43"x27"	180.00	DA09	60	100%	60.00
320	1305+20	CMPA	2-50"x31"	235.00	DA10	886	10%	88.60



Table 5 - Structure Summary (Cont.)

Structure No.	Sta	Type	Size	Length (ft)	Sub Basin	Subbasin 50-Yr Peak Flow (cfs)	Percentage of Flow (%)	Design Flow (cfs)
325	1311+00	CPMA	2-43"x27"	196.00	DA10	886	10%	88.60
330	1317+00	CPMA	2-43"x27"	193.00	DA10	886	10%	88.60
335	1323+00	CPMA	2-43"x27"	188.00	DA10	886	10%	88.60
340	1329+00	CPMA	2-43"x27"	182.00	DA10	886	10%	88.60
345	1335+05	CPMA	3-43"x27"	184.00	DA10	886	10%	88.60
350	1341+00	CPMA	2-43"x27"	183.00	DA10	886	10%	88.60
355	1347+00	CPMA	2-43"x27"	184.00	DA10	886	10%	88.60
360	1353+00	CPMA	2-43"x27"	192.00	DA10	886	10%	88.60
365	1359+00	CPMA	2-43"x27"	203.00	DA10	886	10%	88.60
370	1371+00	CPMA	2-58"x36"	203.00	DA41	577	11%	64.11
375	1378+00	CPMA	2-58"x36"	216.00	DA41	577	11%	64.11
380	1383+00	CBC	2-10'x6'	192.00	DA41	577	11%	64.11
385	1385+52	RCP	1-30"	302.00	DA41	577	11%	64.11
390	1395+00	CPMA	3-43"x27"	197.00	DA41	577	11%	64.11
395	1404+47	CMP	2-48"	463.00	DA41	577	11%	64.11
400	1411+00	CMP	2-36"	200.00	DA41	577	11%	64.11
405	1417+00	CPMA	2-43"x27"	204.00	DA41	577	11%	64.11
410	1423+00	CPMA	2-43"x27"	204.00	DA41	577	11%	64.11
415	1429+00	CPMA	2-43"x27"	203.00	DA11	364	20%	72.80
420	1435+00	CPMA	2-43"x27"	199.00	DA11	364	20%	72.80
425	1442+00	CPMA	2-43"x27"	186.00	DA11	364	20%	72.80
430	1448+00	CPMA	2-43"x27"	192.00	DA11	364	20%	72.80
435	1461+83	CPMA	2-58"x36"	278.00	DA11	364	20%	72.80

Field Verification

Field verification was performed on structure types and sizes. Some discrepancies were found between as-built plans and existing conditions. These discrepancies are summarized below in Table 6. Hydraulic calculations were performed according to both the design plans and existing conditions. Refer to Appendix A for field verification photos and sizes.



Table 6 - As-Built Discrepancies

Structure No.	As-Built Specifications	Field Verification
5	Type - RGRCP	Type - HDPE
10	Type - CMP	Type - HDPE
15	Type - CMP	Type - HDPE
20	Type - CMP	Type - HDPE
25	Type - CMP	Type - HDPE
30	Type - CMP	Type - HDPE
35	Type - CMP	Type - HDPE
40	Type - CMP	Type - HDPE
65	Size - 30"	18" Inlet; 30" Outlet
90	Type/Size - 30" CMP	30" CMP Inlet; 24" HDPE Outlet

Structures were analyzed using the *Federal Highway Administration's* HY-8 software. Roadway edge-of-pavement (EOP) elevations were determined from as-built plans. Tailwater conditions were estimated as trapezoidal channels with 15' bottom width, 3:1 side slopes, and 0.3% longitudinal slope. Design flows were set to the 50-yr event and maximum flows set to the 100-yr event. Table 7 summarizes the resulting culvert capacities with headwater elevation set to 3" below the EOP elevation. Alternative capacities are shown for structures with discrepancies as determined from field survey.

For structure 5, a revised hydraulic calculation was not performed as the discrepancy in pipe material (RGRCP to HDPE) did not result in a revised roughness coefficient. HY-8 output reports are included in Appendix C.

Hydraulic Results

Table 7 - Hydraulic Analysis

Structure No.	Design Flow (cfs)	EOP - 3" Elev (ft)	Per As-Built			Revised per Field Survey		
			Capacity (cfs)	Excess Capacity (cfs)	Excess Flow (cfs)	Capacity (cfs)	Excess Capacity (cfs)	Excess Flow (cfs)
0	-	-	-	-	-			
5	88.00	1148.19	48.15	0.00	39.85			
10	127.50	1148.19	12.08	0.00	115.42	20.09	0.00	107.41
15	127.50	1148.69	14.16	0.00	113.34	23.64	0.00	103.86
20	52.80	1149.19	25.48	0.00	27.32	40.74	0.00	12.06
25	52.80	1149.69	25.77	0.00	27.03	41.10	0.00	11.70
30	52.80	1149.69	22.64	0.00	30.16	35.46	0.00	17.34
35	52.80	1150.19	23.39	0.00	29.41	37.05	0.00	15.75
40	52.80	1150.69	23.87	0.00	28.93	37.91	0.00	14.89



Table 7 - Hydraulic Analysis (Cont.)

Structure No.	Design Flow (cfs)	EOP - 3" Elev (ft)	Per As-Builts			Revised per Field Survey		
			Capacity (cfs)	Excess Capacity (cfs)	Excess Flow (cfs)	Capacity (cfs)	Excess Capacity (cfs)	Excess Flow (cfs)
45	113.50	1152.19	22.42	0.00	91.08			
50	113.50	1152.69	22.46	0.00	91.04			
55	44.00	1153.19	19.72	0.00	24.28			
60	16.00	1154.19	18.55	2.55	0.00			
65	67.00	1154.19	16.94	0.00	50.06	5.25	0.00	61.75
70	5.00	1154.81	21.62	16.62	0.00			
75	10.00	1155.31	23.59	13.59	0.00			
80	13.00	1156.31	19.61	6.61	0.00			
85	487.00	1156.31	14.65	0.00	472.35			
90	46.00	1156.81	15.49	0.00	30.51	15.65	0.00	30.35
95	11.00	1157.81	18.52	7.52	0.00			
100	77.00	1158.31	18.33	0.00	58.67			
105	31.00	1159.31	21.70	0.00	9.30			
110	31.00	1159.31	20.54	0.00	10.46			
115	87.00	1159.81	24.37	0.00	62.63			
120	33.00	1160.31	23.59	0.00	9.41			
125	89.00	1160.81	23.58	0.00	65.42			
130	38.50	1161.31	19.68	0.00	18.82			
135	38.50	1161.81	21.11	0.00	17.39			
140	93.00	1163.31	23.08	0.00	69.92			
145	93.00	1163.81	21.85	0.00	71.15			
150	49.50	1164.31	11.90	0.00	37.60			
155	49.50	1165.31	12.00	0.00	37.50			
160	49.50	1165.81	756.07	706.57	0.00			
165	49.50	1166.31	13.16	0.00	36.34			
170	49.50	1166.31	13.30	0.00	36.20			
175	49.50	1166.81	23.33	0.00	26.17			
180	49.50	1167.31	23.33	0.00	26.17			
185	49.50	1168.31	24.55	0.00	24.95			
190	298.00	1168.81	28.44	0.00	269.56			
200	31.00	1169.31	24.00	0.00	7.00			
205	57.33	1172.31	27.51	0.00	29.82			
210	57.33	1173.31	29.51	0.00	27.82			
215	57.33	1173.81	1002.03	944.70	0.00			

Table 7 - Hydraulic Analysis (Cont.)

Structure No.	Design Flow (cfs)	EOP - 3" Elev (ft)	Per As-Builts			Revised per Field Survey		
			Capacity (cfs)	Excess Capacity (cfs)	Excess Flow (cfs)	Capacity (cfs)	Excess Capacity (cfs)	Excess Flow (cfs)
220	19.00	1174.31	27.51	8.51	0.00			
225	19.00	1174.81	28.49	9.49	0.00			
230	19.00	1175.81	23.51	4.51	0.00			
235	25.00	1176.31	23.51	0.00	1.49			
240	47.25	1177.31	20.66	0.00	26.59			
245	47.25	1177.81	11.33	0.00	35.92			
250	47.25	1177.81	686.96	639.71	0.00			
255	47.25	1177.81	56.05	8.80	0.00			
260	10.00	1177.81	734.83	724.83	0.00			
265	10.00	1178.31	51.03	41.03	0.00			
270	10.67	1178.81	603.21	592.54	0.00			
275	10.67	1178.81	51.45	40.78	0.00			
280	10.67	1179.31	47.15	36.48	0.00			
285	98.50	1181.81	46.79	0.00	51.71			
290	98.50	1180.31	45.55	0.00	52.95			
295	13.00	1183.31	45.99	32.99	0.00			
300	13.00	1184.31	39.08	26.08	0.00			
305	29.00	1186.31	50.61	21.61	0.00			
315	60.00	1187.31	48.21	0.00	11.79			
320	88.60	1188.31	58.44	0.00	30.16			
325	88.60	1189.81	57.77	0.00	30.83			
330	88.60	1190.31	47.36	0.00	41.24			
335	88.60	1191.31	47.79	0.00	40.81			
340	88.60	1191.81	51.79	0.00	36.81			
345	88.60	1192.31	71.40	0.00	17.20			
350	88.60	1193.31	48.06	0.00	40.54			
355	88.60	1193.81	44.32	0.00	44.28			
360	88.60	1194.31	49.65	0.00	38.95			
365	88.60	1195.31	58.95	0.00	29.65			
370	64.11	1193.31	119.90	55.79	0.00			
375	64.11	1192.31	117.05	52.94	0.00			
380	64.11	1192.31	1098.00	1033.89	0.00			
385	64.11	1191.81	46.22	0.00	17.89			
390	64.11	1192.31	46.97	0.00	17.14			



Structure No.	Design Flow (cfs)	EOP - 3" Elev (ft)	Per As-Builts			Revised per Field Survey		
			Capacity (cfs)	Excess Capacity (cfs)	Excess Flow (cfs)	Capacity (cfs)	Excess Capacity (cfs)	Excess Flow (cfs)
395	64.11	1193.31	198.71	134.60	0.00			
400	64.11	1194.31	107.89	43.78	0.00			
405	64.11	1194.81	63.31	0.00	0.80			
410	64.11	1195.31	55.02	0.00	9.09			
415	72.80	1195.31	49.95	0.00	22.85			
420	72.80	1195.81	51.38	0.00	21.42			
425	72.80	1196.81	36.27	0.00	36.53			
430	72.80	1198.31	57.11	0.00	15.69			
435	72.80	1199.31	116.46	43.66	0.00			

Parallel Structures

Structures were grouped together based on the assumption that excess flow from a structure will contribute to the next downstream structure. As runoff ponds against the I-10 embankment, it can contribute to one of several culverts within a section, effectively acting in parallel. Locations were identified where flow is not expected to overtop, including Queen Creek Rd, Riggs Rd, and On/Off-Ramps at interchanges with I-10. These boundaries were used to define independent sections. Design flows and capacities were then combined over these sections and analyzed as a whole. Tables 8a and 8b summarize these sections with the combined design flow and capacity for each.

Section Description	No. of Structures	Total Design Flow (cfs)	Total Capacity (cfs)	Note
North of Sundust (Not Analyzed)	1	N/A	N/A	Irrigation Crossing Not Analyzed
Sundust to Queen Creek	13	961	295.63	Section Does Not Have Sufficient Capacity
Queen Creek TI North	2	15	45.21	
Queen Creek TI South	1	13	19.61	
Queen Creek to Riggs	22	1849	1172.57	Section Does Not Have Sufficient Capacity
Riggs TI	1	31	24.00	Section Does Not Have Sufficient Capacity
Riggs to Gila River	46	2634	6400.74	
Combined Corridor	86	5503	7957.76	

Section Description	No. of Structures	Total Design Flow (cfs)	Total Capacity (cfs)	Note
North of Sundust (Not Analyzed)	1	N/A	N/A	Irrigation Crossing Not Analyzed
Sundust to Queen Creek	13	961	372.54	Section Does Not Have Sufficient Capacity
Queen Creek TI North	2	15	45.21	
Queen Creek TI South	1	13	19.61	
Queen Creek to Riggs	22	1849	1172.73	Section Does Not Have Sufficient Capacity
Riggs TI	1	31	24.00	Section Does Not Have Sufficient Capacity
Riggs to Gila River	46	2634	6400.74	
Combined Corridor	86	5503	8034.83	

III. Conclusions

Offsite flows contributing to I-10 from SR202L (Santan) to the Gila River were analyzed using the US Army Corp of Engineers' HEC-1 software. The 50-yr design flows were determined for a number of contributing subbasins and flows were distributed to crossing structures that convey offsite flow beneath I-10 from east to west. Structures were analyzed with the Federal Highway Administrations HY-8 software to determine capacity. Structures were then grouped into sections on the assumption that several structures will act in parallel to pass flow beneath the interstate. The portions of freeway from Sundust Rd to Queen Creek Rd and from Queen Creek Rd to Riggs Rd, as well as the interior portion of the Riggs Rd TI, do not have sufficient crossing structures to convey offsite flows beneath the highway.

It should be noted that the hydrologic and hydraulic analyses summarized in this report were developed with limited topographic data. More accurate topography may result in modifications to subbasin delineations and resulting design flows, as well as the ability to model the roadway embankment and associated reservoir routing. However, an updated analysis with greater topographic accuracy is not expected to change the conclusion that sections of the interstate and the structures therein have insufficient capacity to convey offsite flows without overtopping the pavement.



Appendix A – Field Survey Photos





CULVERT #0 INLET BOX CULVERT 3-10' X 7' STA 915+00

Outlet Inaccessible

CULVERT #0 OUTLET BOX CULVERT 3-10' X 7' STA 915+00

Inlet Inaccessible

CULVERT #5 INLET STA 926+57



CULVERT #5 OUTLET 30" HDPE STA 926+57



CULVERT #10 INLET 24" HDPE STA 929+00



CULVERT #15 INLET 24" HDPE STA 937+00



CULVERT #10 OUTLET 24" HDPE STA 929+00



CULVERT #15 OUTLET 24" HDPE STA 937+00



CULVERT #20 INLET 30" HDPE STA 945+10



CULVERT #25 INLET HDPE 30" STA 948+00



CULVERT #20 OUTLET 30" HDPE STA 945+10



CULVERT #25 OUTLET HDPE 30" STA 948+00



CULVERT #30 INLET 30" HDPE STA 954+25



CULVERT #35 INLET 30" HDPE STA 959+00



CULVERT #30 OUTLET 30" HDPE STA 954+25



CULVERT #35 OUTLET 30" HDPE STA 959+00



CULVERT #40 INLET 30" HDPE STA 964+00



CULVERT #45 INLET 30" CMP STA 984+00



CULVERT #40 OUTLET 30" HDPE STA 964+00



CULVERT #45 OUTLET 30" CMP STA 984+00



CULVERT #50 INLET 30" CMP STA 986+00



CULVERT #55 INLET 30" CMP STA 996+00



CULVERT #50 OUTLET 30" CMP STA 986+00



CULVERT #55 OUTLET 30" CMP STA 996+00



CULVERT #60 INLET 30" CMP STA 1002+50



CULVERT #65 INLET 18" CMP STA 1008+10



CULVERT #60 OUTLET 30" CMP STA 1002+50



CULVERT #65 OUTLET 30" CMP STA 1008+10



CULVERT #70 INLET 30" CMP STA 1014+00



CULVERT #75 INLET 30" CMP STA 1018+00



CULVERT #70 OUTLET 30" CMP STA 1014+00



CULVERT #75 OUTLET 30" CMP STA 1018+00



CULVERT #80 INLET 36" X 22" CMP ARCH STA 1029+00



CULVERT #85 INLET 30" CMP STA 1033+00



CULVERT #80 OUTLET 36" X 22" CMP ARCH STA 1029+00

Outlet Inaccessible

CULVERT #85 OUTLET 30" CMP STA 1033+00



CULVERT #90 INLET 30" CMP STA 1041+00



CULVERT #95 INLET 36" X 22" CMP ARCH STA 1047+00



CULVERT #90 OUTLET 24" HDPE STA 1041+00



CULVERT #95 OUTLET 36" X 22" CMP ARCH STA 1047+00



CULVERT #100 INLET 36" X 22" CMP ARCH STA 1050+00



CULVERT #105 INLET 30" CMP STA 1061+00



CULVERT #100 OUTLET 36" X 22" CMP ARCH STA 1050+00



CULVERT #105 OUTLET 30" CMP STA 1061+00



CULVERT #110 INLET 30" CMP STA 1064+00



CULVERT #115 INLET 30" CMP STA 1070+00



CULVERT #110 OUTLET 30" CMP STA 1064+00



CULVERT #115 OUTLET 30" CMP STA 1070+00



CULVERT #120 INLET 30" CMP STA 1077+00



CULVERT #125 INLET 30" CMP STA 1083+00



CULVERT #120 OUTLET 30" CMP STA 1077+00



CULVERT #125 OUTLET 30" CMP STA 1083+00



CULVERT #130 INLET 30" CMP STA 1093+00



CULVERT #135 INLET 30" CMP STA 1097+00



CULVERT #130 OUTLET 30" CMP STA 1093+00



CULVERT #135 OUTLET 30" CMP STA 1097+00



CULVERT #140 INLET 30" CMP STA 1105+50



CULVERT #145 INLET 36" X 22" CMP ARCH STA 1109+00



CULVERT #140 OUTLET 30" CMP STA 1105+50



CULVERT #145 OUTLET 36" X 22" CMP ARCH STA 1109+00



CULVERT #150 INLET 29" X 18" CMP ARCH STA 1117+00



CULVERT #155 INLET 29" X 18" CMP ARCH STA 1124+50



CULVERT #150 OUTLET 29" X 18" CMP ARCH STA 1117+00



CULVERT #155 OUTLET 29" X 18" CMP ARCH STA 1124+50



CULVERT #160 INLET BOX CULVERT 3- 10' X 3' STA 1127+00



CULVERT #165 INLET 29" X 18" CMP ARCH STA 1130+00



CULVERT #160 OUTLET BOX CULVERT 3- 10' X 3' STA 1127+00



CULVERT #165 OUTLET 29" X 18" CMP ARCH STA 1130+00



CULVERT #170 INLET 29" X 18" STA 1133+50



CULVERT #175 INLET 36" X 22" CMP ARCH STA 1136+50



CULVERT #170 OUTLET 29" X 18" STA 1133+50



CULVERT #175 OUTLET 36" X 22" CMP ARCH STA 1136+50



CULVERT #180 INLET 36" X 22" CMP ARCH STA 1143+50



CULVERT #185 INLET 36" X 22" CMP ARCH STA 1151+00



CULVERT #180 OUTLET 36" X 22" CMP ARCH STA 1143+50



CULVERT #185 OUTLET 36" X 22" CMP ARCH STA 1151+00



CULVERT #190 INLET 30" CMP STA 1156+56



CULVERT #200 INLET 30" CMP STA 1180+00



CULVERT #190 OUTLET 30" CMP STA 1156+56



CULVERT #200 OUTLET 30" CMP STA 1180+00



CULVERT #205 INLET 30" CMP STA 1198+50



CULVERT #210 INLET 30" CMP STA 1201+50



CULVERT #205 OUTLET 30" CMP STA 1198+50



CULVERT #210 OUTLET 30" CMP STA 1201+50



CULVERT #215 INLET BOX CULVERT 3- 10' X 3' STA 1202+02



CULVERT #220 INLET 30" CMP STA 1208+00



CULVERT #215 OUTLET BOX CULVERT 3- 10' X 3' STA 1202+02



CULVERT #220 OUTLET 30" CMP STA 1208+00



CULVERT #225 INLET 30" CMP STA 1211+00



CULVERT #230 INLET 36" X 22" CMP ARCH STA 1220+00



CULVERT #225 OUTLET 30" CMP STA 1211+00



CULVERT #230 OUTLET 36" X 22" CMP ARCH STA 1220+00



CULVERT #235 INLET 36" X 22" CMP ARCH STA 1224+00



CULVERT #240 INLET 36" X 22" CMP ARCH STA 1233+00



CULVERT #235 OUTLET 36" X 22" CMP ARCH STA 1224+00



CULVERT #240 OUTLET 36" X 22" CMP ARCH STA 1233+00



CULVERT #245 INLET 29" X 18" CMP ARCH STA 1237+00



CULVERT #250 INLET BOX CULVERT 3- 10' X 3' STA 1240+33



CULVERT #245 OUTLET 29" X 18" CMP ARCH STA 1237+00



CULVERT #250 OUTLET BOX CULVERT 3- 10' X 3' STA 1240+33



CULVERT #255 INLET (2) - 43" X 27" CMP ARCH STA 1243+00



CULVERT #260 INLET BOX CULVERT 3- 10' X 3' STA 1244+20



CULVERT #255 OUTLET (2) - 43" X 27" CMP ARCH STA 1243+00



CULVERT #260 OUTLET BOX CULVERT 3- 10' X 3' STA 1244+20



CULVERT #265 INLET (2) - 43" X 27" CMP ARCH STA 1249+00



CULVERT #270 INLET BOX CULVERT 3- 10' X 3' STA 1253+00



CULVERT #265 OUTLET (2) - 43" X 27" CMP ARCH STA 1249+00



CULVERT #270 OUTLET BOX CULVERT 3- 10' X 3' STA 1253+00



CULVERT #275 INLET (2) - 43" X 27" CMP ARCH STA 1255+00



CULVERT #280 INLET (2) - 43" X 27" CMP ARCH STA 1261+00



CULVERT #275 OUTLET (2) 43" X 27" CMP ARCH STA 1255+00



CULVERT #280 OUTLET (2) - 43" X 27" CMP ARCH STA 1261+00



CULVERT #285 INLET (2) - 43" X 27" CMP ARCH STA 1267+00



CULVERT #290 INLET (2) - 43" X 27" CMP ARCH STA 1273+00



CULVERT #285 OUTLET (2) - 43" X 27" CMP ARCH STA 1267+00



CULVERT #290 OUTLET (2) - 43" X 27" CMP ARCH STA 1273+00



CULVERT #295 INLET (2) - 43" X 27" CMP ARCH STA 1279+00



CULVERT #300 INLET (2) - 43" X 27" CMP ARCH STA 1285+00



CULVERT #295 OUTLET (2) - 43" X 27" CMP ARCH STA 1279+00



CULVERT #300 OUTLET (2) - 43" X 27" CMP ARCH STA 1285+00



CULVERT #305 INLET (2) - 43" X 27" CMP ARCH STA 1291+00



CULVERT #315 INLET (2) - 43" X 27" CMP ARCH STA 1297+00



CULVERT #305 OUTLET (2) - 43" X 27" CMP ARCH STA 1291+00



CULVERT #315 OUTLET (2) - 43" X 27" CMP ARCH STA 1297+00



CULVERT #320 INLET (2) - 50" X 31" CMP ARCH STA 1305+20



CULVERT #325 INLET (2) - 43" X 27" CMP ARCH STA 1311+00



CULVERT #320 OUTLET (2) - 50" X 31" CMP ARCH STA 1305+20



CULVERT #325 OUTLET (2) - 43" X 27" CMP ARCH STA 1311+00



CULVERT #330 INLET (2) - 43" X 27" CMP ARCH STA 1317+00



CULVERT #335 INLET (2) - 43" X 27" CMP ARCH STA 1323+00



CULVERT #330 OUTLET (2) - 43" X 27" CMP ARCH STA 1317+00



CULVERT #335 OUTLET (2) - 43" X 27" CMP ARCH STA 1323+00



CULVERT #340 INLET (2) - 43" X 27" CMP ARCH STA 1329+00



CULVERT #345 INLET (3) - 43" X 27" CMP ARCH STA 1335+00



CULVERT #340 OUTLET (2) - 43" X 27" CMP ARCH STA 1329+00



CULVERT #345 OUTLET (3) - 43" X 27" CMP ARCH STA 1335+00



CULVERT #350 INLET (2) - 43" X 27" CMP ARCH STA 1341+00



CULVERT #355 INLET (2) - 43" X 27" CMP ARCH STA 1347+00



CULVERT #350 OUTLET (2) - 43" X 27" CMP ARCH STA 1341+00



CULVERT #355 OUTLET (2) - 43" X 27" CMP ARCH STA 1347+00



CULVERT #360 INLET (2) - 43" X 27" CMP ARCH STA 1353+00



CULVERT #365 INLET (2) - 43" X 27" CMP ARCH STA 1359+00



CULVERT #360 OUTLET (2) - 43" X 27" CMP ARCH STA 1353+00



CULVERT #365 OUTLET (2) - 43" X 27" CMP ARCH STA 1359+00



CULVERT #370 INLET (2) - 58" X 36" CMP ARCH STA 1371+00



CULVERT #375 INLET (2) - 58" X 36" CMP ARCH STA 1378+00



CULVERT #370 OUTLET (2) - 58" X 36" CMP ARCH STA 1371+00



CULVERT #375 OUTLET (2) - 58" X 36" CMP ARCH STA 1378+00



CULVERT #380 INLET BOX CULVERT 2-10' X 6' STA 1383+00



CULVERT #385 INLET 30" RCP STA 1385+44



CULVERT #380 OUTLET BOX CULVERT 2-10' X 6' STA 1383+00

Outlet Inaccessible

CULVERT #385 OUTLET 30" RCP STA 1385+44



CULVERT #390 INLET (3) - 43" X 27" CMP ARCH STA 1395+00



CULVERT #395 INLET (2) - 48" CMP STA 1404+47



CULVERT #390 OUTLET (3) - 43" X 27" CMP ARCH STA 1395+00



CULVERT #395 OUTLET (2) - 48" CMP STA 1404+47



CULVERT #400 INLET (2) - 36" CMP STA 1411+00



CULVERT #405 INLET (2) - 43" X 27" CMP ARCH STA 1417+00



CULVERT #400 OUTLET (2) - 36" CMP STA 1411+00



CULVERT #405 OUTLET (2) - 43" X 27" CMP ARCH STA 1417+00



CULVERT #410 INLET (2) - 43" X 27" CMP ARCH STA 1423+00



CULVERT #415 INLET (2) - 43" X 27" CMP ARCH STA 1429+00



CULVERT #410 OUTLET (2) - 43" X 27" CMP ARCH STA 1423+00



CULVERT #415 OUTLET (2) - 43" X 27" CMP ARCH STA 1429+00



CULVERT #420 INLET (2) - 43" X 27" CMP ARCH STA 1435+00



CULVERT #425 INLET (2) - 43" X 27" CMP ARCH STA 1442+00



CULVERT #420 OUTLET (2) - 43" X 27" CMP ARCH STA 1435+00



CULVERT #425 OUTLET (2) - 43" X 27" CMP ARCH STA 1435+00



CULVERT #430 INLET (2) - 43" X 27" CMP ARCH STA 1448+00



CULVERT #435 INLET (2) - 58" X 36" CMP ARCH STA 1461+83



CULVERT #430 OUTLET (2) - 43" X 27" CMP ARCH STA 1448+00



CULVERT #435 OUTLET (2) - 58" X 36" CMP ARCH STA 1461+83



I-10, SR202 (Santan) to Gila River
10-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
10-Yr HEC-1 Output

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 25FEB20 TIME 15:59:45 *
*****
    
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```

*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****
    
```

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X X XXXXXXX XXXXX X
X X X X X XX
X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX
    
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID Hydrologic Model: I-10 GRIC 10 yr
3 ID
4 ID project: I-10 GRIC
5 ID TRACS No.
6 ID FHWA No.
7 ID
8 ID Notes By: J2 Design
9 ID Develped: February 10, 2020
10 ID
11 ID File Name: I10GRIC_10yr
12 ID Storm Event:10yr
13 ID Conditions: Existing Conditions
14 ID
15 ID Comments:
16 ID This model is developed to predict the stormwater runoff that will
17 ID contribute to crossing structures beneath I-10 within the Gila River
18 ID Indian Community with contributing areas greater than 160 ac
19 ID UPDATE LG CARDS
20 ID
21 ID *****
22 IT 5 10FEB20 0 500
23 IO 5
*
24 KK DA01 Basin
25 KM
26 BA 0.039
27 PH 0.395 0.745 1.24 1.41 1.48 1.67
28 LG 0.10 0.25 5.0 .250 60.0
29 UC 0.163 0.115
*
30 KK DA02 Basin
31 KM
32 BA 0.090
33 LG 0.10 0.32 4.7 .253 90.0
34 UC 0.149 0.066
*
35 KK DA04 Basin
36 KM
37 BA 2.423
38 LG 0.38 0.80 3.4 .300 5.0
39 UC 2.885 2.103
*
40 KK DA07 Basin
41 KM
42 BA 1.630
43 LG 0.41 0.28 4.9 .252 5.0
44 UC 2.004 1.101
    
```

1 HEC-1 INPUT PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    
```

```

45 KK DA08 Basin
46 KM
47 BA 1.434
48 LG 0.48 0.25 5.0 .250 5.0
49 UC 2.630 2.479
*
50 KK DA09 Basin
51 KM
52 BA 0.218
53 LG 0.35 0.25 5.0 .250 5.0
54 UC 1.275 1.402
*
55 KK DA10 Basin
56 KM
57 BA 5.726
58 LG 0.35 0.26 4.9 .249 5.0
59 UC 3.372 1.716
*
60 KK DA11 Basin
61 KM
62 BA 0.375
63 LG 0.35 0.33 4.4 .250 5.0
64 UC 0.512 0.230
*
65 KK DA13 Basin
66 KM
67 BA 1.739
68 LG 0.40 0.39 4.4 .318 5.0
69 UC 2.649 2.138
*
70 KK DA14 Basin
71 KM
72 BA 0.122
73 LG 0.35 0.28 4.7 .250 5.0
74 UC 1.000 1.002
*
75 KK DA15 Basin
76 KM
77 BA 0.012
78 LG 0.35 0.30 4.5 .250 5.0
79 UC 0.255 0.191
*
1 LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
80 KK DA16 Basin
81 KM
82 BA 0.002
83 LG 0.35 0.30 4.5 .250 5.0
84 UC 0.107 0.057
*
85 KK DA17 Basin
86 KM
87 BA 0.005
88 LG 0.35 0.30 4.5 .250 5.0
89 UC 0.166 0.096
*
90 KK DA18 Basin
91 KM
92 BA 0.126
93 LG 0.35 0.30 4.5 .250 5.0
94 UC 0.807 0.587
*
95 KK DA19 Basin
96 KM
97 BA 0.006
98 LG 0.35 0.30 4.5 .250 5.0
99 UC 0.169 0.074
*
100 KK DA20 Basin
101 KM
102 BA 2.847
103 LG 0.42 0.33 4.5 .254 5.0
104 UC 2.690 1.547
*
105 KK DA21 Basin
106 KM
107 BA 0.079
108 LG 0.35 0.30 4.5 .250 5.0
109 UC 0.671 0.563
*
    
```


I-10, SR202 (Santan) to Gila River
10-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
10-Yr HEC-1 Output

```

1*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 25FEB20 TIME 15:59:45 *
* *****

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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
* *****

```

Hydrologic Model: I-10 GRIC 10 yr

project: I-10 GRIC
TRACS No.
FHWA No.

Notes By: J2 Design
Developed: February 10, 2020

File Name: I10GRIC_10yr
Storm Event:10yr
Conditions: Existing Conditions

Comments:
This model is developed to predict the stormwater runoff that will contribute to crossing structures beneath I-10 within the Gila River Indian Community with contributing areas greater than 160 ac
UPDATE LG CARDS

```

23 IO OUTPUT CONTROL VARIABLES
      IPRNT      5 PRINT CONTROL
      IPLOT      0 PLOT CONTROL
      QSCAL      0. HYDROGRAPH PLOT SCALE

```

```

IT HYDROGRAPH TIME DATA
      NMIN      5 MINUTES IN COMPUTATION INTERVAL
      IDATE     10FEB20 STARTING DATE
      ITIME     0000 STARTING TIME
      NQ        500 NUMBER OF HYDROGRAPH ORDINATES
      NDDATE    11FEB20 ENDING DATE
      NDTIME    1735 ENDING TIME
      ICENT     19 CENTURY MARK

```

```

      COMPUTATION INTERVAL .08 HOURS
      TOTAL TIME BASE 41.58 HOURS

```

```

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

```

```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

```

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	DA01	60.	3.17	5.	1.	1.	.04		
HYDROGRAPH AT	DA02	179.	3.17	15.	4.	2.	.09		
HYDROGRAPH AT	DA04	110.	5.50	63.	18.	10.	2.42		
HYDROGRAPH AT	DA07	191.	4.67	73.	19.	11.	1.63		
HYDROGRAPH AT	DA08	92.	5.42	53.	15.	9.	1.43		
HYDROGRAPH AT	DA09	31.	4.17	11.	3.	2.	.22		
HYDROGRAPH AT	DA10	453.	5.75	259.	70.	41.	5.73		
HYDROGRAPH AT	DA11	186.	3.42	18.	5.	3.	.38		

+	HYDROGRAPH AT	DA13	101.	5.42	56.	16.	9.	1.74
+	HYDROGRAPH AT	DA14	23.	3.92	6.	2.	1.	.12
+	HYDROGRAPH AT	DA15	9.	3.25	1.	0.	0.	.01
+	HYDROGRAPH AT	DA16	3.	3.17	0.	0.	0.	.00
+	HYDROGRAPH AT	DA17	5.	3.17	0.	0.	0.	.00
+	HYDROGRAPH AT	DA18	34.	3.75	6.	2.	1.	.13
+	HYDROGRAPH AT	DA19	7.	3.17	0.	0.	0.	.01
+	HYDROGRAPH AT	DA20	230.	5.25	115.	30.	18.	2.85
+	HYDROGRAPH AT	DA21	24.	3.67	4.	1.	1.	.08
+	HYDROGRAPH AT	DA22	6.	3.50	1.	0.	0.	.02
+	HYDROGRAPH AT	DA23	40.	3.83	9.	2.	1.	.17
+	HYDROGRAPH AT	DA24	32.	3.92	8.	2.	1.	.16
+	HYDROGRAPH AT	DA25	45.	3.83	9.	2.	1.	.17
+	HYDROGRAPH AT	DA26	21.	3.33	2.	1.	0.	.02
+	HYDROGRAPH AT	DA27	48.	3.83	10.	3.	1.	.18
+	HYDROGRAPH AT	DA28	42.	3.83	9.	2.	1.	.16
+	HYDROGRAPH AT	DA29	97.	3.83	19.	5.	3.	.37
+	HYDROGRAPH AT	DA30	136.	4.42	45.	11.	7.	1.13
+	HYDROGRAPH AT	DA31	16.	3.25	1.	0.	0.	.02
+	HYDROGRAPH AT	DA32	81.	4.25	24.	6.	4.	.55
+	HYDROGRAPH AT	DA33	18.	4.08	6.	2.	1.	.14
+	HYDROGRAPH AT	DA34	9.	4.00	4.	1.	1.	.08
+	HYDROGRAPH AT	DA35	12.	4.00	4.	1.	1.	.10
+	HYDROGRAPH AT	DA36	90.	5.50	54.	16.	9.	1.45
+	HYDROGRAPH AT	DA37	11.	3.58	2.	0.	0.	.03
+	HYDROGRAPH AT	DA38	17.	3.67	3.	1.	0.	.06
+	HYDROGRAPH AT	DA39	14.	3.33	1.	0.	0.	.02
+	HYDROGRAPH AT	DA40	15.	3.42	2.	0.	0.	.03
+	HYDROGRAPH AT	DA41	297.	4.75	116.	30.	17.	2.33

*** NORMAL END OF HEC-1 ***

I-10, SR202 (Santan) to Gila River
25-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
25-Yr HEC-1 Output

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 25FEB20 TIME 15:59:54 *
*****
    
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```

*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****
    
```

```

X X XXXXXXX XXXXX X
X X X X X XX
X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX
    
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID Hydrologic Model: I-10 GRIC 25 yr
3 ID
4 ID project: I-10 GRIC
5 ID TRACS No.
6 ID FHWA No.
7 ID
8 ID Notes By: J2 Design
9 ID Develped: February 10, 2020
10 ID
11 ID File Name: I10GRIC_25yr
12 ID Storm Event:25yr
13 ID Conditions: Existing Conditions
14 ID
15 ID Comments:
16 ID This model is developed to predict the stormwater runoff that will
17 ID contribute to crossing structures beneath I-10 within the Gila River
18 ID Indian Community with contributing areas greater than 160 ac
19 ID UPDATE LG CARDS
20 ID
21 ID *****
22 IT 5 10FEB20 0 500
23 IO 5
*
24 KK DA01 Basin
25 KM
26 BA 0.039
27 PH 0.485 0.915 1.52 1.71 1.81 2.00
28 LG 0.10 0.25 5.0 .250 60.0
29 UC 0.163 0.115
*
30 KK DA02 Basin
31 KM
32 BA 0.090
33 LG 0.10 0.32 4.7 .253 90.0
34 UC 0.149 0.066
*
35 KK DA04 Basin
36 KM
37 BA 2.423
38 LG 0.38 0.80 3.4 .300 5.0
39 UC 2.885 2.103
*
40 KK DA07 Basin
41 KM
42 BA 1.630
43 LG 0.41 0.28 4.9 .252 5.0
44 UC 2.004 1.101
    
```

1 HEC-1 INPUT PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    
```

```

45 KK DA08 Basin
46 KM
47 BA 1.434
48 LG 0.48 0.25 5.0 .250 5.0
49 UC 2.630 2.479
*
50 KK DA09 Basin
51 KM
52 BA 0.218
53 LG 0.35 0.25 5.0 .250 5.0
54 UC 1.275 1.402
*
55 KK DA10 Basin
56 KM
57 BA 5.726
58 LG 0.35 0.26 4.9 .249 5.0
59 UC 3.372 1.716
*
60 KK DA11 Basin
61 KM
62 BA 0.375
63 LG 0.35 0.33 4.4 .250 5.0
64 UC 0.512 0.230
*
65 KK DA13 Basin
66 KM
67 BA 1.739
68 LG 0.40 0.39 4.4 .318 5.0
69 UC 2.649 2.138
*
70 KK DA14 Basin
71 KM
72 BA 0.122
73 LG 0.35 0.28 4.7 .250 5.0
74 UC 1.000 1.002
*
75 KK DA15 Basin
76 KM
77 BA 0.012
78 LG 0.35 0.30 4.5 .250 5.0
79 UC 0.255 0.191
*
1 LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
80 KK DA16 Basin
81 KM
82 BA 0.002
83 LG 0.35 0.30 4.5 .250 5.0
84 UC 0.107 0.057
*
85 KK DA17 Basin
86 KM
87 BA 0.005
88 LG 0.35 0.30 4.5 .250 5.0
89 UC 0.166 0.096
*
90 KK DA18 Basin
91 KM
92 BA 0.126
93 LG 0.35 0.30 4.5 .250 5.0
94 UC 0.807 0.587
*
95 KK DA19 Basin
96 KM
97 BA 0.006
98 LG 0.35 0.30 4.5 .250 5.0
99 UC 0.169 0.074
*
100 KK DA20 Basin
101 KM
102 BA 2.847
103 LG 0.42 0.33 4.5 .254 5.0
104 UC 2.690 1.547
*
105 KK DA21 Basin
106 KM
107 BA 0.079
108 LG 0.35 0.30 4.5 .250 5.0
109 UC 0.671 0.563
*
    
```


I-10, SR202 (Santan) to Gila River
25-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
25-Yr HEC-1 Output

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 25FEB20 TIME 15:59:54 *
*****
    
```

```

*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****
    
```

Hydrologic Model: I-10 GRIC 25 yr

project: I-10 GRIC
TRACS No.
FHWA No.

Notes By: J2 Design
Developed: February 10, 2020

File Name: I10GRIC_25yr
Storm Event: 25yr
Conditions: Existing Conditions

Comments:
This model is developed to predict the stormwater runoff that will contribute to crossing structures beneath I-10 within the Gila River Indian Community with contributing areas greater than 160 ac
UPDATE LG CARDS

```

23 IO OUTPUT CONTROL VARIABLES
      IPRNT      5 PRINT CONTROL
      IPLOT      0 PLOT CONTROL
      QSCAL      0. HYDROGRAPH PLOT SCALE
    
```

```

IT HYDROGRAPH TIME DATA
      NMIN      5 MINUTES IN COMPUTATION INTERVAL
      IDATE     10FEB20 STARTING DATE
      ITIME     0000 STARTING TIME
      NQ        500 NUMBER OF HYDROGRAPH ORDINATES
      NDDATE    11FEB20 ENDING DATE
      NDTIME    1735 ENDING TIME
      ICENT     19 CENTURY MARK
    
```

```

      COMPUTATION INTERVAL .08 HOURS
      TOTAL TIME BASE 41.58 HOURS
    
```

```

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT
    
```

```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES
    
```

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	DA01	76.	3.17	6.	2.	1.	.04		
HYDROGRAPH AT	DA02	222.	3.17	18.	5.	3.	.09		
HYDROGRAPH AT	DA04	190.	5.58	108.	30.	17.	2.42		
HYDROGRAPH AT	DA07	305.	4.67	115.	29.	17.	1.63		
HYDROGRAPH AT	DA08	149.	5.42	86.	25.	14.	1.43		
HYDROGRAPH AT	DA09	47.	4.17	17.	4.	2.	.22		
HYDROGRAPH AT	DA10	690.	5.75	393.	106.	61.	5.73		
HYDROGRAPH AT	DA11	286.	3.42	28.	7.	4.	.38		

+	HYDROGRAPH AT	DA13	167.	5.33	92.	26.	15.	1.74
+	HYDROGRAPH AT	DA14	35.	3.92	9.	2.	1.	.12
+	HYDROGRAPH AT	DA15	13.	3.25	1.	0.	0.	.01
+	HYDROGRAPH AT	DA16	4.	3.17	0.	0.	0.	.00
+	HYDROGRAPH AT	DA17	8.	3.17	0.	0.	0.	.00
+	HYDROGRAPH AT	DA18	53.	3.75	10.	2.	1.	.13
+	HYDROGRAPH AT	DA19	10.	3.17	0.	0.	0.	.01
+	HYDROGRAPH AT	DA20	371.	5.25	185.	49.	28.	2.85
+	HYDROGRAPH AT	DA21	36.	3.67	6.	2.	1.	.08
+	HYDROGRAPH AT	DA22	9.	3.50	1.	0.	0.	.02
+	HYDROGRAPH AT	DA23	61.	3.83	13.	3.	2.	.17
+	HYDROGRAPH AT	DA24	49.	3.92	12.	3.	2.	.16
+	HYDROGRAPH AT	DA25	68.	3.83	14.	3.	2.	.17
+	HYDROGRAPH AT	DA26	28.	3.33	3.	1.	0.	.02
+	HYDROGRAPH AT	DA27	70.	3.83	15.	4.	2.	.18
+	HYDROGRAPH AT	DA28	61.	3.83	13.	3.	2.	.16
+	HYDROGRAPH AT	DA29	146.	3.83	29.	7.	4.	.37
+	HYDROGRAPH AT	DA30	224.	4.42	73.	18.	11.	1.13
+	HYDROGRAPH AT	DA31	25.	3.25	2.	0.	0.	.02
+	HYDROGRAPH AT	DA32	131.	4.25	39.	10.	6.	.55
+	HYDROGRAPH AT	DA33	29.	4.08	10.	3.	1.	.14
+	HYDROGRAPH AT	DA34	15.	4.00	6.	1.	1.	.08
+	HYDROGRAPH AT	DA35	19.	4.00	7.	2.	1.	.10
+	HYDROGRAPH AT	DA36	144.	5.50	86.	26.	15.	1.45
+	HYDROGRAPH AT	DA37	16.	3.58	3.	1.	0.	.03
+	HYDROGRAPH AT	DA38	25.	3.67	5.	1.	1.	.06
+	HYDROGRAPH AT	DA39	21.	3.33	2.	0.	0.	.02
+	HYDROGRAPH AT	DA40	23.	3.42	3.	1.	0.	.03
+	HYDROGRAPH AT	DA41	451.	4.75	176.	45.	26.	2.33

*** NORMAL END OF HEC-1 ***

I-10, SR202 (Santan) to Gila River
50-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
50-Yr HEC-1 Output

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 24FEB20 TIME 16:05:11 *
*****

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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****

```

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X X XXXXXXX XXXXX X
X X X X X XX
X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX

```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID Hydrologic Model: I-10 GRIC 50 yr
3 ID
4 ID project: I-10 GRIC
5 ID TRACS No.
6 ID FHWA No.
7 ID
8 ID Notes By: J2 Design
9 ID Develped: February 10, 2020
10 ID
11 ID File Name: I10GRIC_50yr
12 ID Storm Event:50yr
13 ID Conditions: Existing Conditions
14 ID
15 ID Comments:
16 ID This model is developed to predict the stormwater runoff that will
17 ID contribute to crossing structures beneath I-10 within the Gila River
18 ID Indian Community with contributing areas greater than 160 ac
19 ID UPDATE LG CARDS
20 ID
21 ID *****
22 IT 5 10FEB20 0 500
23 IO 5
*
24 KK DA01 Basin
25 KM
26 BA 0.039
27 PH 0.555 1.05 1.74 1.95 2.07 2.27
28 LG 0.10 0.25 5.0 .250 60.0
29 UC 0.163 0.115
*
30 KK DA02 Basin
31 KM
32 BA 0.090
33 LG 0.10 0.32 4.7 .253 90.0
34 UC 0.149 0.066
*
35 KK DA04 Basin
36 KM
37 BA 2.423
38 LG 0.38 0.80 3.4 .300 5.0
39 UC 2.885 2.103
*
40 KK DA07 Basin
41 KM
42 BA 1.630
43 LG 0.41 0.28 4.9 .252 5.0
44 UC 2.004 1.101

```

1 HEC-1 INPUT PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

```

```

45 KK DA08 Basin
46 KM
47 BA 1.434
48 LG 0.48 0.25 5.0 .250 5.0
49 UC 2.630 2.479
*
50 KK DA09 Basin
51 KM
52 BA 0.218
53 LG 0.35 0.25 5.0 .250 5.0
54 UC 1.275 1.402
*
55 KK DA10 Basin
56 KM
57 BA 5.726
58 LG 0.35 0.26 4.9 .249 5.0
59 UC 3.372 1.716
*
60 KK DA11 Basin
61 KM
62 BA 0.375
63 LG 0.35 0.33 4.4 .250 5.0
64 UC 0.512 0.230
*
65 KK DA13 Basin
66 KM
67 BA 1.739
68 LG 0.40 0.39 4.4 .318 5.0
69 UC 2.649 2.138
*
70 KK DA14 Basin
71 KM
72 BA 0.122
73 LG 0.35 0.28 4.7 .250 5.0
74 UC 1.000 1.002
*
75 KK DA15 Basin
76 KM
77 BA 0.012
78 LG 0.35 0.30 4.5 .250 5.0
79 UC 0.255 0.191
*
1 LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
80 KK DA16 Basin
81 KM
82 BA 0.002
83 LG 0.35 0.30 4.5 .250 5.0
84 UC 0.107 0.057
*
85 KK DA17 Basin
86 KM
87 BA 0.005
88 LG 0.35 0.30 4.5 .250 5.0
89 UC 0.166 0.096
*
90 KK DA18 Basin
91 KM
92 BA 0.126
93 LG 0.35 0.30 4.5 .250 5.0
94 UC 0.807 0.587
*
95 KK DA19 Basin
96 KM
97 BA 0.006
98 LG 0.35 0.30 4.5 .250 5.0
99 UC 0.169 0.074
*
100 KK DA20 Basin
101 KM
102 BA 2.847
103 LG 0.42 0.33 4.5 .254 5.0
104 UC 2.690 1.547
*
105 KK DA21 Basin
106 KM
107 BA 0.079
108 LG 0.35 0.30 4.5 .250 5.0
109 UC 0.671 0.563
*

```


I-10, SR202 (Santan) to Gila River
50-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
50-Yr HEC-1 Output

```

1*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 24FEB20 TIME 16:05:11 *
* *****
  
```

```

*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
* *****
  
```

Hydrologic Model: I-10 GRIC 50 yr

project: I-10 GRIC
TRACS No.
FHWA No.

Notes By: J2 Design
Developed: February 10, 2020

File Name: I10GRIC_50yr
Storm Event:50yr
Conditions: Existing Conditions

Comments:
This model is developed to predict the stormwater runoff that will contribute to crossing structures beneath I-10 within the Gila River Indian Community with contributing areas greater than 160 ac
UPDATE LG CARDS

```

23 IO OUTPUT CONTROL VARIABLES
      IPRNT      5 PRINT CONTROL
      IPLOT      0 PLOT CONTROL
      QSCAL      0. HYDROGRAPH PLOT SCALE
  
```

```

IT HYDROGRAPH TIME DATA
      NMIN      5 MINUTES IN COMPUTATION INTERVAL
      IDATE     10FEB20 STARTING DATE
      ITIME     0000 STARTING TIME
      NQ        500 NUMBER OF HYDROGRAPH ORDINATES
      NDDATE    11FEB20 ENDING DATE
      NDTIME    1735 ENDING TIME
      ICENT     19 CENTURY MARK
  
```

```

      COMPUTATION INTERVAL .08 HOURS
      TOTAL TIME BASE 41.58 HOURS
  
```

```

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT
  
```

```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES
  
```

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	DA01	88.	3.17	7.	2.	1.	.04		
HYDROGRAPH AT	DA02	255.	3.17	21.	5.	3.	.09		
HYDROGRAPH AT	DA04	264.	5.50	149.	42.	24.	2.42		
HYDROGRAPH AT	DA07	396.	4.67	150.	38.	22.	1.63		
HYDROGRAPH AT	DA08	197.	5.42	113.	33.	19.	1.43		
HYDROGRAPH AT	DA09	60.	4.17	21.	5.	3.	.22		
HYDROGRAPH AT	DA10	886.	5.75	503.	136.	79.	5.73		
HYDROGRAPH AT	DA11	364.	3.42	36.	9.	5.	.38		

+	HYDROGRAPH AT	DA13	227.	5.33	125.	35.	20.	1.74
+	HYDROGRAPH AT	DA14	44.	3.92	12.	3.	2.	.12
+	HYDROGRAPH AT	DA15	16.	3.25	1.	0.	0.	.01
+	HYDROGRAPH AT	DA16	5.	3.17	0.	0.	0.	.00
+	HYDROGRAPH AT	DA17	10.	3.17	0.	0.	0.	.00
+	HYDROGRAPH AT	DA18	67.	3.75	12.	3.	2.	.13
+	HYDROGRAPH AT	DA19	13.	3.17	1.	0.	0.	.01
+	HYDROGRAPH AT	DA20	487.	5.25	241.	63.	37.	2.85
+	HYDROGRAPH AT	DA21	46.	3.67	8.	2.	1.	.08
+	HYDROGRAPH AT	DA22	11.	3.50	2.	0.	0.	.02
+	HYDROGRAPH AT	DA23	77.	3.83	17.	4.	2.	.17
+	HYDROGRAPH AT	DA24	62.	3.92	15.	4.	2.	.16
+	HYDROGRAPH AT	DA25	87.	3.83	18.	4.	3.	.17
+	HYDROGRAPH AT	DA26	33.	3.33	3.	1.	0.	.02
+	HYDROGRAPH AT	DA27	89.	3.83	19.	5.	3.	.18
+	HYDROGRAPH AT	DA28	77.	3.83	17.	4.	2.	.16
+	HYDROGRAPH AT	DA29	186.	3.83	37.	9.	5.	.37
+	HYDROGRAPH AT	DA30	298.	4.42	97.	24.	14.	1.13
+	HYDROGRAPH AT	DA31	31.	3.25	2.	1.	0.	.02
+	HYDROGRAPH AT	DA32	172.	4.25	51.	13.	7.	.55
+	HYDROGRAPH AT	DA33	38.	4.08	13.	3.	2.	.14
+	HYDROGRAPH AT	DA34	19.	4.00	7.	2.	1.	.08
+	HYDROGRAPH AT	DA35	25.	4.00	9.	2.	1.	.10
+	HYDROGRAPH AT	DA36	189.	5.50	113.	34.	19.	1.45
+	HYDROGRAPH AT	DA37	20.	3.58	3.	1.	0.	.03
+	HYDROGRAPH AT	DA38	32.	3.67	6.	1.	1.	.06
+	HYDROGRAPH AT	DA39	26.	3.33	2.	1.	0.	.02
+	HYDROGRAPH AT	DA40	29.	3.42	3.	1.	0.	.03
+	HYDROGRAPH AT	DA41	577.	4.75	224.	57.	33.	2.33

*** NORMAL END OF HEC-1 ***

I-10, SR202 (Santan) to Gila River
100-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
100-Yr HEC-1 Output

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 25FEB20 TIME 16:00:03 *
*****

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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****

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X X XXXXXXX XXXXX X
X X X X X XX
X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX

```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID Hydrologic Model: I-10 GRIC 100 yr
3 ID
4 ID project: I-10 GRIC
5 ID TRACS No.
6 ID FHWA No.
7 ID
8 ID Notes By: J2 Design
9 ID Develped: February 10, 2020
10 ID
11 ID File Name: I10GRIC_100yr
12 ID Storm Event:100yr
13 ID Conditions: Existing Conditions
14 ID
15 ID Comments:
16 ID This model is developed to predict the stormwater runoff that will
17 ID contribute to crossing structures beneath I-10 within the Gila River
18 ID Indian Community with contributing areas greater than 160 ac
19 ID UPDATE LG CARDS
20 ID
21 ID *****
22 IT 5 10FEB20 0 500
23 IO 5
*
24 KK DA01 Basin
25 KM
26 BA 0.039
27 PH 0.626 1.18 1.97 2.20 2.34 2.55
28 LG 0.10 0.25 5.0 .250 60.0
29 UC 0.163 0.115
*
30 KK DA02 Basin
31 KM
32 BA 0.090
33 LG 0.10 0.32 4.7 .253 90.0
34 UC 0.149 0.066
*
35 KK DA04 Basin
36 KM
37 BA 2.423
38 LG 0.38 0.80 3.4 .300 5.0
39 UC 2.885 2.103
*
40 KK DA07 Basin
41 KM
42 BA 1.630
43 LG 0.41 0.28 4.9 .252 5.0
44 UC 2.004 1.101

```

1 HEC-1 INPUT PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

```

```

45 KK DA08 Basin
46 KM
47 BA 1.434
48 LG 0.48 0.25 5.0 .250 5.0
49 UC 2.630 2.479
*
50 KK DA09 Basin
51 KM
52 BA 0.218
53 LG 0.35 0.25 5.0 .250 5.0
54 UC 1.275 1.402
*
55 KK DA10 Basin
56 KM
57 BA 5.726
58 LG 0.35 0.26 4.9 .249 5.0
59 UC 3.372 1.716
*
60 KK DA11 Basin
61 KM
62 BA 0.375
63 LG 0.35 0.33 4.4 .250 5.0
64 UC 0.512 0.230
*
65 KK DA13 Basin
66 KM
67 BA 1.739
68 LG 0.40 0.39 4.4 .318 5.0
69 UC 2.649 2.138
*
70 KK DA14 Basin
71 KM
72 BA 0.122
73 LG 0.35 0.28 4.7 .250 5.0
74 UC 1.000 1.002
*
75 KK DA15 Basin
76 KM
77 BA 0.012
78 LG 0.35 0.30 4.5 .250 5.0
79 UC 0.255 0.191
*
1 LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
80 KK DA16 Basin
81 KM
82 BA 0.002
83 LG 0.35 0.30 4.5 .250 5.0
84 UC 0.107 0.057
*
85 KK DA17 Basin
86 KM
87 BA 0.005
88 LG 0.35 0.30 4.5 .250 5.0
89 UC 0.166 0.096
*
90 KK DA18 Basin
91 KM
92 BA 0.126
93 LG 0.35 0.30 4.5 .250 5.0
94 UC 0.807 0.587
*
95 KK DA19 Basin
96 KM
97 BA 0.006
98 LG 0.35 0.30 4.5 .250 5.0
99 UC 0.169 0.074
*
100 KK DA20 Basin
101 KM
102 BA 2.847
103 LG 0.42 0.33 4.5 .254 5.0
104 UC 2.690 1.547
*
105 KK DA21 Basin
106 KM
107 BA 0.079
108 LG 0.35 0.30 4.5 .250 5.0
109 UC 0.671 0.563
*

```

1 HEC-1 INPUT PAGE 3

I-10, SR202 (Santan) to Gila River
100-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
100-Yr HEC-1 Output

110 KK DA22 Basin
111 KM
112 BA 0.016
113 LG 0.35 0.27 4.8 .250 5.0
114 UC 0.558 0.471
*

HEC-1 INPUT PAGE 4

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

115 KK DA23 Basin
116 KM
117 BA 0.167
118 LG 0.35 0.27 4.8 .250 5.0
119 UC 0.948 0.686
*

120 KK DA24 Basin
121 KM
122 BA 0.156
123 LG 0.35 0.26 4.9 .250 5.0
124 UC 0.993 0.873
*

125 KK DA25 Basin
126 KM
127 BA 0.175
128 LG 0.35 0.25 5.2 .242 5.0
129 UC 0.887 0.650
*

130 KK DA26 Basin
131 KM
132 BA 0.024
133 LG 0.35 0.04 9.5 .150 5.0
134 UC 0.360 0.255
*

135 KK DA27 Basin
136 KM
137 BA 0.179
138 LG 0.35 0.18 6.7 .209 5.0
139 UC 0.910 0.719
*

140 KK DA28 Basin
141 KM
142 BA 0.158
143 LG 0.35 0.18 6.6 .211 5.0
144 UC 0.862 0.763
*

145 KK DA29 Basin
146 KM
147 BA 0.365
148 LG 0.35 0.24 5.5 .235 5.0
149 UC 1.013 0.549
*

HEC-1 INPUT PAGE 5

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

150 KK DA30 Basin
151 KM
152 BA 1.134
153 LG 0.44 0.37 4.5 .256 5.0
154 UC 1.711 0.935
*

155 KK DA31 Basin
156 KM
157 BA 0.021
158 LG 0.35 0.28 4.7 .250 5.0
159 UC 0.301 0.137
*

160 KK DA32 Basin
161 KM
162 BA 0.547
163 LG 0.45 0.28 4.7 .250 5.0
164 UC 1.408 0.916
*

165 KK DA33 Basin
166 KM
167 BA 0.145
168 LG 0.45 0.29 4.6 .250 5.0
169 UC 1.144 1.401
*

170 KK DA34 Basin
171 KM

172 BA 0.079
173 LG 0.43 0.28 4.6 .250 5.0
174 UC 1.026 1.683
*

175 KK DA35 Basin
176 KM
177 BA 0.096
178 LG 0.45 0.26 4.8 .250 5.0
179 UC 1.061 1.506
*

180 KK DA36 Basin
181 KM
182 BA 1.453
183 LG 0.47 0.25 4.9 .250 5.0
184 UC 2.689 2.724
*

HEC-1 INPUT PAGE 6

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

185 KK DA37 Basin
186 KM
187 BA 0.034
188 LG 0.35 0.26 4.8 .250 5.0
189 UC 0.612 0.591
*

190 KK DA38 Basin
191 KM
192 BA 0.059
193 LG 0.35 0.26 4.9 .250 5.0
194 UC 0.719 0.615
*

195 KK DA39 Basin
196 KM
197 BA 0.020
198 LG 0.35 0.25 5.0 .250 5.0
199 UC 0.308 0.189
*

200 KK DA40 Basin
201 KM
202 BA 0.033
203 LG 0.35 0.25 5.0 .250 5.0
204 UC 0.455 0.341
*

205 KK DA41 Basin
206 KM
207 BA 2.329
208 LG 0.35 0.26 4.9 .250 5.0
209 UC 2.073 1.134
210 ZZ

I-10, SR202 (Santan) to Gila River
100-Yr HEC-1 Output

I-10, SR202 (Santan) to Gila River
100-Yr HEC-1 Output

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 25FEB20 TIME 16:00:03 *
*****
    
```

```

*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****
    
```

Hydrologic Model: I-10 GRIC 100 yr

project: I-10 GRIC
TRACS No.
FHWA No.

Notes By: J2 Design
Developed: February 10, 2020

File Name: I10GRIC_100yr
Storm Event:100yr
Conditions: Existing Conditions

Comments:
This model is developed to predict the stormwater runoff that will contribute to crossing structures beneath I-10 within the Gila River Indian Community with contributing areas greater than 160 ac
UPDATE LG CARDS

```

23 IO OUTPUT CONTROL VARIABLES
      IPRNT      5 PRINT CONTROL
      IPLOT      0 PLOT CONTROL
      QSCAL      0. HYDROGRAPH PLOT SCALE
    
```

```

IT HYDROGRAPH TIME DATA
      NMIN      5 MINUTES IN COMPUTATION INTERVAL
      IDATE     10FEB20 STARTING DATE
      ITIME     0000 STARTING TIME
      NQ        500 NUMBER OF HYDROGRAPH ORDINATES
      NDDATE    11FEB20 ENDING DATE
      NDTIME    1735 ENDING TIME
      ICENT     19 CENTURY MARK
    
```

```

      COMPUTATION INTERVAL .08 HOURS
      TOTAL TIME BASE 41.58 HOURS
    
```

```

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT
    
```

```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES
    
```

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	DA01	101.	3.17	8.	2.	1.	.04		
HYDROGRAPH AT	DA02	288.	3.17	23.	6.	3.	.09		
HYDROGRAPH AT	DA04	344.	5.50	194.	54.	31.	2.42		
HYDROGRAPH AT	DA07	495.	4.67	187.	47.	27.	1.63		
HYDROGRAPH AT	DA08	248.	5.42	142.	41.	24.	1.43		
HYDROGRAPH AT	DA09	75.	4.17	26.	7.	4.	.22		
HYDROGRAPH AT	DA10	1107.	5.75	629.	170.	98.	5.73		
HYDROGRAPH AT	DA11	445.	3.42	45.	11.	6.	.38		

+	HYDROGRAPH AT	DA13	286.	5.33	157.	44.	25.	1.74
+	HYDROGRAPH AT	DA14	55.	3.92	15.	4.	2.	.12
+	HYDROGRAPH AT	DA15	20.	3.25	1.	0.	0.	.01
+	HYDROGRAPH AT	DA16	5.	3.17	0.	0.	0.	.00
+	HYDROGRAPH AT	DA17	12.	3.17	1.	0.	0.	.00
+	HYDROGRAPH AT	DA18	83.	3.75	15.	4.	2.	.13
+	HYDROGRAPH AT	DA19	15.	3.17	1.	0.	0.	.01
+	HYDROGRAPH AT	DA20	609.	5.25	302.	79.	46.	2.85
+	HYDROGRAPH AT	DA21	56.	3.67	10.	2.	1.	.08
+	HYDROGRAPH AT	DA22	13.	3.50	2.	0.	0.	.02
+	HYDROGRAPH AT	DA23	96.	3.83	21.	5.	3.	.17
+	HYDROGRAPH AT	DA24	77.	3.92	19.	5.	3.	.16
+	HYDROGRAPH AT	DA25	107.	3.83	22.	5.	3.	.17
+	HYDROGRAPH AT	DA26	39.	3.33	4.	1.	1.	.02
+	HYDROGRAPH AT	DA27	109.	3.83	24.	6.	3.	.18
+	HYDROGRAPH AT	DA28	95.	3.83	21.	5.	3.	.16
+	HYDROGRAPH AT	DA29	230.	3.92	46.	11.	7.	.37
+	HYDROGRAPH AT	DA30	375.	4.42	122.	31.	18.	1.13
+	HYDROGRAPH AT	DA31	37.	3.25	3.	1.	0.	.02
+	HYDROGRAPH AT	DA32	216.	4.25	63.	16.	9.	.55
+	HYDROGRAPH AT	DA33	48.	4.08	16.	4.	2.	.14
+	HYDROGRAPH AT	DA34	24.	4.00	9.	2.	1.	.08
+	HYDROGRAPH AT	DA35	31.	4.00	11.	3.	2.	.10
+	HYDROGRAPH AT	DA36	238.	5.50	141.	42.	24.	1.45
+	HYDROGRAPH AT	DA37	25.	3.58	4.	1.	1.	.03
+	HYDROGRAPH AT	DA38	40.	3.67	7.	2.	1.	.06
+	HYDROGRAPH AT	DA39	31.	3.33	2.	1.	0.	.02
+	HYDROGRAPH AT	DA40	35.	3.42	4.	1.	1.	.03
+	HYDROGRAPH AT	DA41	719.	4.75	280.	71.	41.	2.33

*** NORMAL END OF HEC-1 ***



HY-8 Culvert Analysis Report Structure 05

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 10 cfs

Design Flow: 30.68 cfs

Maximum Flow: 100 cfs

Table 1 - Summary of Culvert Flows at Crossing: 926+57 - Culvert 05

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 5 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1141.64	10.00	10.00	0.00	1
1142.36	19.00	19.00	0.00	1
1143.17	28.00	28.00	0.00	1
1143.75	30.68	30.68	0.00	1
1147.56	46.00	46.00	0.00	1
1148.27	55.00	48.40	6.49	15
1148.33	64.00	48.61	15.25	5
1148.38	73.00	48.77	24.05	4
1148.42	82.00	48.92	33.00	4
1148.46	91.00	49.04	41.72	3
1148.50	100.00	49.16	50.68	3
1148.19	48.15	48.15	0.00	Overtopping

Rating Curve Plot for Crossing: 926+57 - Culvert 05

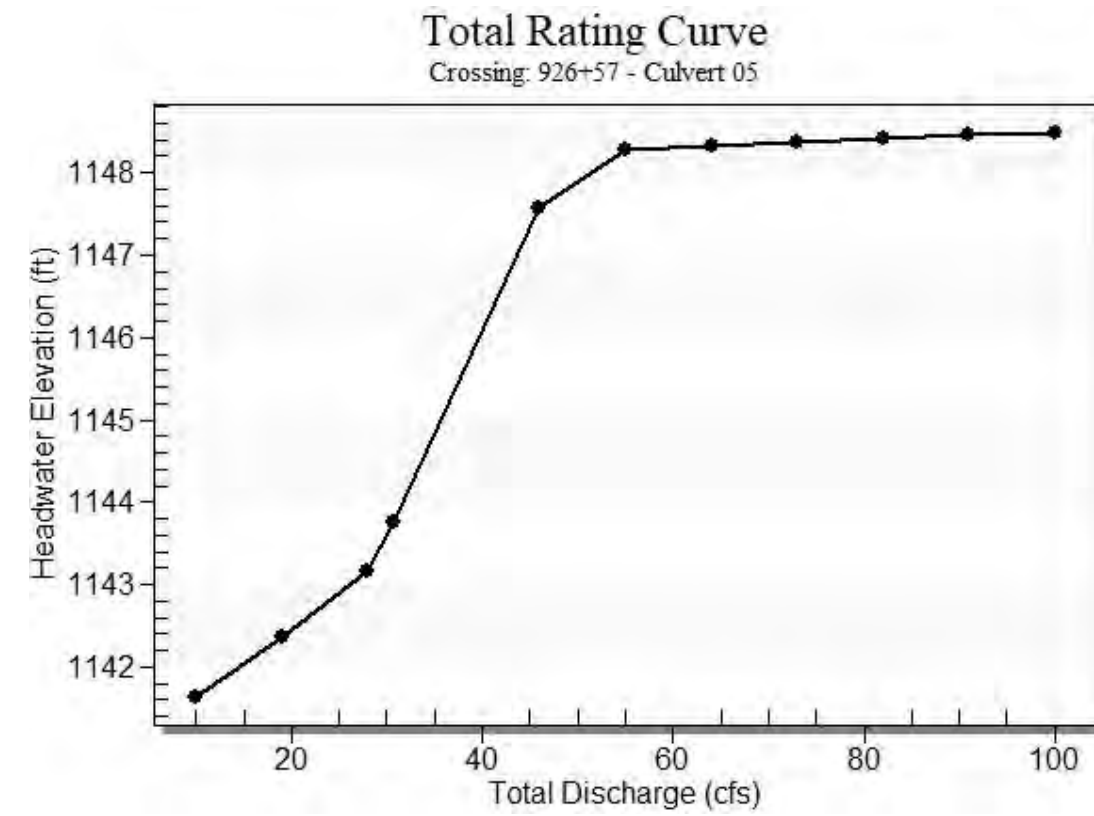
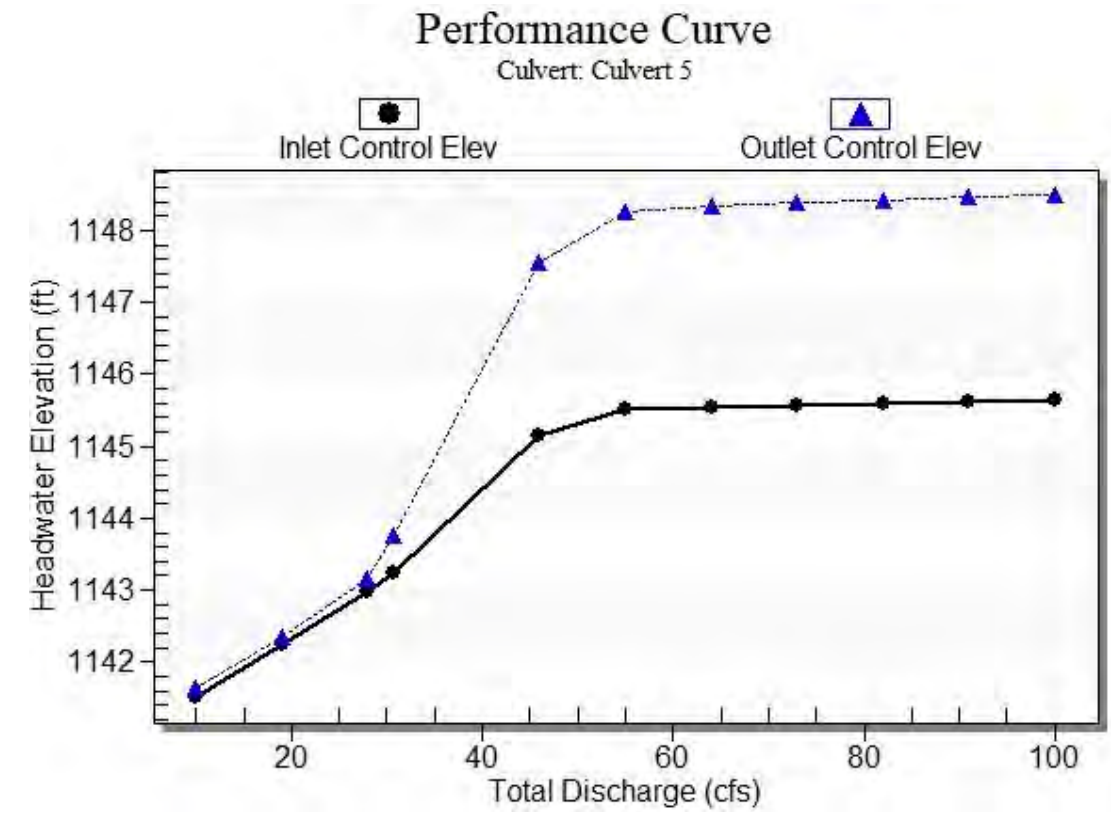


Table 2 - Culvert Summary Table: Culvert 5

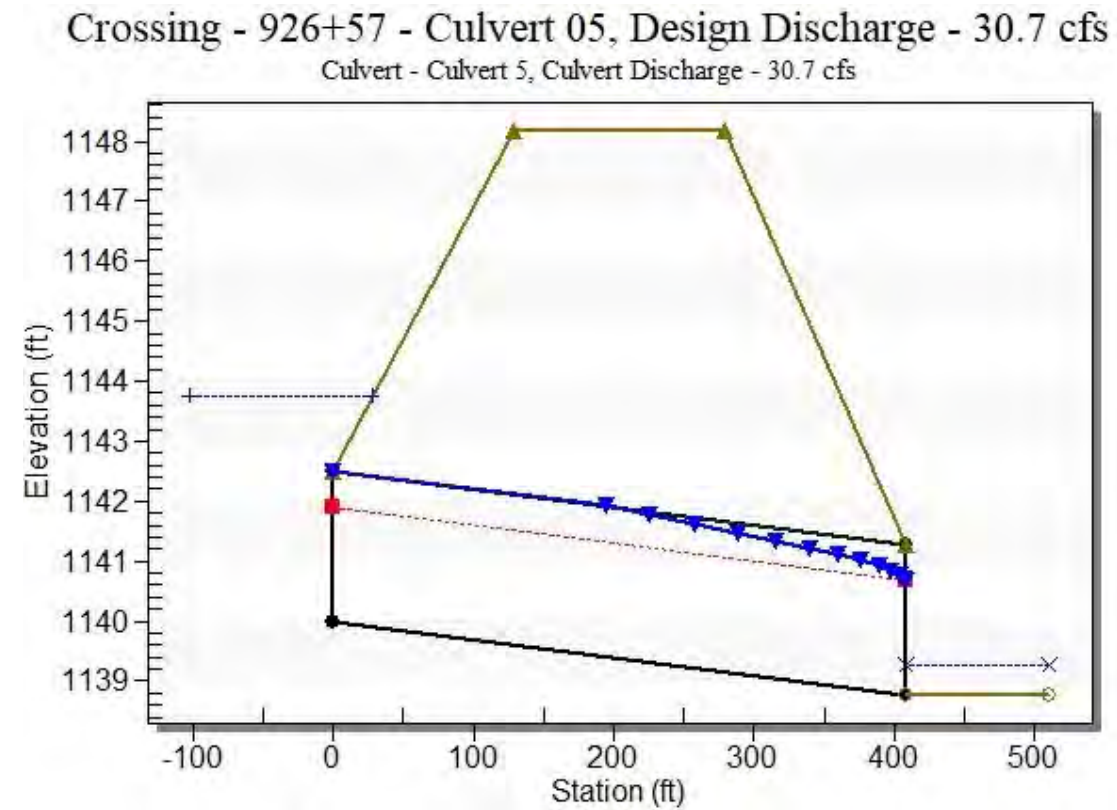
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10.00	10.00	1141.64	1.510	1.643	2-M2c	1.087	1.054	1.054	0.259	5.084	2.452
19.00	19.00	1142.36	2.246	2.363	2-M2c	1.619	1.474	1.474	0.378	6.311	3.114
28.00	28.00	1143.17	2.978	3.169	7-M2c	2.500	1.802	1.802	0.475	7.391	3.586
30.68	30.68	1143.75	3.229	3.750	7-M2c	2.500	1.885	1.885	0.501	7.725	3.707
46.00	46.00	1147.56	5.138	7.561	7-M2c	2.500	2.242	2.242	0.636	9.911	4.280
55.00	48.40	1148.27	5.515	8.270	7-M2c	2.500	2.279	2.279	0.706	10.309	4.554
64.00	48.61	1148.33	5.549	8.329	7-M2c	2.500	2.282	2.282	0.770	10.345	4.799
73.00	48.77	1148.38	5.575	8.377	7-M2c	2.500	2.284	2.284	0.831	10.372	5.020
82.00	48.92	1148.42	5.599	8.421	7-M2c	2.500	2.286	2.286	0.889	10.397	5.221
91.00	49.04	1148.46	5.619	8.459	7-M2c	2.500	2.287	2.287	0.944	10.418	5.407
100.00	49.16	1148.50	5.638	8.498	7-M2c	2.500	2.289	2.289	0.996	10.438	5.580

 Straight Culvert
 Inlet Elevation (invert): 1140.00 ft, Outlet Elevation (invert): 1138.78 ft
 Culvert Length: 408.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 5



Water Surface Profile Plot for Culvert: Culvert 5



Site Data - Culvert 5

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1140.00 ft
 Outlet Station: 408.00 ft
 Outlet Elevation: 1138.78 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 5

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 926+57 - Culvert 05)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
10.00	1139.04	0.26	2.45	0.05	0.87
19.00	1139.16	0.38	3.11	0.07	0.92
28.00	1139.26	0.48	3.59	0.09	0.96
30.68	1139.28	0.50	3.71	0.09	0.96
46.00	1139.42	0.64	4.28	0.12	1.00
55.00	1139.49	0.71	4.55	0.13	1.01
64.00	1139.55	0.77	4.80	0.14	1.03
73.00	1139.61	0.83	5.02	0.16	1.04
82.00	1139.67	0.89	5.22	0.17	1.05
91.00	1139.72	0.94	5.41	0.18	1.06
100.00	1139.78	1.00	5.58	0.19	1.06

Tailwater Channel Data - 926+57 - Culvert 05

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1138.78 ft

Roadway Data for Crossing: 926+57 - Culvert 05

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1148.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 10

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 127.5 cfs

Maximum Flow: 144 cfs

Table 1 - Summary of Culvert Flows at Crossing: 929+00 - Culvert 10

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 10 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1144.50	0.00	0.00	0.00	1
1148.23	14.40	12.16	2.14	31
1148.33	28.80	12.36	16.24	6
1148.41	43.20	12.51	30.59	5
1148.47	57.60	12.62	44.83	4
1148.53	72.00	12.69	59.25	4
1148.58	86.40	12.79	73.41	3
1148.63	100.80	12.89	87.81	3
1148.68	115.20	12.98	102.16	3
1148.71	127.50	13.06	114.42	3
1148.76	144.00	13.14	130.57	2
1148.19	12.08	12.08	0.00	Overtopping

Rating Curve Plot for Crossing: 929+00 - Culvert 10

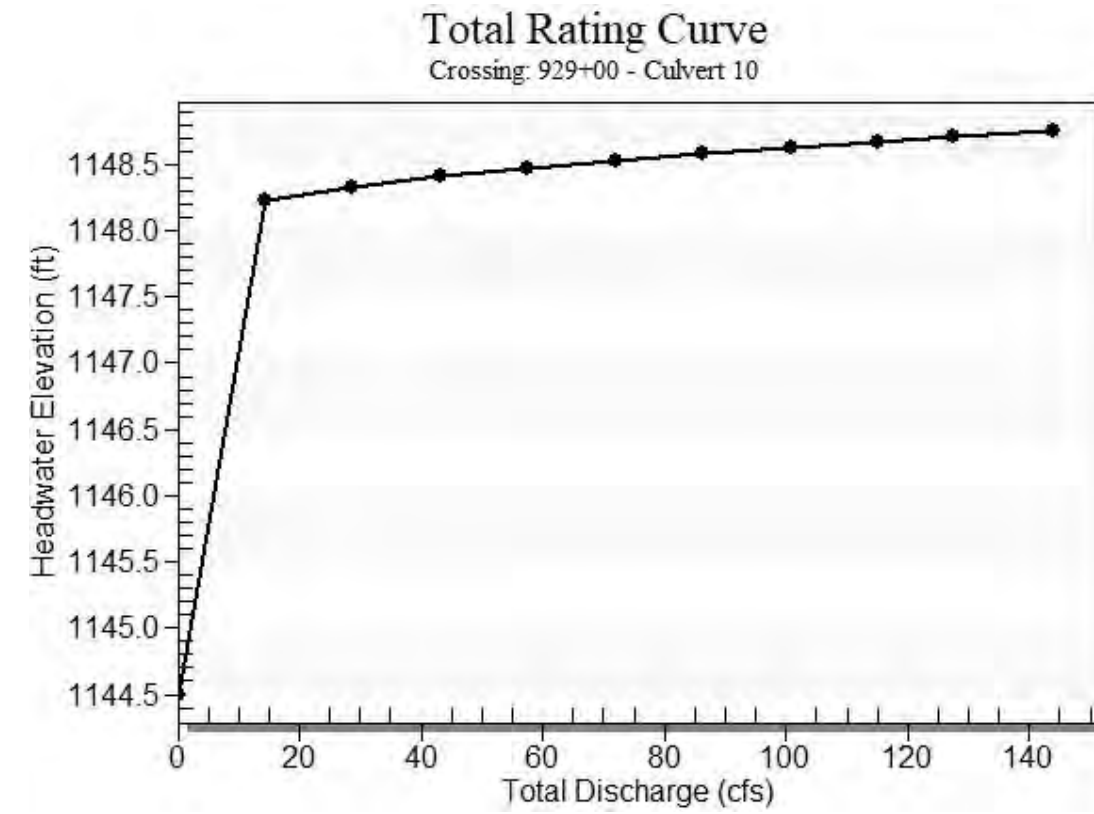
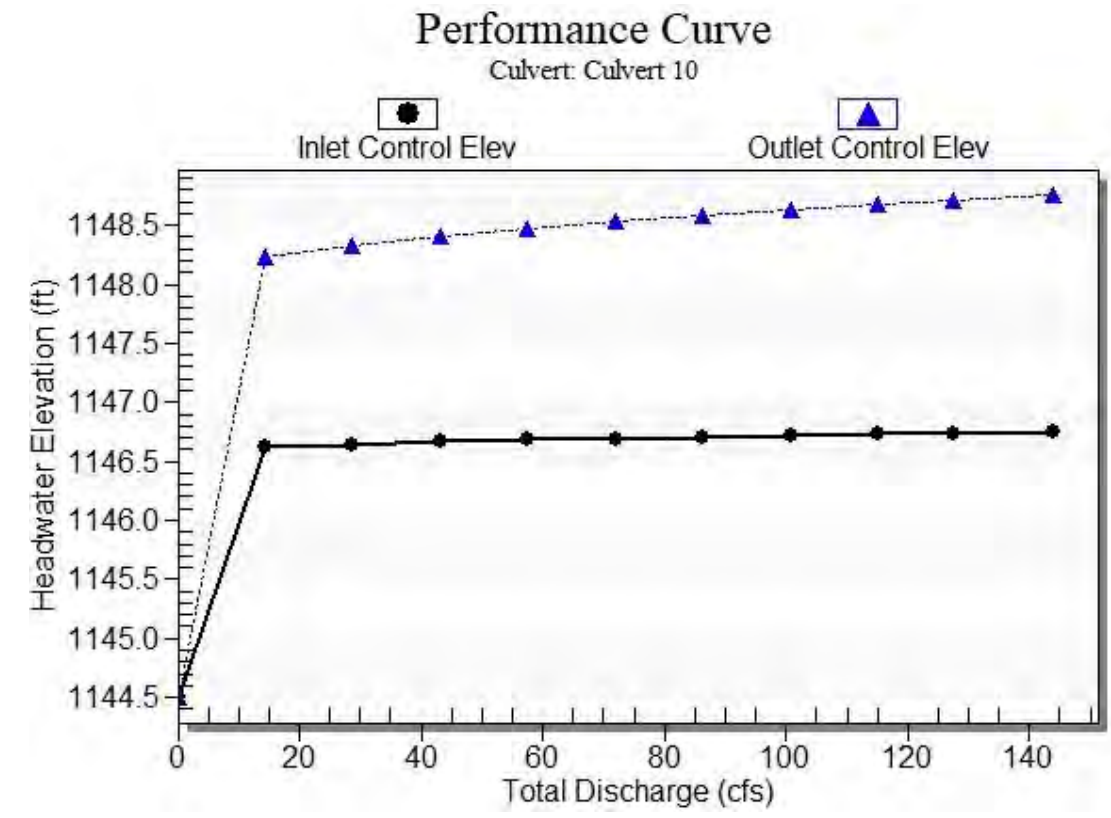


Table 2 - Culvert Summary Table: Culvert 10

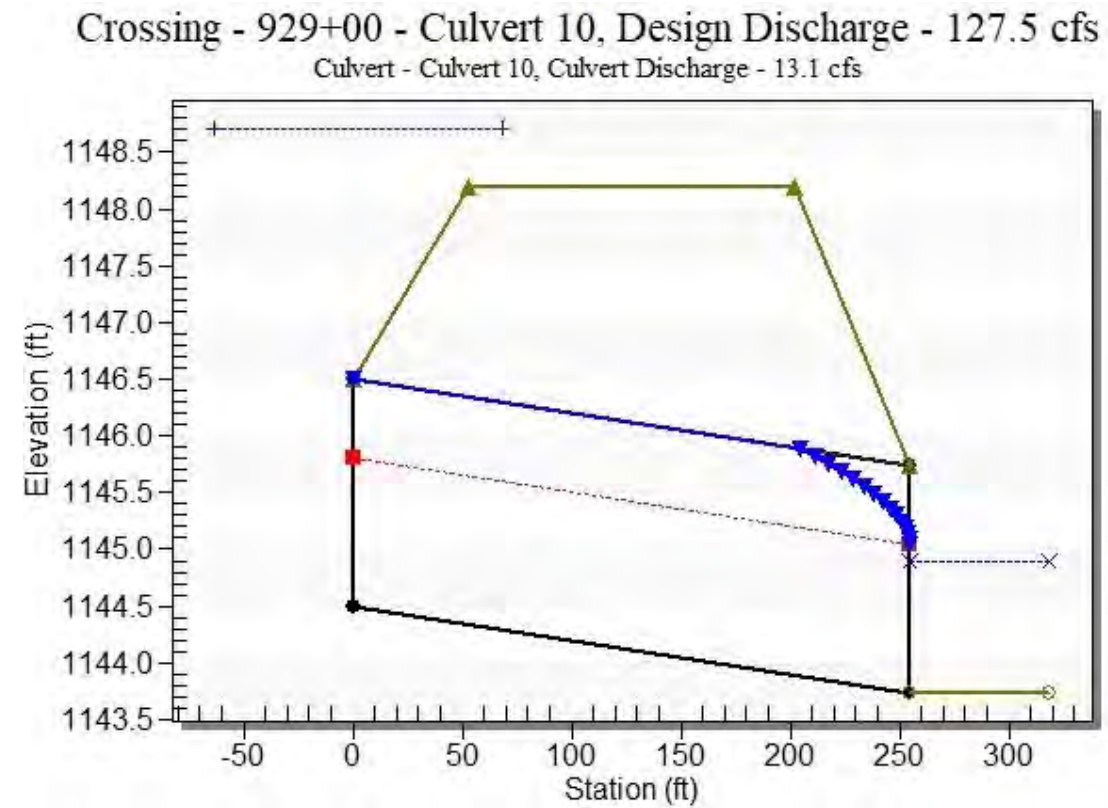
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1144.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
14.40	12.16	1148.23	2.115	3.728	7-M2c	2.000	1.247	1.247	0.321	5.901	2.812
28.80	12.36	1148.33	2.143	3.834	7-M2c	2.000	1.262	1.262	0.483	5.921	3.624
43.20	12.51	1148.41	2.163	3.910	7-M2c	2.000	1.269	1.269	0.613	5.949	4.187
57.60	12.62	1148.47	2.179	3.971	7-M2c	2.000	1.275	1.275	0.725	5.971	4.628
72.00	12.69	1148.53	2.188	4.029	7-M2c	2.000	1.278	1.278	0.825	5.984	4.996
86.40	12.79	1148.58	2.203	4.080	7-M2c	2.000	1.284	1.284	0.916	6.003	5.314
100.80	12.89	1148.63	2.217	4.129	7-M2c	2.000	1.289	1.289	1.001	6.022	5.595
115.20	12.98	1148.68	2.230	4.175	7-M2c	2.000	1.293	1.293	1.080	6.040	5.847
127.50	13.06	1148.71	2.240	4.213	7-M2c	2.000	1.297	1.297	1.144	6.054	6.044
144.00	13.14	1148.76	2.253	4.260	7-M2c	2.000	1.302	1.302	1.226	6.071	6.288

 Straight Culvert
 Inlet Elevation (invert): 1144.50 ft, Outlet Elevation (invert): 1143.74 ft
 Culvert Length: 255.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 10



Water Surface Profile Plot for Culvert: Culvert 10



Site Data - Culvert 10

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1144.50 ft
 Outlet Station: 255.00 ft
 Outlet Elevation: 1143.74 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 10

Barrel Shape: Circular
 Barrel Diameter: 2.00 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 929+00 - Culvert 10)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1143.74	0.00	0.00	0.00	0.00
14.40	1144.06	0.32	2.81	0.06	0.90
28.80	1144.22	0.48	3.62	0.09	0.96
43.20	1144.35	0.61	4.19	0.11	0.99
57.60	1144.46	0.72	4.63	0.14	1.02
72.00	1144.56	0.82	5.00	0.15	1.04
86.40	1144.66	0.92	5.31	0.17	1.05
100.80	1144.74	1.00	5.59	0.19	1.06
115.20	1144.82	1.08	5.85	0.20	1.08
127.50	1144.88	1.14	6.04	0.21	1.08
144.00	1144.97	1.23	6.29	0.23	1.09

Tailwater Channel Data - 929+00 - Culvert 10

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1143.74 ft

Roadway Data for Crossing: 929+00 - Culvert 10

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1148.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 15

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 127.5 cfs

Maximum Flow: 144 cfs

Table 1 - Summary of Culvert Flows at Crossing: 937+00 - Culvert 15

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 15 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1144.00	0.00	0.00	0.00	1
1148.68	14.40	14.13	0.00	100
1148.82	28.80	14.39	14.23	7
1148.90	43.20	14.52	28.55	5
1148.96	57.60	14.63	42.80	4
1149.02	72.00	14.69	57.24	4
1149.07	86.40	14.79	71.40	3
1149.12	100.80	14.87	85.81	3
1149.17	115.20	14.96	100.18	3
1149.21	127.50	15.03	112.45	3
1149.26	144.00	15.11	128.55	2
1148.69	14.16	14.16	0.00	Overtopping

Rating Curve Plot for Crossing: 937+00 - Culvert 15

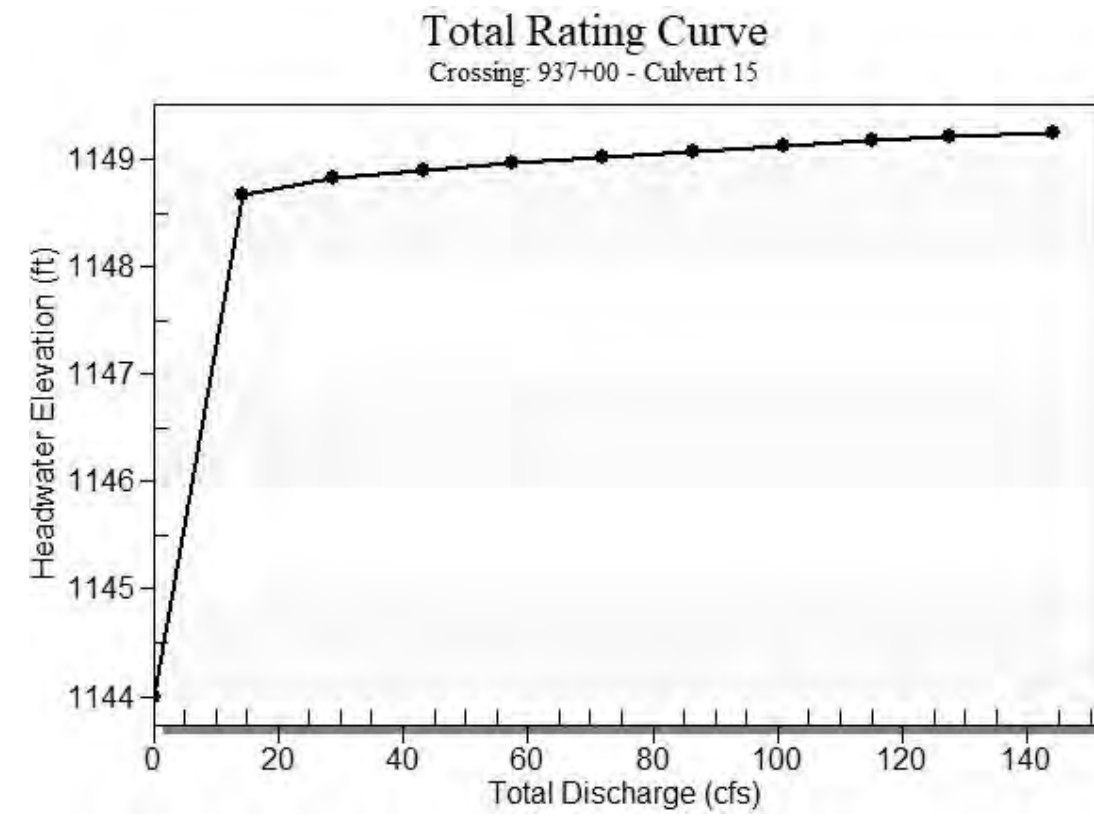
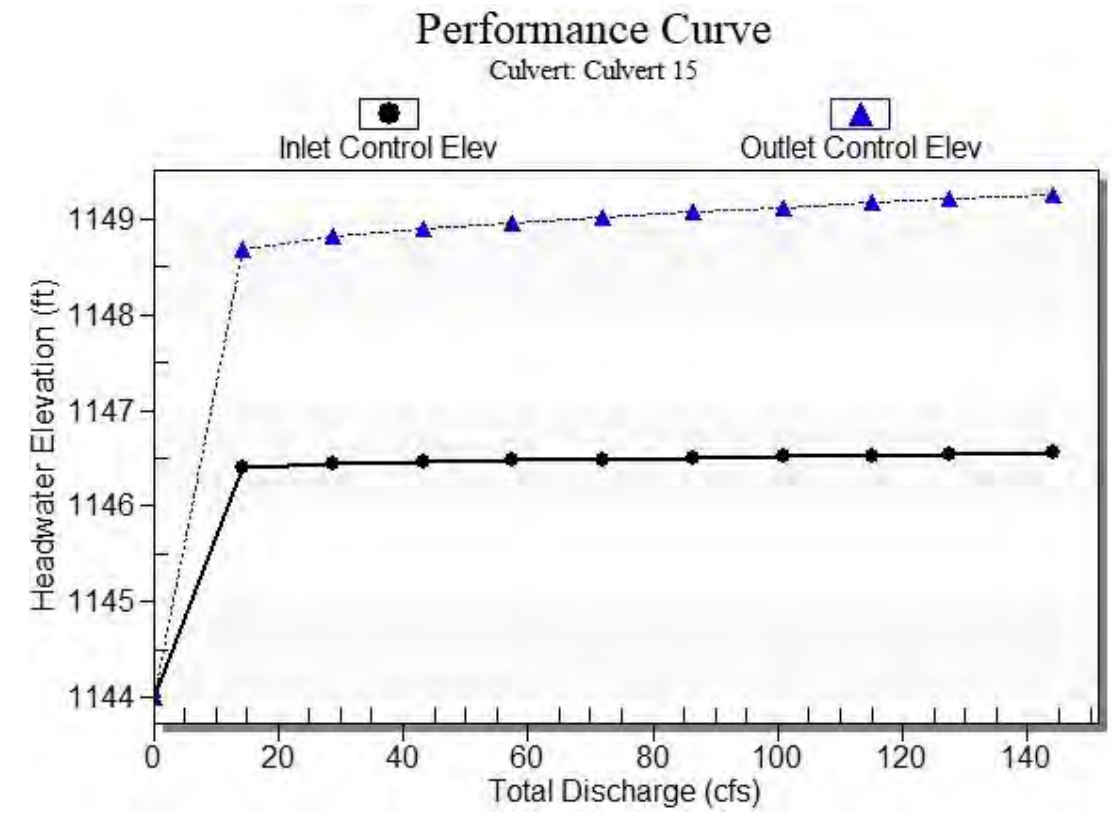


Table 2 - Culvert Summary Table: Culvert 15

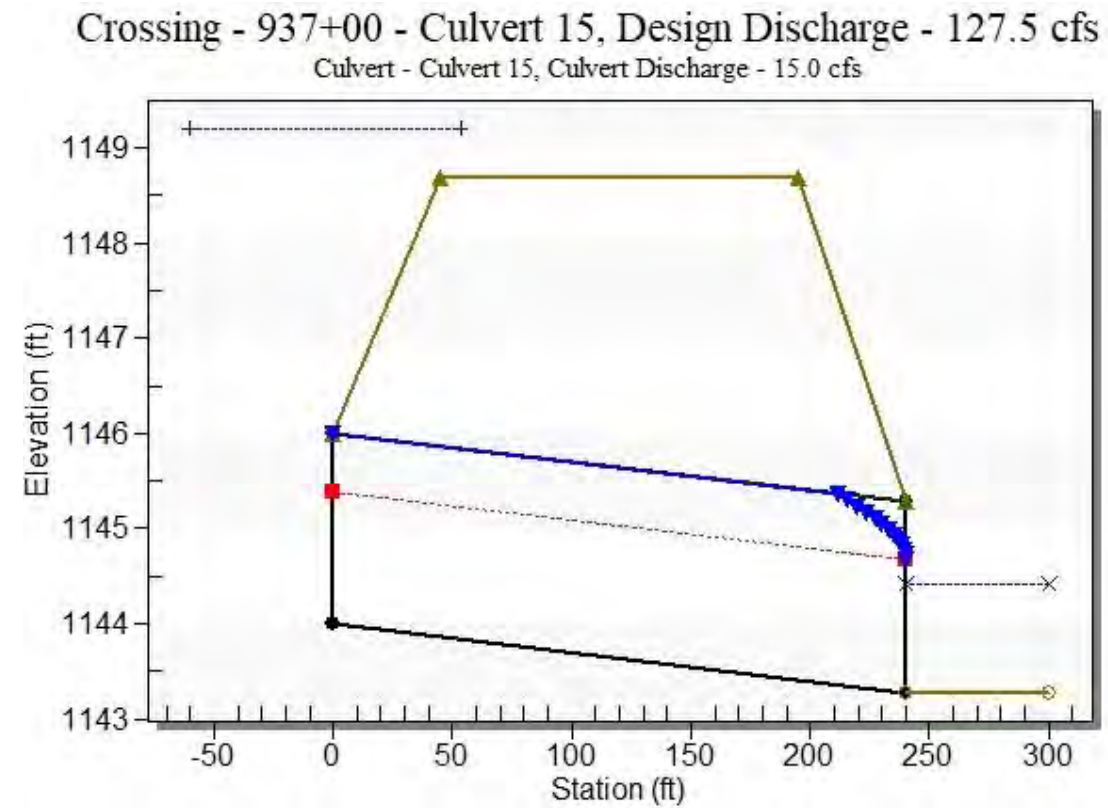
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1144.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
14.40	14.13	1148.68	2.398	4.676	7-M2c	2.000	1.351	1.351	0.321	6.261	2.812
28.80	14.39	1148.82	2.437	4.823	7-M2c	2.000	1.363	1.363	0.483	6.310	3.624
43.20	14.52	1148.90	2.457	4.899	7-M2c	2.000	1.369	1.369	0.613	6.335	4.187
57.60	14.63	1148.96	2.474	4.964	7-M2c	2.000	1.374	1.374	0.725	6.357	4.628
72.00	14.69	1149.02	2.484	5.023	7-M2c	2.000	1.377	1.377	0.825	6.368	4.996
86.40	14.79	1149.07	2.498	5.073	7-M2c	2.000	1.382	1.382	0.916	6.386	5.314
100.80	14.87	1149.12	2.512	5.122	7-M2c	2.000	1.386	1.386	1.001	6.403	5.595
115.20	14.96	1149.17	2.525	5.169	7-M2c	2.000	1.390	1.390	1.080	6.420	5.847
127.50	15.03	1149.21	2.536	5.207	7-M2c	2.000	1.393	1.393	1.144	6.433	6.044
144.00	15.11	1149.26	2.550	5.255	7-M2c	2.000	1.397	1.397	1.226	6.449	6.288

 Straight Culvert
 Inlet Elevation (invert): 1144.00 ft, Outlet Elevation (invert): 1143.28 ft
 Culvert Length: 240.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 15



Water Surface Profile Plot for Culvert: Culvert 15



Site Data - Culvert 15

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1144.00 ft
 Outlet Station: 240.00 ft
 Outlet Elevation: 1143.28 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 15

Barrel Shape: Circular
 Barrel Diameter: 2.00 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 937+00 - Culvert 15)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1143.28	0.00	0.00	0.00	0.00
14.40	1143.60	0.32	2.81	0.06	0.90
28.80	1143.76	0.48	3.62	0.09	0.96
43.20	1143.89	0.61	4.19	0.11	0.99
57.60	1144.00	0.72	4.63	0.14	1.02
72.00	1144.10	0.82	5.00	0.15	1.04
86.40	1144.20	0.92	5.31	0.17	1.05
100.80	1144.28	1.00	5.59	0.19	1.06
115.20	1144.36	1.08	5.85	0.20	1.08
127.50	1144.42	1.14	6.04	0.21	1.08
144.00	1144.51	1.23	6.29	0.23	1.09

Tailwater Channel Data - 937+00 - Culvert 15

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1143.28 ft

Roadway Data for Crossing: 937+00 - Culvert 15

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1148.69 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 20

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 945+10 - Culvert 20

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 20 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1144.00	0.00	0.00	0.00	1
1145.52	6.88	6.88	0.00	1
1146.35	13.76	13.76	0.00	1
1147.74	20.64	20.64	0.00	1
1149.22	27.52	25.58	1.80	29
1149.28	34.40	25.76	8.44	5
1149.33	41.28	25.84	15.27	4
1149.37	48.16	25.96	22.13	4
1149.39	52.80	26.04	26.61	3
1149.43	61.92	26.18	35.59	3
1149.46	68.80	26.27	42.46	3
1149.19	25.48	25.48	0.00	Overtopping

Rating Curve Plot for Crossing: 945+10 - Culvert 20

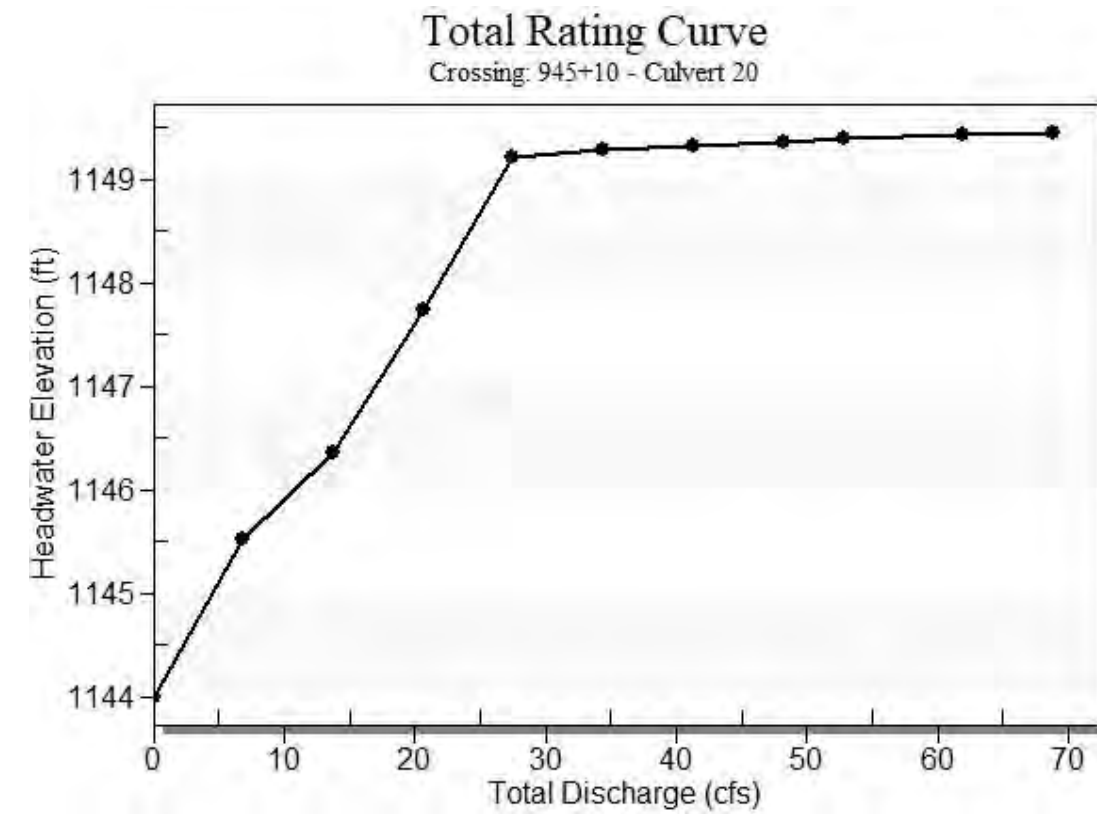
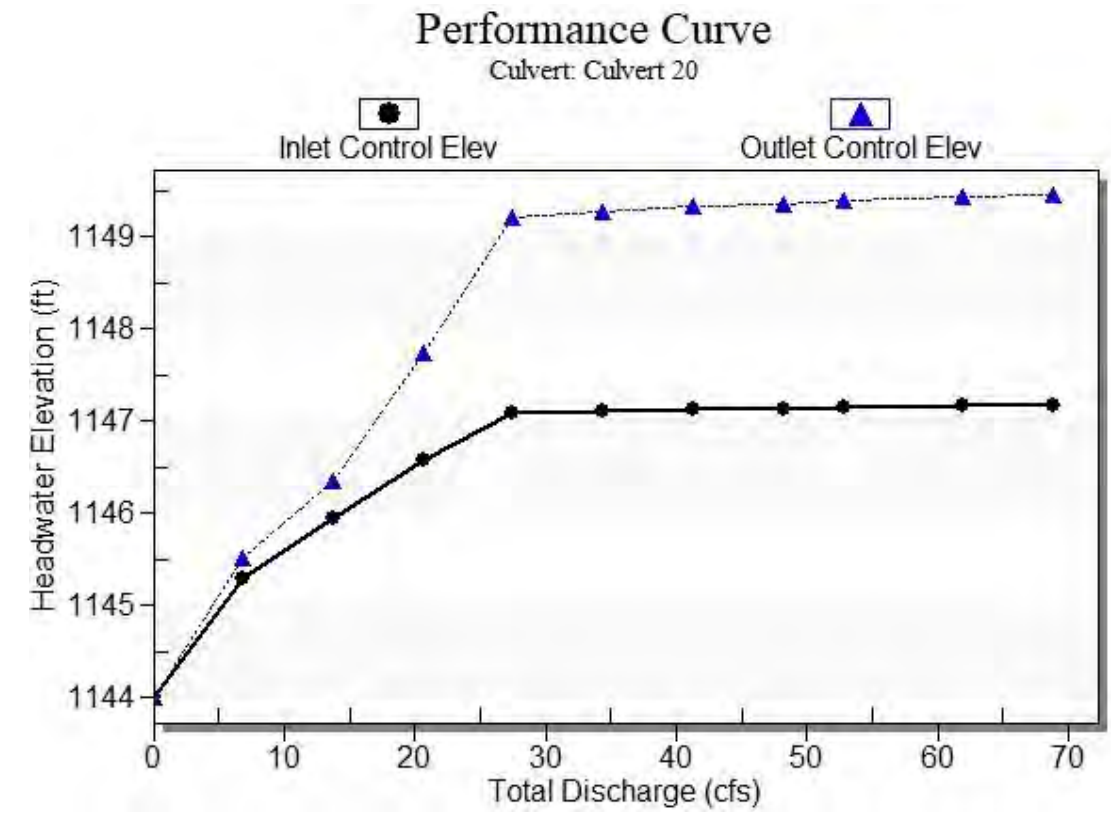


Table 2 - Culvert Summary Table: Culvert 20

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1144.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1145.52	1.299	1.515	2-M2c	1.309	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1146.35	1.953	2.354	2-M2c	2.500	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1147.74	2.585	3.745	7-M2c	2.500	1.541	1.541	0.397	6.502	3.211
27.52	25.58	1149.22	3.095	5.224	7-M2c	2.500	1.719	1.719	0.470	7.109	3.564
34.40	25.76	1149.28	3.115	5.284	7-M2c	2.500	1.725	1.725	0.536	7.132	3.861
41.28	25.84	1149.33	3.123	5.330	7-M2c	2.500	1.727	1.727	0.597	7.141	4.120
48.16	25.96	1149.37	3.137	5.367	7-M2c	2.500	1.732	1.732	0.653	7.156	4.349
52.80	26.04	1149.39	3.146	5.390	7-M2c	2.500	1.734	1.734	0.689	7.166	4.491
61.92	26.18	1149.43	3.162	5.432	7-M2c	2.500	1.739	1.739	0.756	7.183	4.745
68.80	26.27	1149.46	3.173	5.462	7-M2c	2.500	1.742	1.742	0.803	7.195	4.920

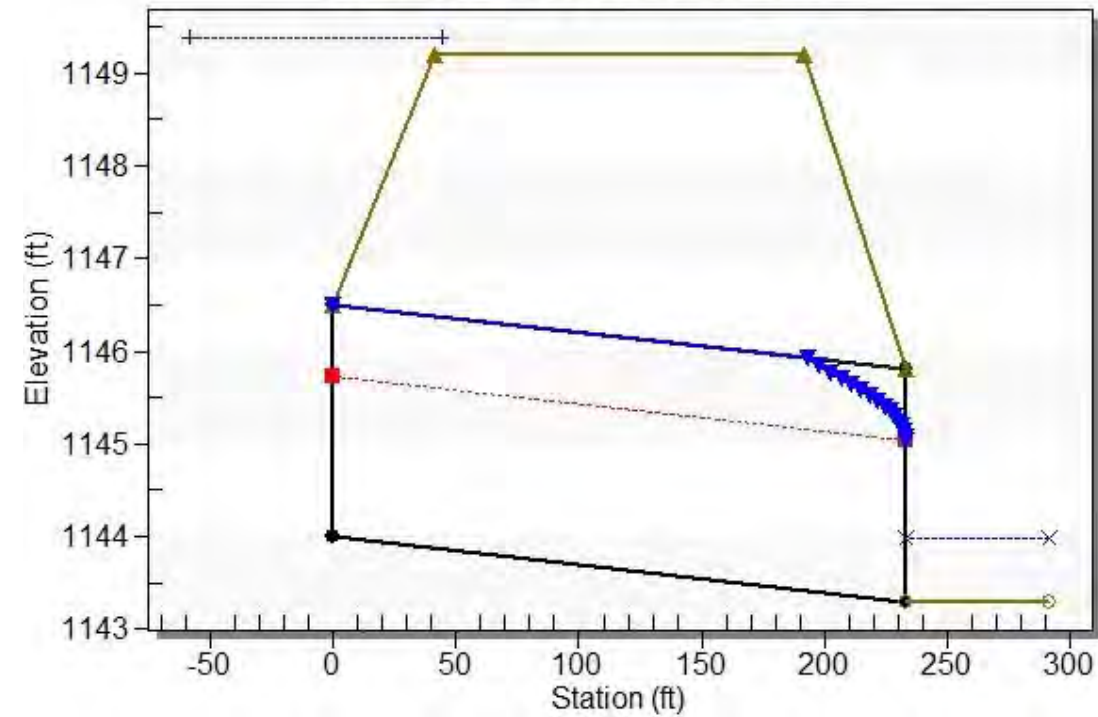
 Straight Culvert
 Inlet Elevation (invert): 1144.00 ft, Outlet Elevation (invert): 1143.30 ft
 Culvert Length: 233.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 20



Water Surface Profile Plot for Culvert: Culvert 20

Crossing - 945+10 - Culvert 20, Design Discharge - 52.8 cfs
 Culvert - Culvert 20, Culvert Discharge - 26.0 cfs



Site Data - Culvert 20

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1144.00 ft
 Outlet Station: 233.00 ft
 Outlet Elevation: 1143.30 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 20

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 945+10 - Culvert 20)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1143.30	0.00	0.00	0.00	0.00
6.88	1143.51	0.21	2.13	0.04	0.84
13.76	1143.61	0.31	2.76	0.06	0.90
20.64	1143.70	0.40	3.21	0.07	0.93
27.52	1143.77	0.47	3.56	0.09	0.95
34.40	1143.84	0.54	3.86	0.10	0.97
41.28	1143.90	0.60	4.12	0.11	0.99
48.16	1143.95	0.65	4.35	0.12	1.00
52.80	1143.99	0.69	4.49	0.13	1.01
61.92	1144.06	0.76	4.75	0.14	1.02
68.80	1144.10	0.80	4.92	0.15	1.03

Tailwater Channel Data - 945+10 - Culvert 20

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1143.30 ft

Roadway Data for Crossing: 945+10 - Culvert 20

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1149.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 25

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 948+00 - Culvert 25

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 25 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1144.50	0.00	0.00	0.00	1
1146.02	6.88	6.88	0.00	1
1146.85	13.76	13.76	0.00	1
1148.18	20.64	20.64	0.00	1
1149.72	27.52	25.88	1.50	34
1149.78	34.40	26.09	8.10	5
1149.83	41.28	26.24	14.86	4
1149.87	48.16	26.37	21.71	4
1149.89	52.80	26.45	26.19	3
1149.93	61.92	26.59	35.17	3
1149.96	68.80	26.68	42.05	3
1149.69	25.77	25.77	0.00	Overtopping

Rating Curve Plot for Crossing: 948+00 - Culvert 25

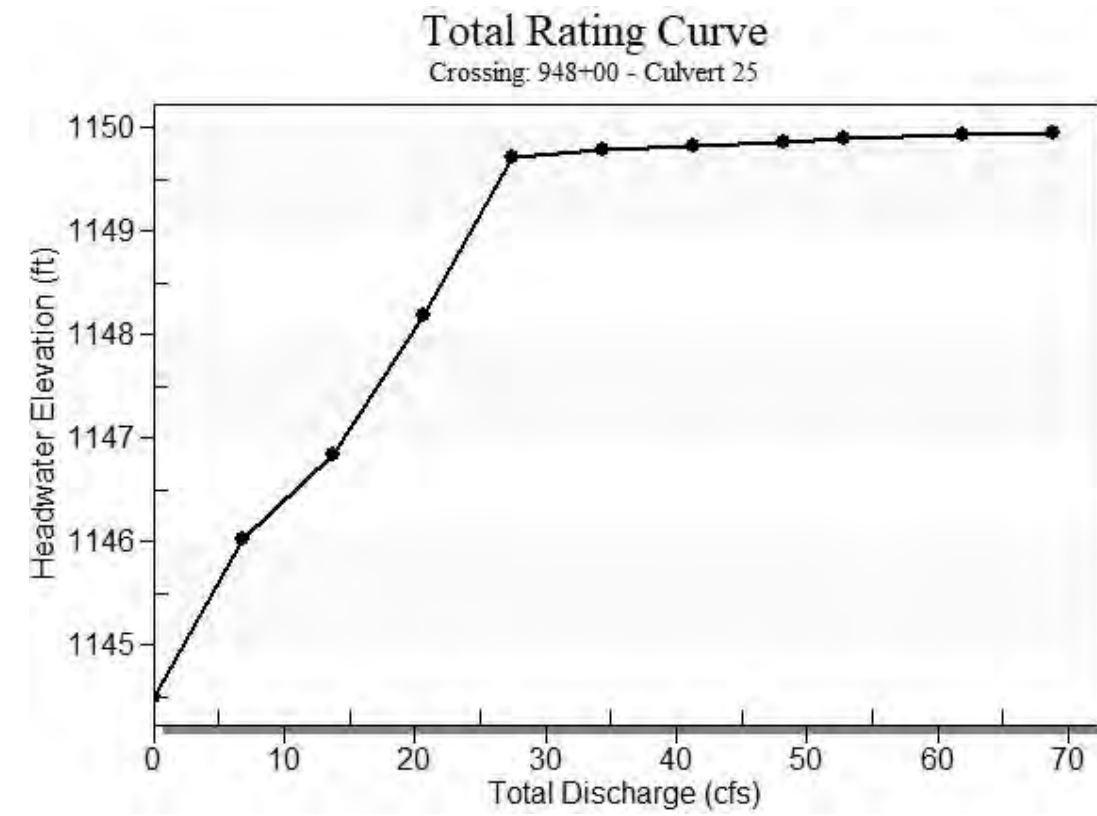


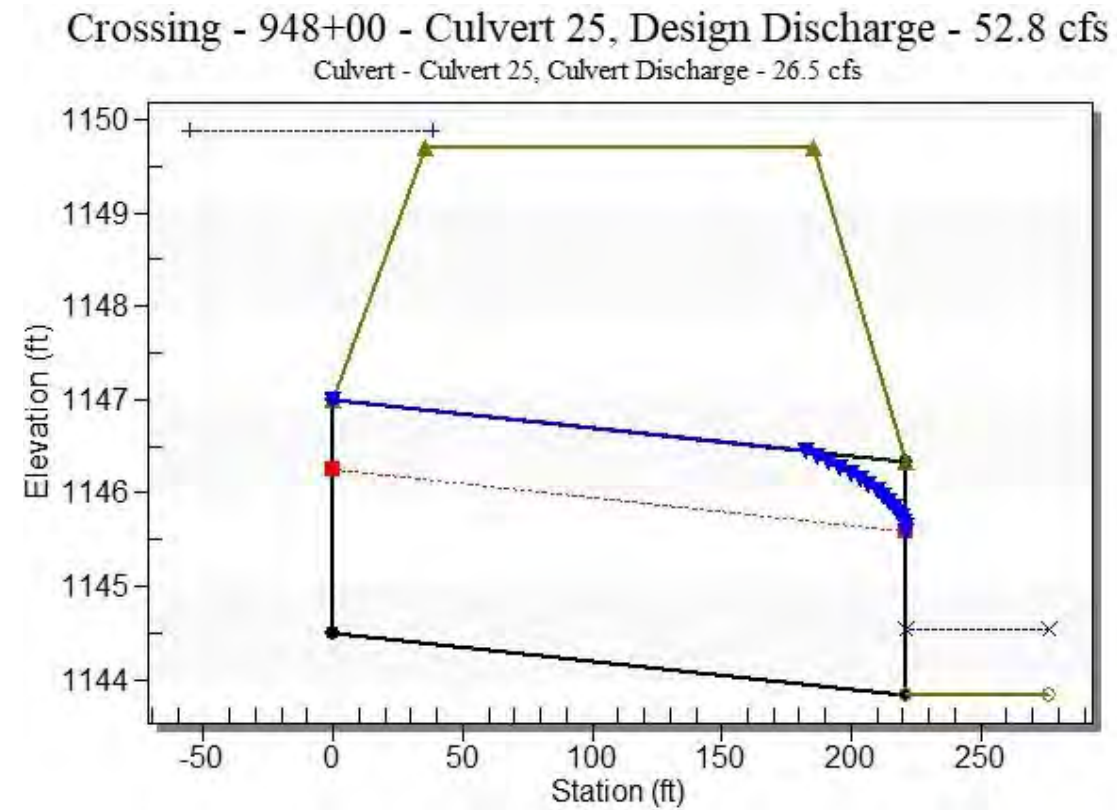
Table 2 - Culvert Summary Table: Culvert 25

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1144.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1146.02	1.299	1.517	2-M2c	1.311	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1146.85	1.953	2.347	2-M2c	2.500	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1148.18	2.585	3.682	7-M2c	2.500	1.541	1.541	0.397	6.502	3.211
27.52	25.88	1149.72	3.128	5.221	7-M2c	2.500	1.729	1.729	0.470	7.146	3.564
34.40	26.09	1149.78	3.152	5.281	7-M2c	2.500	1.736	1.736	0.536	7.172	3.861
41.28	26.24	1149.83	3.169	5.326	7-M2c	2.500	1.741	1.741	0.597	7.191	4.120
48.16	26.37	1149.87	3.184	5.365	7-M2c	2.500	1.745	1.745	0.653	7.207	4.349
52.80	26.45	1149.89	3.193	5.388	7-M2c	2.500	1.748	1.748	0.689	7.217	4.491
61.92	26.59	1149.93	3.209	5.431	7-M2c	2.500	1.756	1.756	0.756	7.218	4.745
68.80	26.68	1149.96	3.219	5.461	7-M2c	2.500	1.759	1.759	0.803	7.229	4.920

 Straight Culvert
 Inlet Elevation (invert): 1144.50 ft, Outlet Elevation (invert): 1143.84 ft
 Culvert Length: 221.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 25

Water Surface Profile Plot for Culvert: Culvert 25



Site Data - Culvert 25

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1144.50 ft
 Outlet Station: 221.00 ft
 Outlet Elevation: 1143.84 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 25

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 948+00 - Culvert 25)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1143.84	0.00	0.00	0.00	0.00
6.88	1144.05	0.21	2.13	0.04	0.84
13.76	1144.15	0.31	2.76	0.06	0.90
20.64	1144.24	0.40	3.21	0.07	0.93
27.52	1144.31	0.47	3.56	0.09	0.95
34.40	1144.38	0.54	3.86	0.10	0.97
41.28	1144.44	0.60	4.12	0.11	0.99
48.16	1144.49	0.65	4.35	0.12	1.00
52.80	1144.53	0.69	4.49	0.13	1.01
61.92	1144.60	0.76	4.75	0.14	1.02
68.80	1144.64	0.80	4.92	0.15	1.03

Tailwater Channel Data - 948+00 - Culvert 25

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1143.84 ft

Roadway Data for Crossing: 948+00 - Culvert 25

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1149.69 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 30

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 954+25 - Culvert 30

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 30 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1145.50	0.00	0.00	0.00	1
1147.02	6.88	6.88	0.00	1
1147.84	13.76	13.76	0.00	1
1149.15	20.64	20.64	0.00	1
1149.74	27.52	22.86	4.51	17
1149.79	34.40	22.97	11.33	5
1149.84	41.28	23.13	18.04	4
1149.87	48.16	23.28	24.83	4
1149.89	52.80	23.37	29.31	3
1149.93	61.92	23.53	38.27	3
1149.96	68.80	23.63	45.12	3
1149.68	22.64	22.64	0.00	Overtopping

Rating Curve Plot for Crossing: 954+25 - Culvert 30

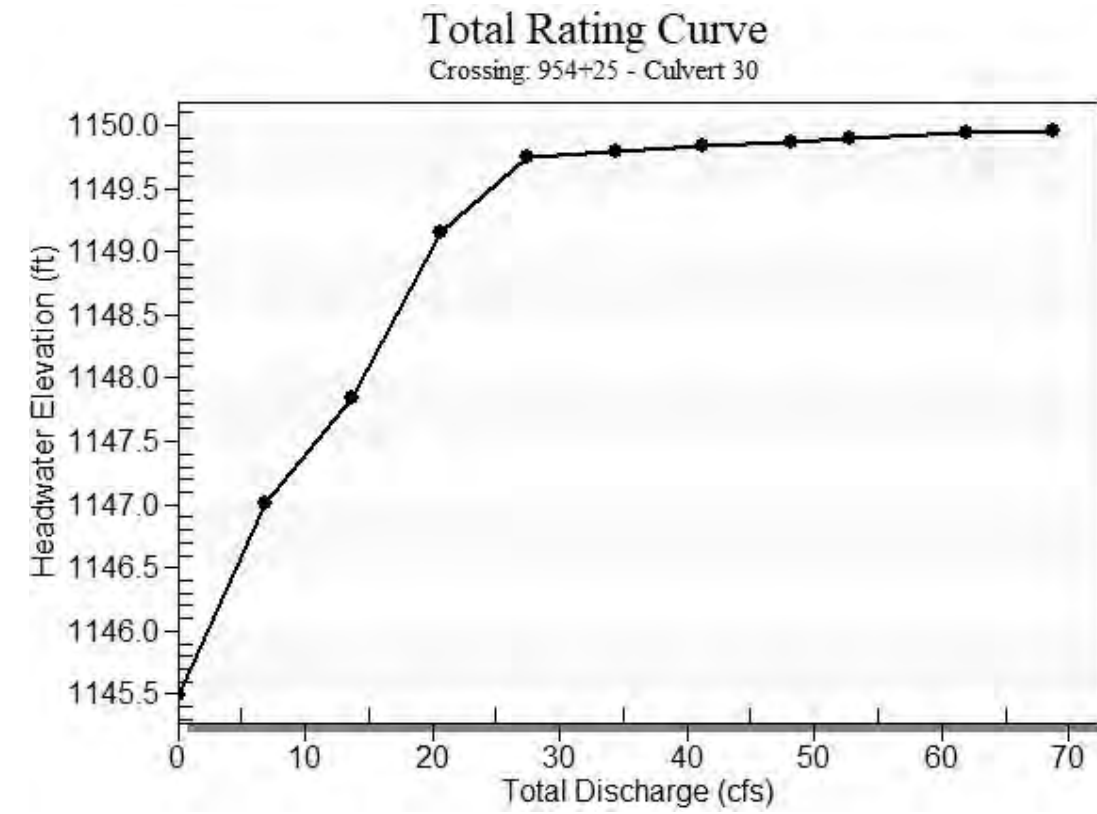
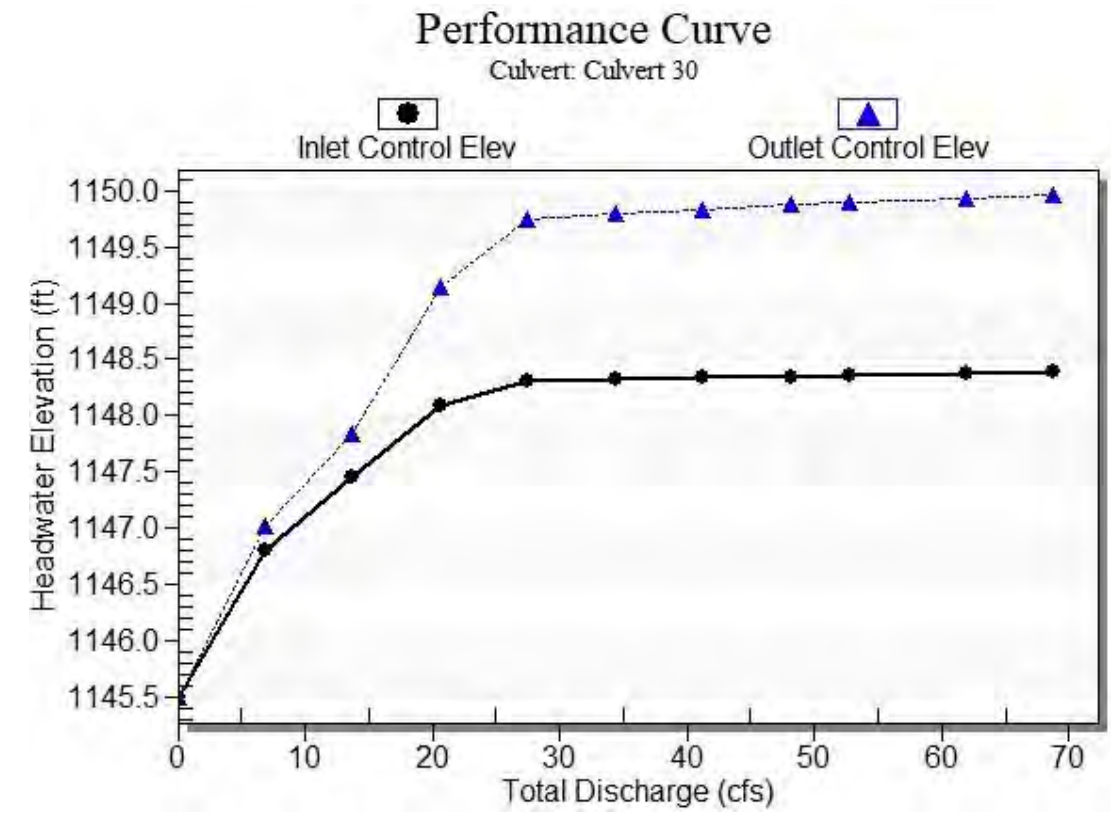


Table 2 - Culvert Summary Table: Culvert 30

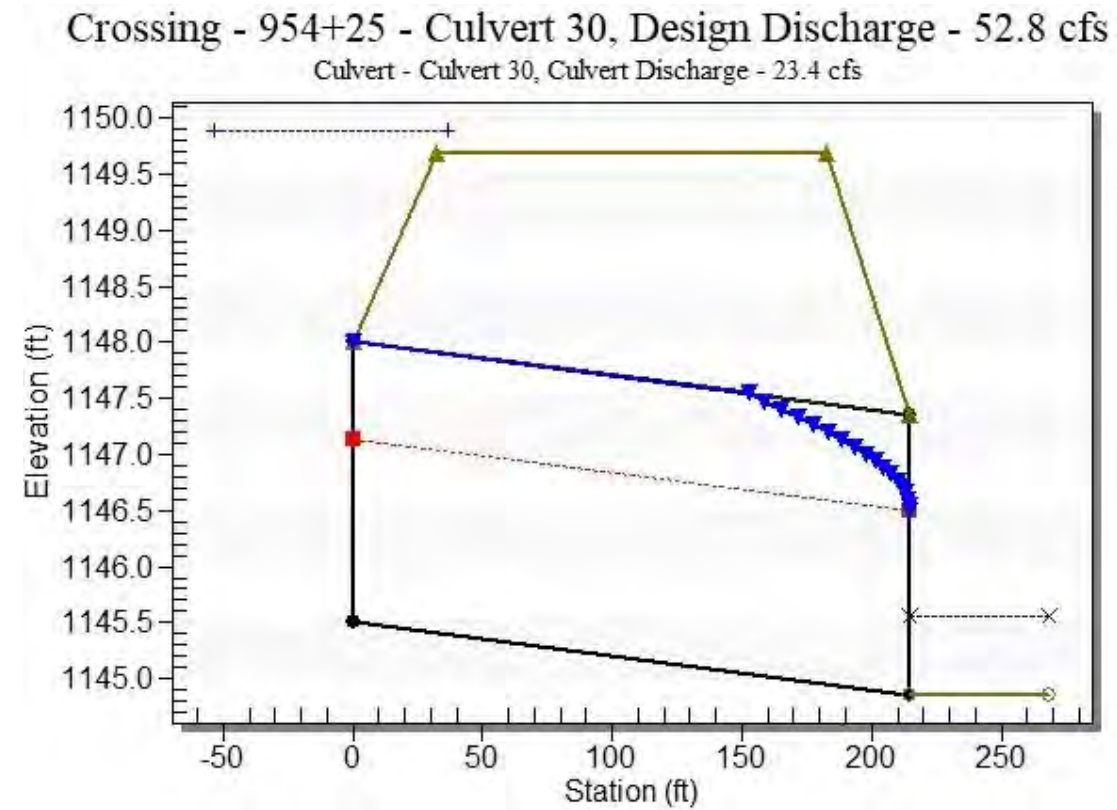
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1145.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1147.02	1.299	1.518	2-M2c	1.312	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1147.84	1.953	2.343	2-M2c	2.500	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1149.15	2.585	3.650	7-M2c	2.500	1.541	1.541	0.397	6.502	3.211
27.52	22.86	1149.74	2.806	4.242	7-M2c	2.500	1.624	1.624	0.470	6.776	3.564
34.40	22.97	1149.79	2.818	4.295	7-M2c	2.500	1.628	1.628	0.536	6.789	3.861
41.28	23.13	1149.84	2.834	4.335	7-M2c	2.500	1.633	1.633	0.597	6.809	4.120
48.16	23.28	1149.87	2.849	4.371	7-M2c	2.500	1.639	1.639	0.653	6.827	4.349
52.80	23.37	1149.89	2.858	4.393	7-M2c	2.500	1.642	1.642	0.689	6.838	4.491
61.92	23.53	1149.93	2.875	4.434	7-M2c	2.500	1.648	1.648	0.756	6.858	4.745
68.80	23.63	1149.96	2.886	4.463	7-M2c	2.500	1.651	1.651	0.803	6.870	4.920

 Straight Culvert
 Inlet Elevation (invert): 1145.50 ft, Outlet Elevation (invert): 1144.86 ft
 Culvert Length: 215.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 30



Water Surface Profile Plot for Culvert: Culvert 30



Site Data - Culvert 30

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1145.50 ft
 Outlet Station: 215.00 ft
 Outlet Elevation: 1144.86 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 30

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 954+25 - Culvert 30)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1144.86	0.00	0.00	0.00	0.00
6.88	1145.07	0.21	2.13	0.04	0.84
13.76	1145.17	0.31	2.76	0.06	0.90
20.64	1145.26	0.40	3.21	0.07	0.93
27.52	1145.33	0.47	3.56	0.09	0.95
34.40	1145.40	0.54	3.86	0.10	0.97
41.28	1145.46	0.60	4.12	0.11	0.99
48.16	1145.51	0.65	4.35	0.12	1.00
52.80	1145.55	0.69	4.49	0.13	1.01
61.92	1145.62	0.76	4.75	0.14	1.02
68.80	1145.66	0.80	4.92	0.15	1.03

Tailwater Channel Data - 954+25 - Culvert 30

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1144.86 ft

Roadway Data for Crossing: 954+25 - Culvert 30

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1149.68 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 35

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 959+00 - Culvert 35

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 35 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1145.70	0.00	0.00	0.00	1
1147.22	6.88	6.88	0.00	1
1148.05	13.76	13.76	0.00	1
1149.41	20.64	20.64	0.00	1
1150.25	27.52	23.59	3.80	14
1150.30	34.40	23.77	10.52	5
1150.34	41.28	23.91	17.25	4
1150.38	48.16	24.03	24.08	4
1150.40	52.80	24.10	28.57	3
1150.44	61.92	24.24	37.56	3
1150.47	68.80	24.31	44.43	3
1150.19	23.39	23.39	0.00	Overtopping

Rating Curve Plot for Crossing: 959+00 - Culvert 35

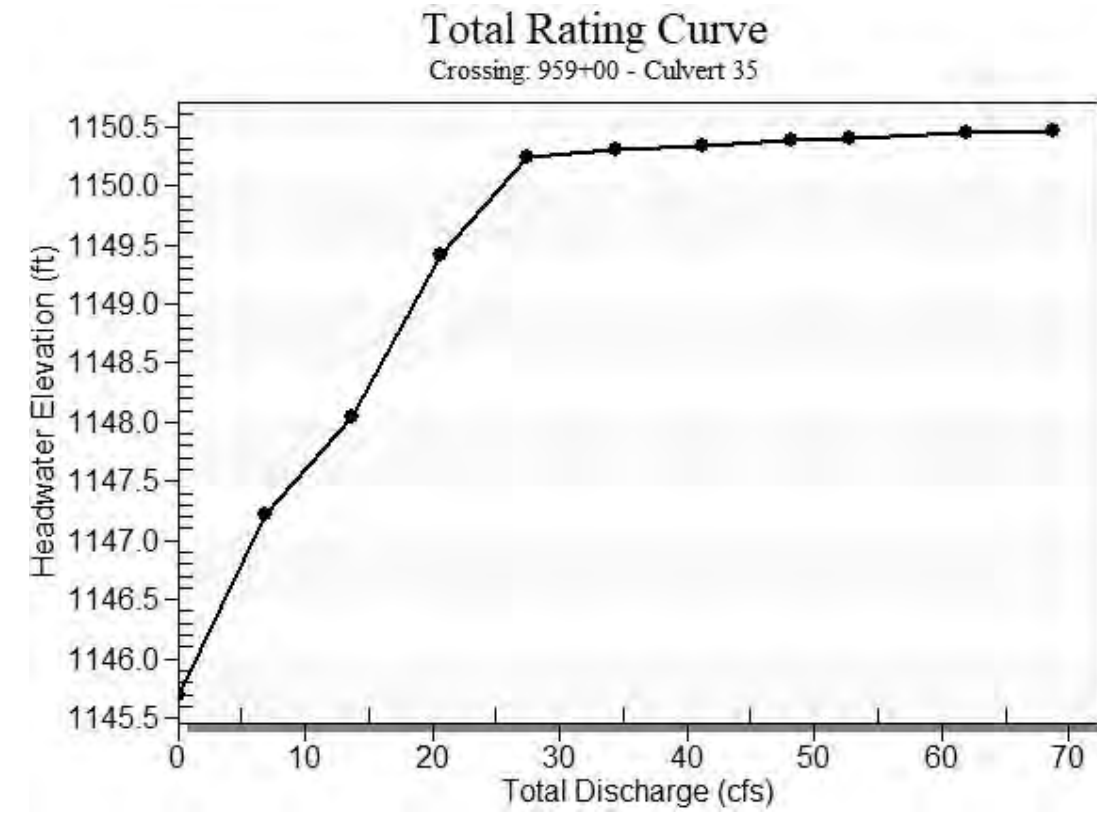
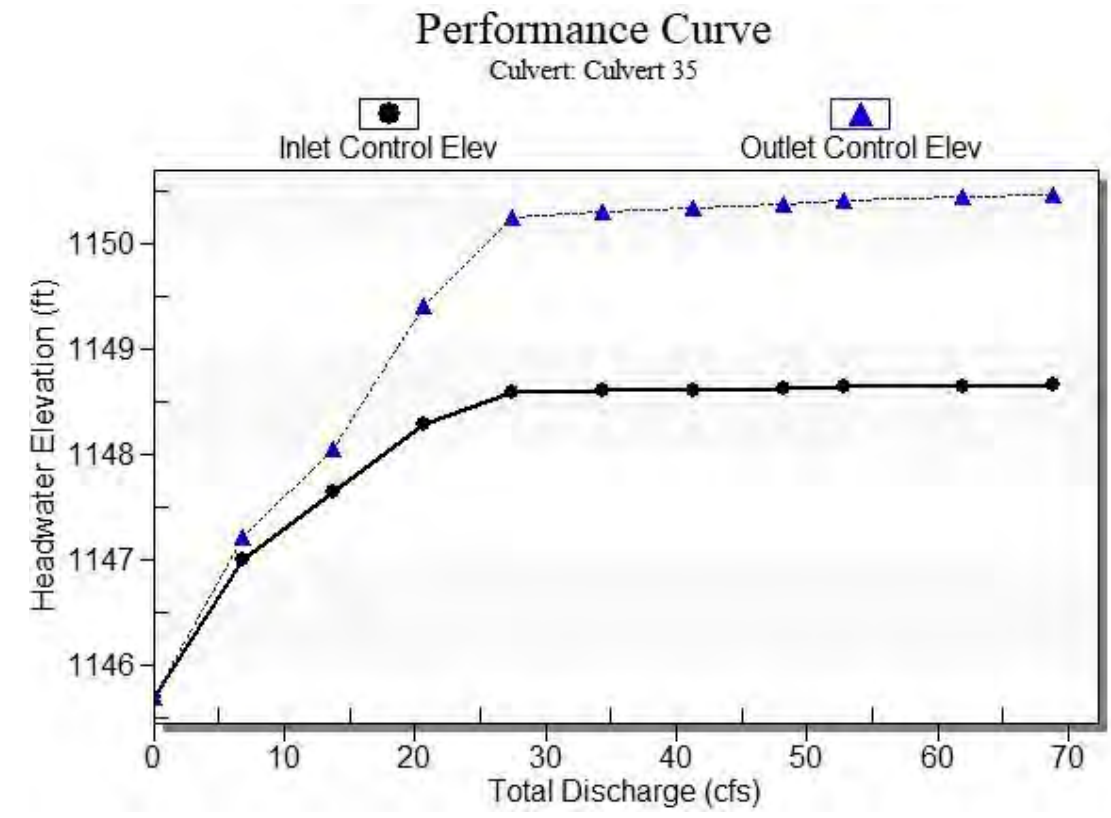


Table 2 - Culvert Summary Table: Culvert 35

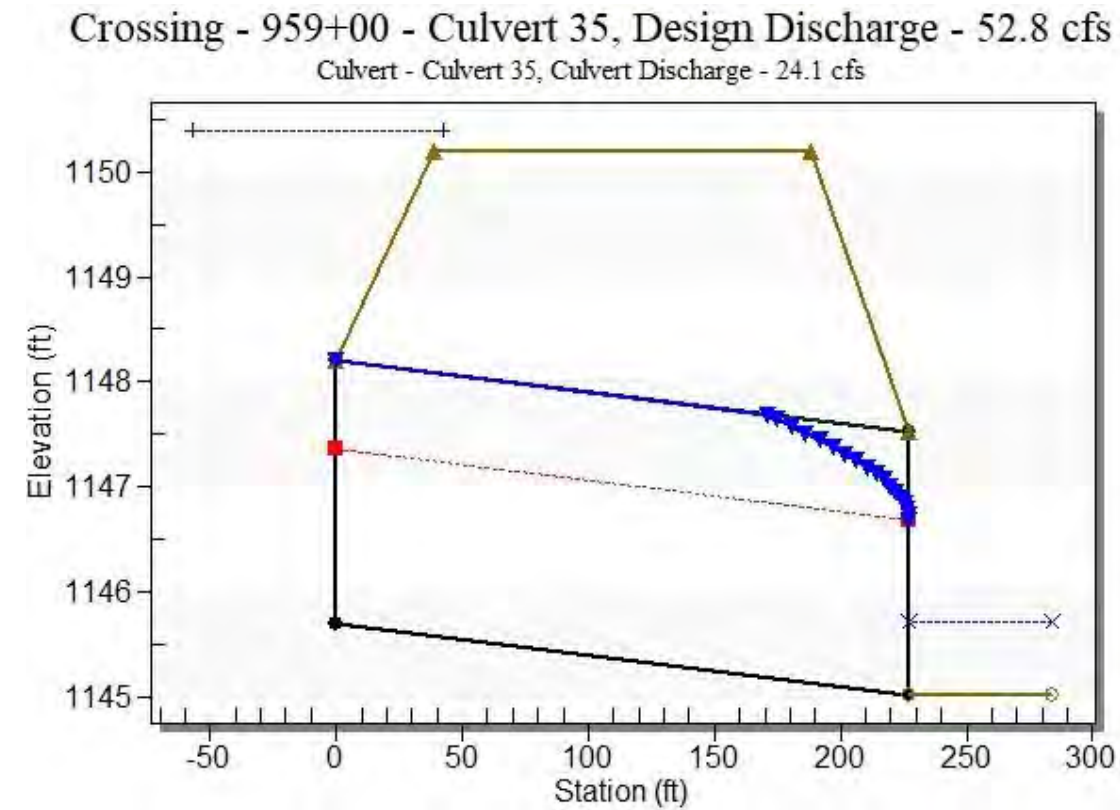
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1145.70	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1147.22	1.299	1.516	2-M2c	1.310	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1148.05	1.953	2.351	2-M2c	2.500	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1149.41	2.585	3.713	7-M2c	2.500	1.541	1.541	0.397	6.502	3.211
27.52	23.59	1150.25	2.881	4.545	7-M2c	2.500	1.650	1.650	0.470	6.865	3.564
34.40	23.77	1150.30	2.900	4.598	7-M2c	2.500	1.656	1.656	0.536	6.887	3.861
41.28	23.91	1150.34	2.914	4.640	7-M2c	2.500	1.661	1.661	0.597	6.904	4.120
48.16	24.03	1150.38	2.927	4.677	7-M2c	2.500	1.665	1.665	0.653	6.919	4.349
52.80	24.10	1150.40	2.935	4.700	7-M2c	2.500	1.668	1.668	0.689	6.928	4.491
61.92	24.24	1150.44	2.949	4.741	7-M2c	2.500	1.673	1.673	0.756	6.945	4.745
68.80	24.31	1150.47	2.957	4.762	7-M2c	2.500	1.675	1.675	0.803	6.953	4.920

 Straight Culvert
 Inlet Elevation (invert): 1145.70 ft, Outlet Elevation (invert): 1145.02 ft
 Culvert Length: 227.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 35



Water Surface Profile Plot for Culvert: Culvert 35



Site Data - Culvert 35

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1145.70 ft
 Outlet Station: 227.00 ft
 Outlet Elevation: 1145.02 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 35

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 959+00 - Culvert 35)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1145.02	0.00	0.00	0.00	0.00
6.88	1145.23	0.21	2.13	0.04	0.84
13.76	1145.33	0.31	2.76	0.06	0.90
20.64	1145.42	0.40	3.21	0.07	0.93
27.52	1145.49	0.47	3.56	0.09	0.95
34.40	1145.56	0.54	3.86	0.10	0.97
41.28	1145.62	0.60	4.12	0.11	0.99
48.16	1145.67	0.65	4.35	0.12	1.00
52.80	1145.71	0.69	4.49	0.13	1.01
61.92	1145.78	0.76	4.75	0.14	1.02
68.80	1145.82	0.80	4.92	0.15	1.03

Tailwater Channel Data - 959+00 - Culvert 35

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1145.02 ft

Roadway Data for Crossing: 959+00 - Culvert 35

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1150.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 40

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 964+00 - Culvert 40

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 40 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1146.00	0.00	0.00	0.00	1
1147.52	6.88	6.88	0.00	1
1148.36	13.76	13.76	0.00	1
1149.75	20.64	20.64	0.00	1
1150.74	27.52	24.04	3.47	5
1150.80	34.40	24.21	10.07	5
1150.84	41.28	24.31	16.83	4
1150.88	48.16	24.40	23.70	4
1150.90	52.80	24.48	28.19	3
1150.94	61.92	24.62	37.16	3
1150.97	68.80	24.73	44.02	3
1150.69	23.87	23.87	0.00	Overtopping

Rating Curve Plot for Crossing: 964+00 - Culvert 40

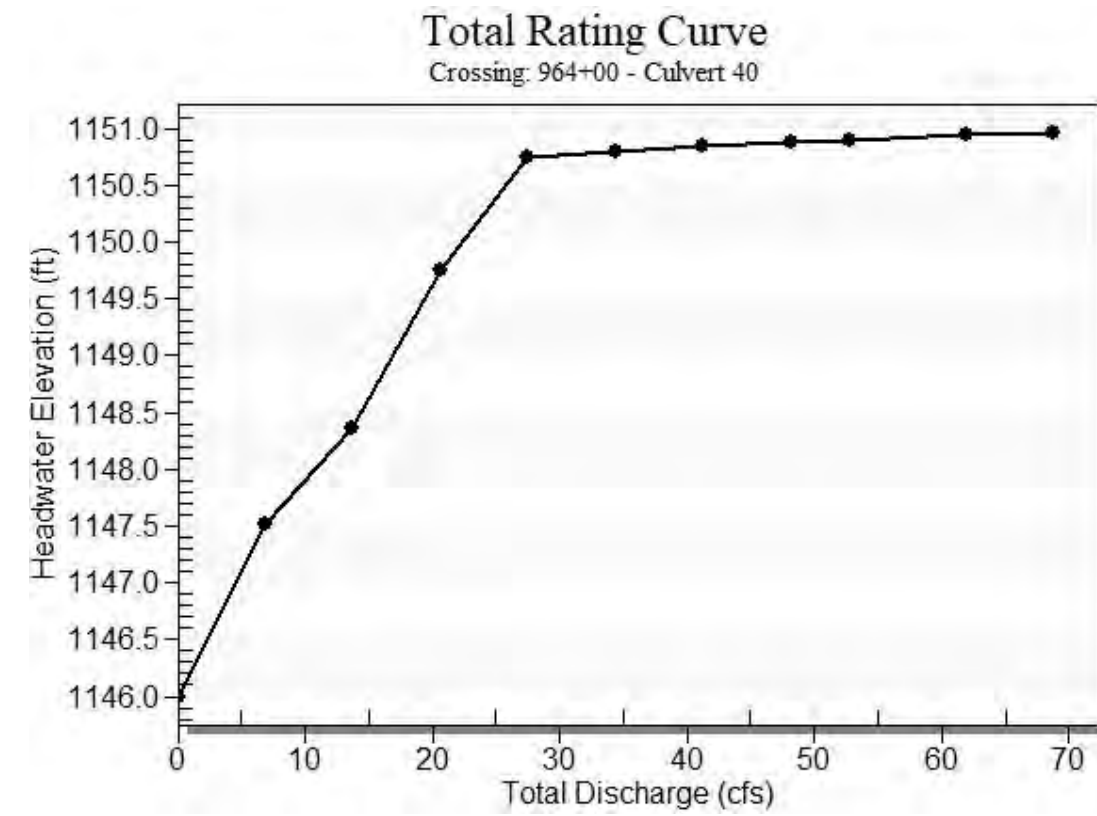
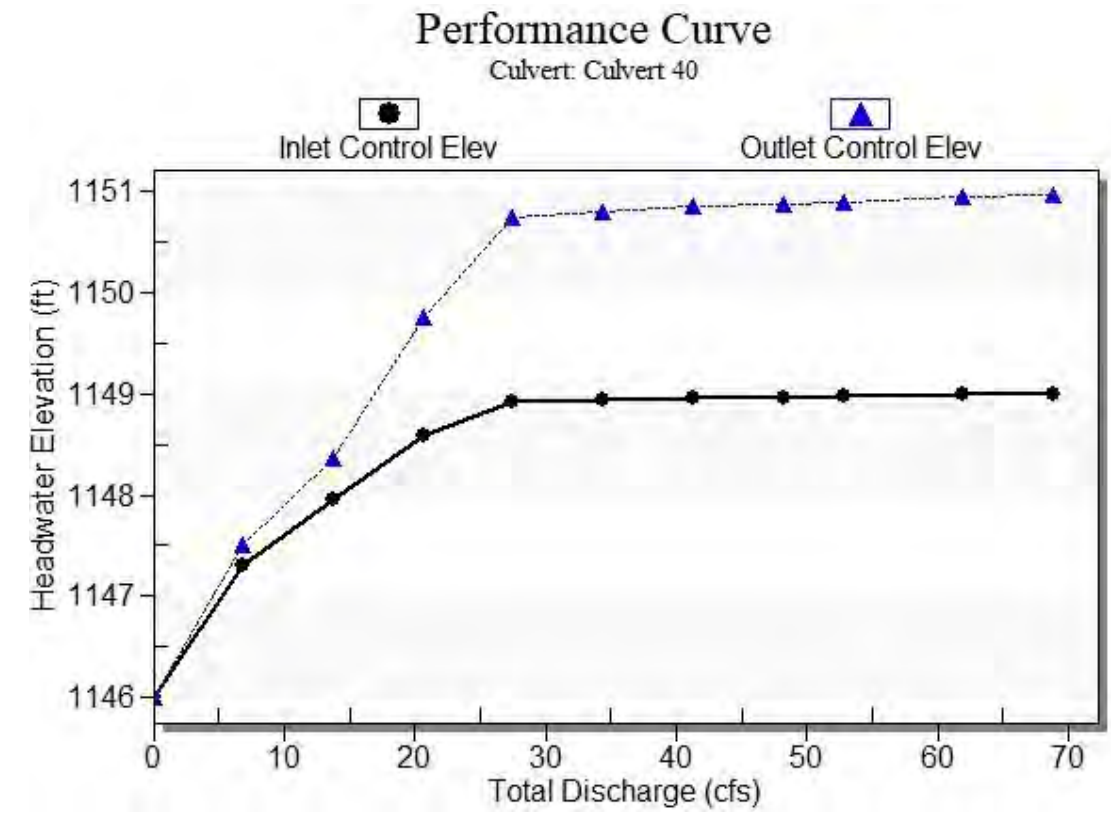


Table 2 - Culvert Summary Table: Culvert 40

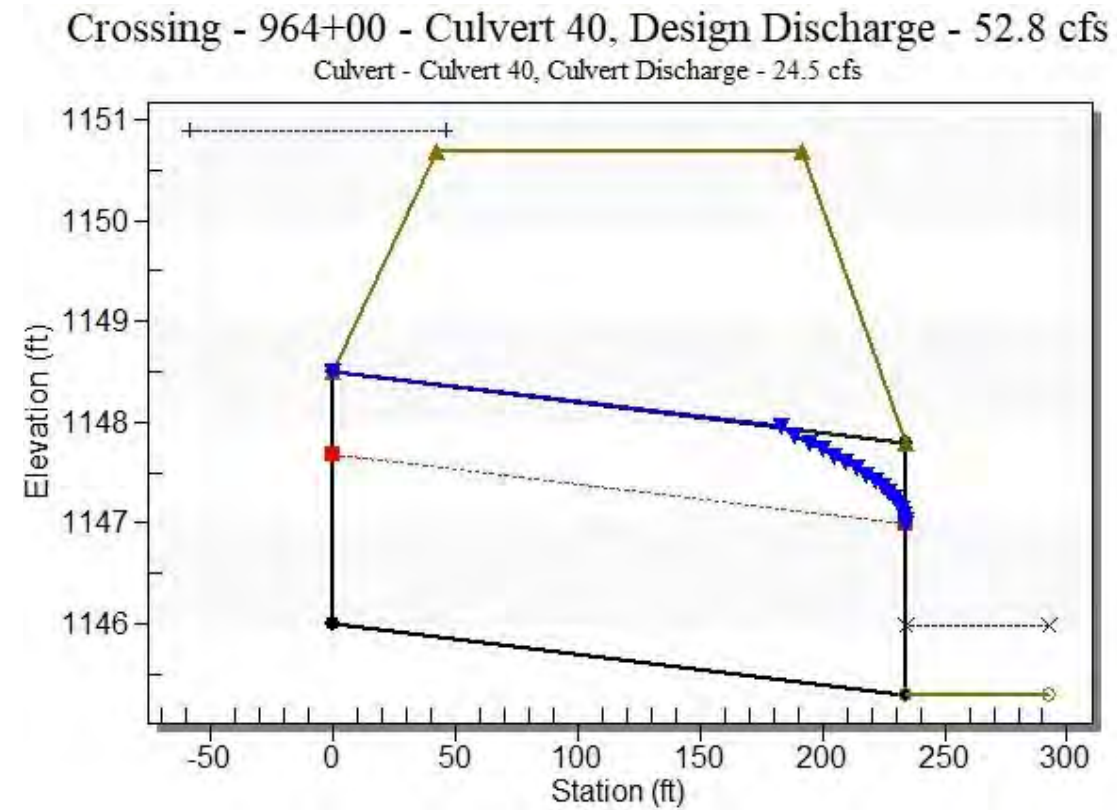
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1146.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1147.52	1.299	1.516	2-M2c	1.310	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1148.36	1.953	2.356	2-M2c	2.500	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1149.75	2.585	3.753	7-M2c	2.500	1.541	1.541	0.397	6.502	3.211
27.52	24.04	1150.74	2.928	4.742	7-M2c	2.500	1.666	1.666	0.470	6.920	3.564
34.40	24.21	1150.80	2.947	4.795	7-M2c	2.500	1.672	1.672	0.536	6.941	3.861
41.28	24.31	1150.84	2.957	4.851	7-M2c	2.500	1.675	1.675	0.597	6.953	4.120
48.16	24.40	1150.88	2.967	4.876	7-M2c	2.500	1.678	1.678	0.653	6.964	4.349
52.80	24.48	1150.90	2.975	4.899	7-M2c	2.500	1.681	1.681	0.689	6.974	4.491
61.92	24.62	1150.94	2.991	4.940	7-M2c	2.500	1.686	1.686	0.756	6.992	4.745
68.80	24.73	1150.97	3.002	4.969	7-M2c	2.500	1.690	1.690	0.803	7.004	4.920

 Straight Culvert
 Inlet Elevation (invert): 1146.00 ft, Outlet Elevation (invert): 1145.30 ft
 Culvert Length: 234.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 40



Water Surface Profile Plot for Culvert: Culvert 40



Site Data - Culvert 40

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1148.50 ft
 Outlet Station: 234.00 ft
 Outlet Elevation: 1147.00 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 40

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 964+00 - Culvert 40)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1145.30	0.00	0.00	0.00	0.00
6.88	1145.51	0.21	2.13	0.04	0.84
13.76	1145.61	0.31	2.76	0.06	0.90
20.64	1145.70	0.40	3.21	0.07	0.93
27.52	1145.77	0.47	3.56	0.09	0.95
34.40	1145.84	0.54	3.86	0.10	0.97
41.28	1145.90	0.60	4.12	0.11	0.99
48.16	1145.95	0.65	4.35	0.12	1.00
52.80	1145.99	0.69	4.49	0.13	1.01
61.92	1146.06	0.76	4.75	0.14	1.02
68.80	1146.10	0.80	4.92	0.15	1.03

Tailwater Channel Data - 964+00 - Culvert 40

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1145.30 ft

Roadway Data for Crossing: 964+00 - Culvert 40

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1150.69 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 45

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 113.5 cfs

Maximum Flow: 143 cfs

Table 1 - Summary of Culvert Flows at Crossing: 984+00 - Culvert 45

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 45 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1148.00	0.00	0.00	0.00	1
1150.42	14.30	14.30	0.00	1
1152.26	28.60	22.68	5.81	12
1152.36	42.90	22.91	19.88	6
1152.42	57.20	23.17	33.74	4
1152.49	71.50	23.41	47.98	4
1152.54	85.80	23.61	61.88	3
1152.59	100.10	23.78	76.13	3
1152.63	113.50	23.93	89.50	3
1152.68	128.70	24.09	104.57	3
1152.73	143.00	24.23	118.76	3
1152.19	22.42	22.42	0.00	Overtopping

Rating Curve Plot for Crossing: 984+00 - Culvert 45

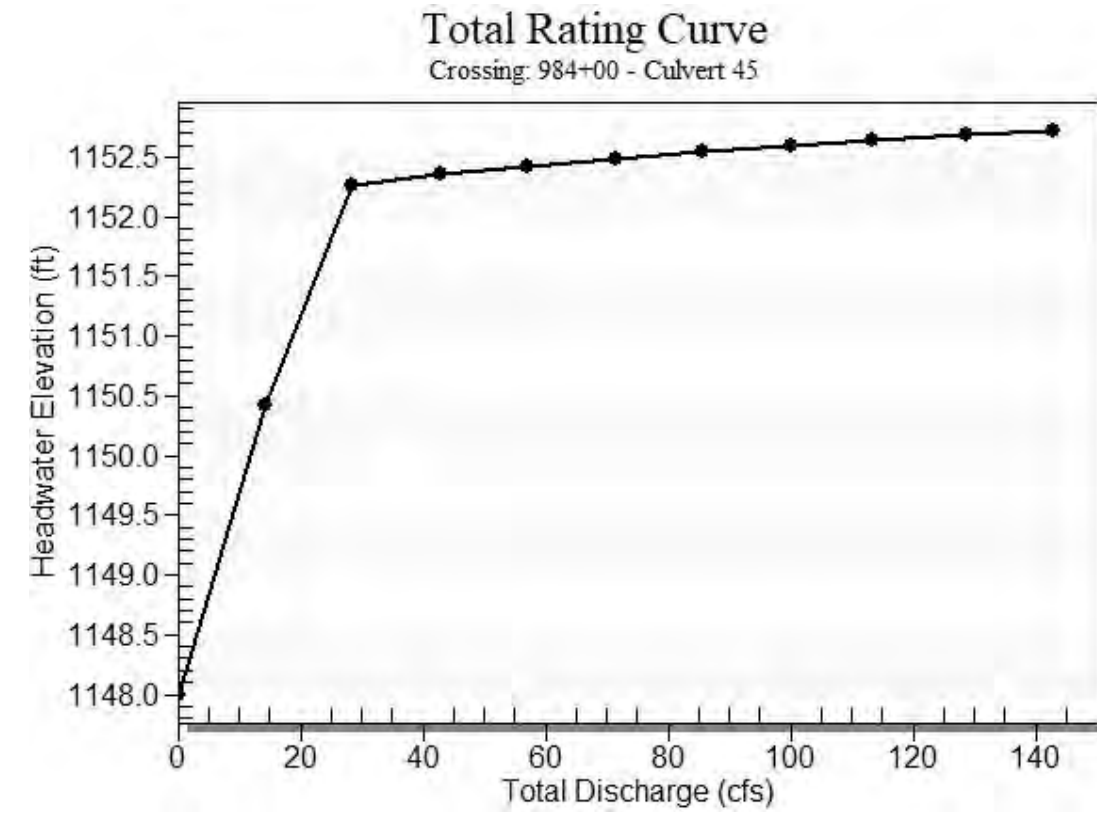
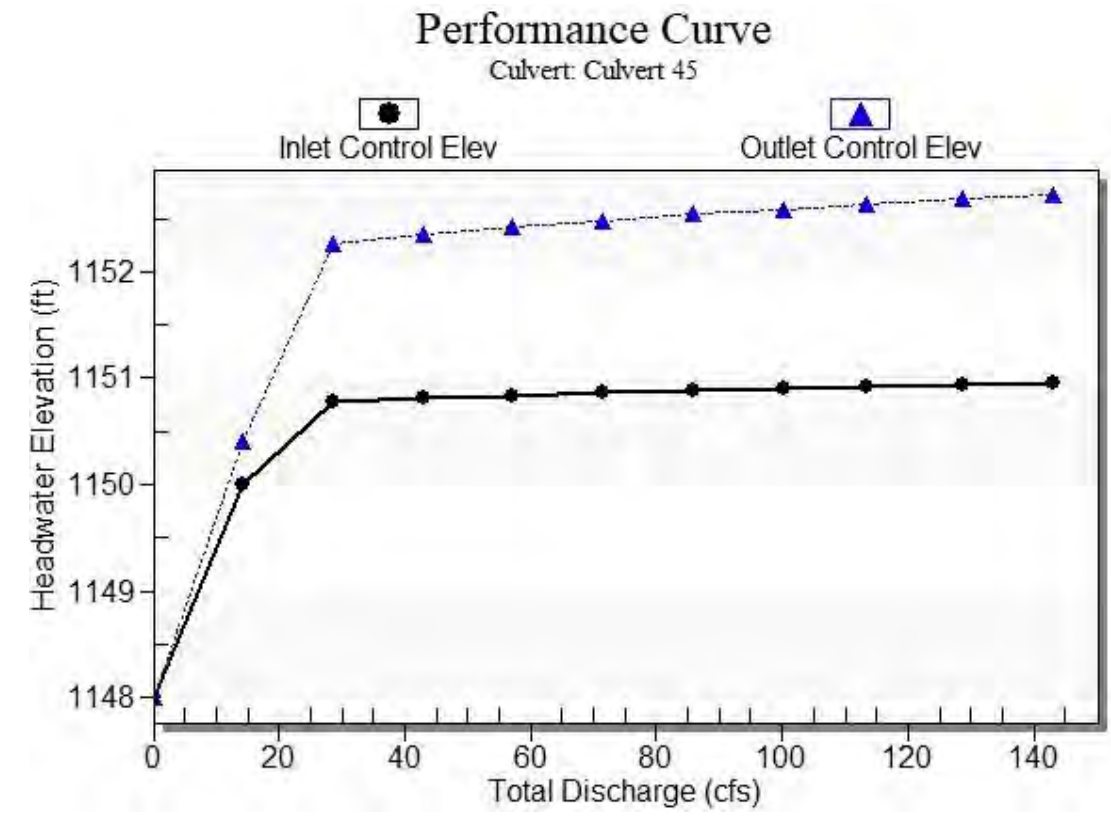


Table 2 - Culvert Summary Table: Culvert 45

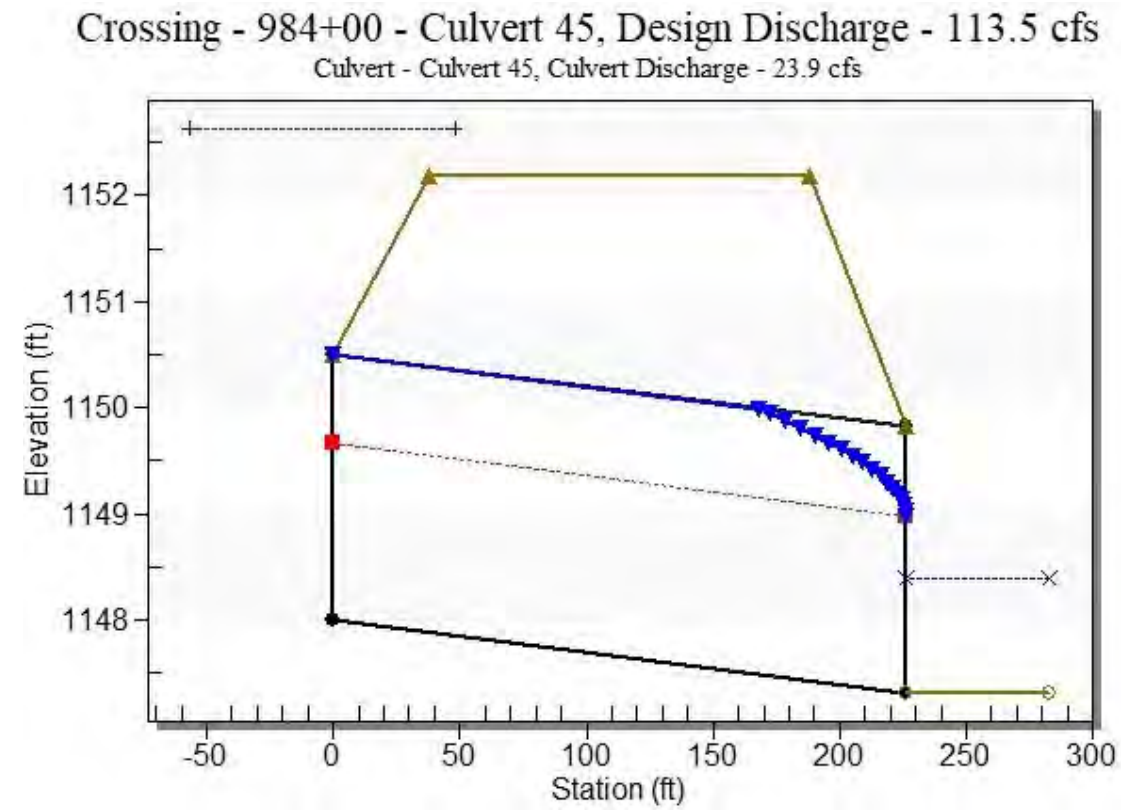
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1148.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
14.30	14.30	1150.42	2.001	2.415	2-M2c	2.500	1.273	1.273	0.320	5.693	2.804
28.60	22.68	1152.26	2.787	4.263	7-M2c	2.500	1.617	1.617	0.481	6.753	3.614
42.90	22.91	1152.36	2.811	4.356	7-M2c	2.500	1.625	1.625	0.610	6.782	4.176
57.20	23.17	1152.42	2.838	4.424	7-M2c	2.500	1.635	1.635	0.722	6.814	4.617
71.50	23.41	1152.49	2.862	4.485	7-M2c	2.500	1.643	1.643	0.821	6.843	4.984
85.80	23.61	1152.54	2.883	4.539	7-M2c	2.500	1.650	1.650	0.912	6.867	5.301
100.10	23.78	1152.59	2.901	4.590	7-M2c	2.500	1.656	1.656	0.997	6.888	5.582
113.50	23.93	1152.63	2.916	4.634	7-M2c	2.500	1.662	1.662	1.071	6.906	5.819
128.70	24.09	1152.68	2.933	4.683	7-M2c	2.500	1.667	1.667	1.150	6.926	6.063
143.00	24.23	1152.73	2.948	4.726	7-M2c	2.500	1.672	1.672	1.221	6.943	6.274

 Straight Culvert
 Inlet Elevation (invert): 1148.00 ft, Outlet Elevation (invert): 1147.32 ft
 Culvert Length: 226.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 45



Water Surface Profile Plot for Culvert: Culvert 45



Site Data - Culvert 45

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1148.00 ft
 Outlet Station: 226.00 ft
 Outlet Elevation: 1147.32 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 45

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 984+00 - Culvert 45)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1147.32	0.00	0.00	0.00	0.00
14.30	1147.64	0.32	2.80	0.06	0.90
28.60	1147.80	0.48	3.61	0.09	0.96
42.90	1147.93	0.61	4.18	0.11	0.99
57.20	1148.04	0.72	4.62	0.14	1.02
71.50	1148.14	0.82	4.98	0.15	1.04
85.80	1148.23	0.91	5.30	0.17	1.05
100.10	1148.32	1.00	5.58	0.19	1.06
113.50	1148.39	1.07	5.82	0.20	1.07
128.70	1148.47	1.15	6.06	0.22	1.09
143.00	1148.54	1.22	6.27	0.23	1.09

Tailwater Channel Data - 984+00 - Culvert 45

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1147.32 ft

Roadway Data for Crossing: 984+00 - Culvert 45

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1152.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 50

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 113.5 cfs

Maximum Flow: 143 cfs

Table 1 - Summary of Culvert Flows at Crossing: 986+00 - Culvert 50

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 50 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1148.00	0.00	0.00	0.00	1
1150.73	14.30	14.30	0.00	1
1152.76	28.60	22.71	5.67	8
1152.86	42.90	22.96	19.84	6
1152.92	57.20	23.22	33.70	4
1152.99	71.50	23.45	47.93	4
1153.04	85.80	23.65	62.10	4
1153.09	100.10	23.82	76.12	3
1153.13	113.50	23.97	89.46	3
1153.18	128.70	24.13	104.53	3
1153.23	143.00	24.27	118.72	3
1152.69	22.46	22.46	0.00	Overtopping

Rating Curve Plot for Crossing: 986+00 - Culvert 50

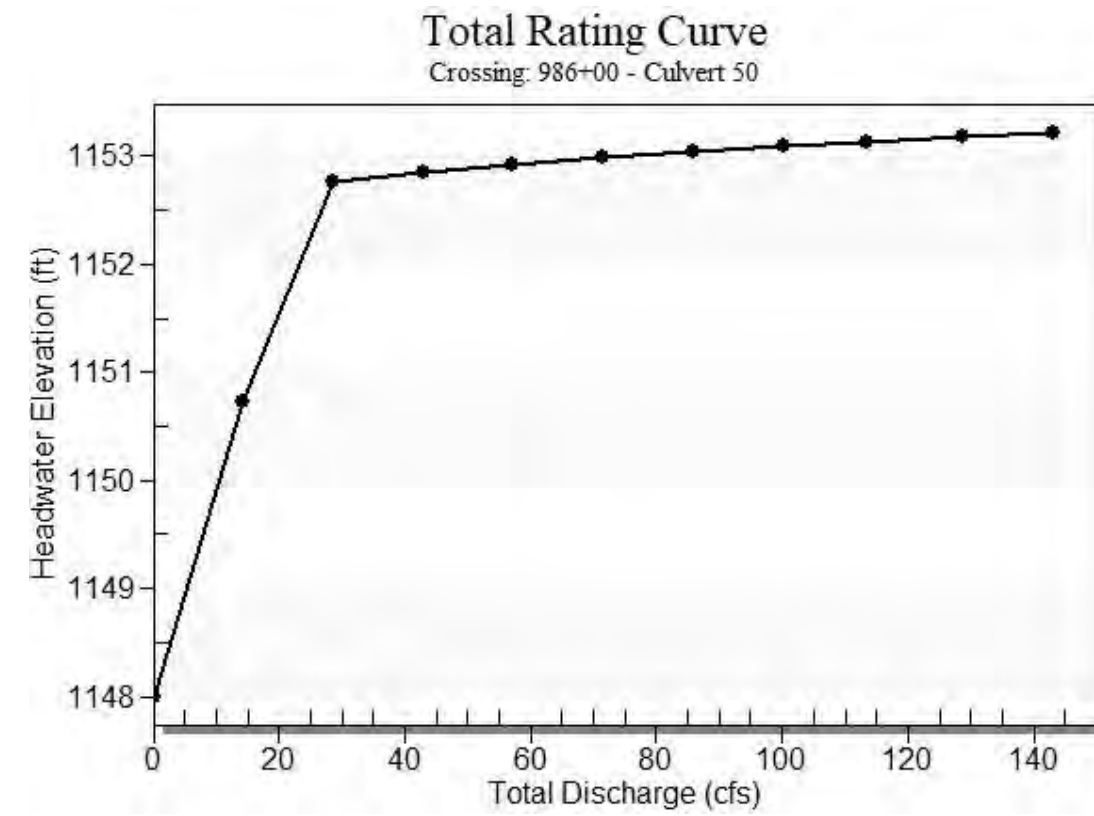
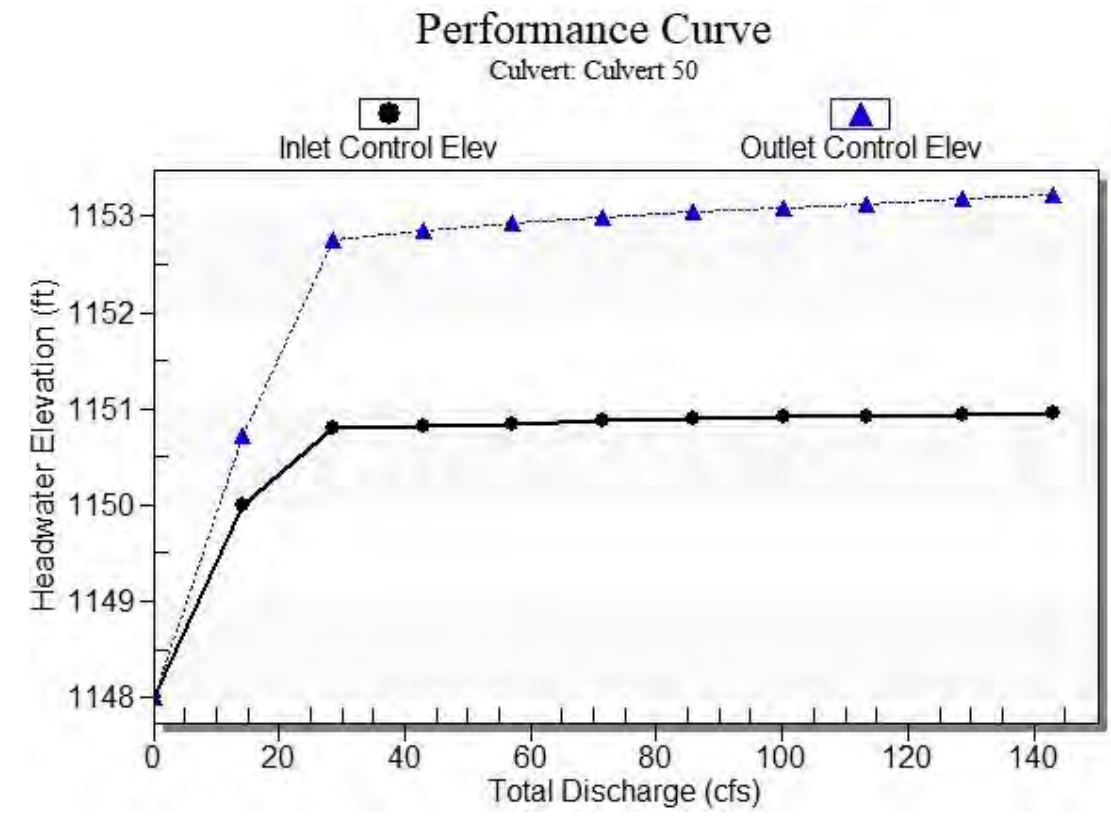


Table 2 - Culvert Summary Table: Culvert 50

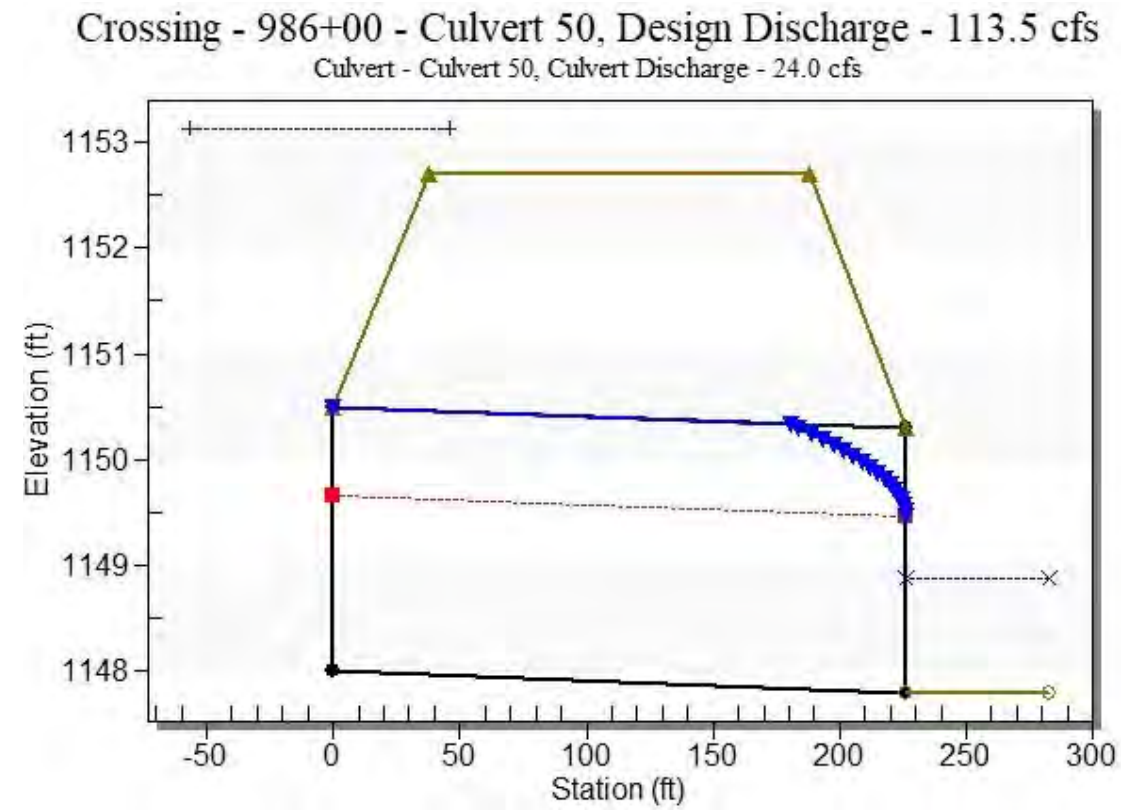
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1148.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
14.30	14.30	1150.73	2.004	2.727	7-M2c	2.500	1.273	1.273	0.320	5.693	2.804
28.60	22.71	1152.76	2.794	4.762	7-M2c	2.500	1.618	1.618	0.481	6.757	3.614
42.90	22.96	1152.86	2.818	4.855	7-M2c	2.500	1.627	1.627	0.610	6.787	4.176
57.20	23.22	1152.92	2.846	4.924	7-M2c	2.500	1.637	1.637	0.722	6.820	4.617
71.50	23.45	1152.99	2.870	4.985	7-M2c	2.500	1.645	1.645	0.821	6.848	4.984
85.80	23.65	1153.04	2.890	5.040	7-M2c	2.500	1.652	1.652	0.912	6.873	5.301
100.10	23.82	1153.09	2.908	5.090	7-M2c	2.500	1.658	1.658	0.997	6.893	5.582
113.50	23.97	1153.13	2.923	5.134	7-M2c	2.500	1.663	1.663	1.071	6.911	5.819
128.70	24.13	1153.18	2.940	5.183	7-M2c	2.500	1.669	1.669	1.150	6.931	6.063
143.00	24.27	1153.23	2.955	5.226	7-M2c	2.500	1.674	1.674	1.221	6.948	6.274

 Straight Culvert
 Inlet Elevation (invert): 1148.00 ft, Outlet Elevation (invert): 1147.80 ft
 Culvert Length: 226.00 ft, Culvert Slope: 0.0009

Culvert Performance Curve Plot: Culvert 50



Water Surface Profile Plot for Culvert: Culvert 50



Site Data - Culvert 50

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1148.00 ft
 Outlet Station: 226.00 ft
 Outlet Elevation: 1147.80 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 50

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 986+00 - Culvert 50)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1147.80	0.00	0.00	0.00	0.00
14.30	1148.12	0.32	2.80	0.06	0.90
28.60	1148.28	0.48	3.61	0.09	0.96
42.90	1148.41	0.61	4.18	0.11	0.99
57.20	1148.52	0.72	4.62	0.14	1.02
71.50	1148.62	0.82	4.98	0.15	1.04
85.80	1148.71	0.91	5.30	0.17	1.05
100.10	1148.80	1.00	5.58	0.19	1.06
113.50	1148.87	1.07	5.82	0.20	1.07
128.70	1148.95	1.15	6.06	0.22	1.09
143.00	1149.02	1.22	6.27	0.23	1.09

Tailwater Channel Data - 986+00 - Culvert 50

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1147.80 ft

Roadway Data for Crossing: 986+00 - Culvert 50

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1152.69 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 55

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 44 cfs

Maximum Flow: 55 cfs

Table 1 - Summary of Culvert Flows at Crossing: 996+00 - Culvert 55

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 55 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1149.50	0.00	0.00	0.00	1
1150.93	5.50	5.50	0.00	1
1151.64	11.00	11.00	0.00	1
1152.44	16.50	16.50	0.00	1
1153.23	22.00	19.87	2.04	22
1153.28	27.50	20.06	7.31	5
1153.31	33.00	20.21	12.67	4
1153.35	38.50	20.33	18.12	4
1153.37	44.00	20.38	23.48	3
1153.40	49.50	20.50	28.91	3
1153.43	55.00	20.61	34.34	3
1153.19	19.72	19.72	0.00	Overtopping

Rating Curve Plot for Crossing: 996+00 - Culvert 55

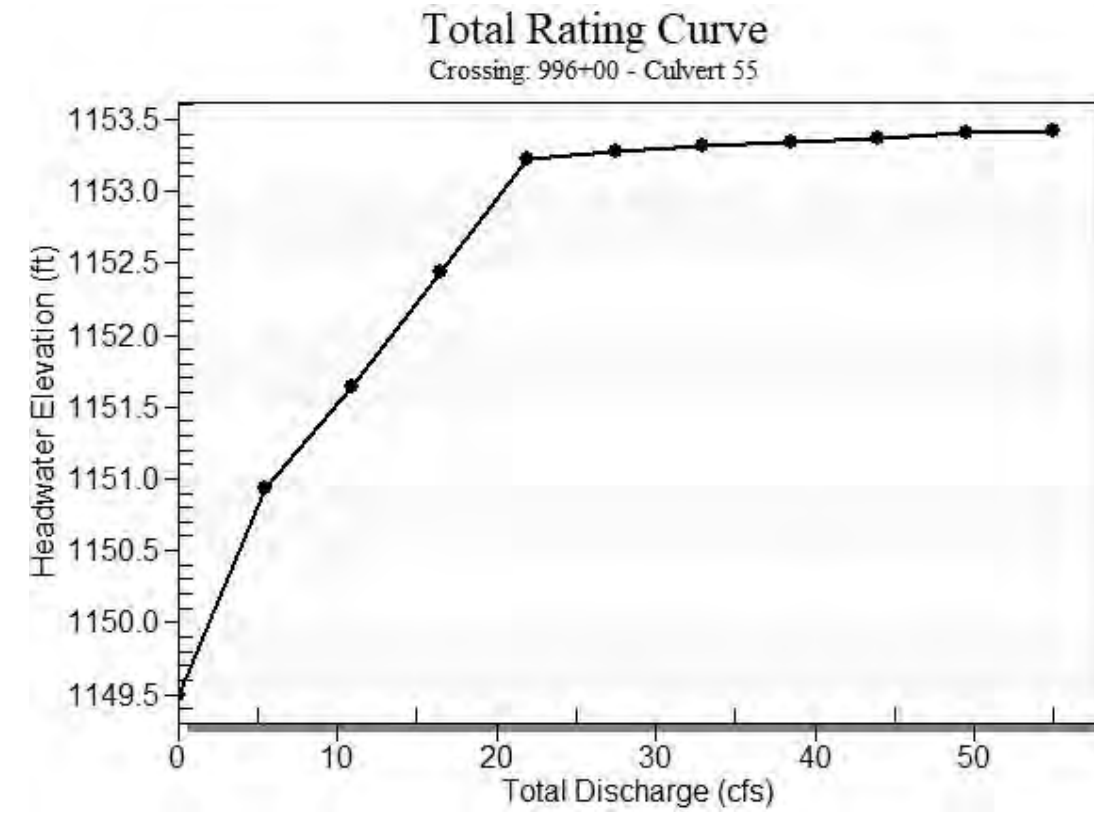
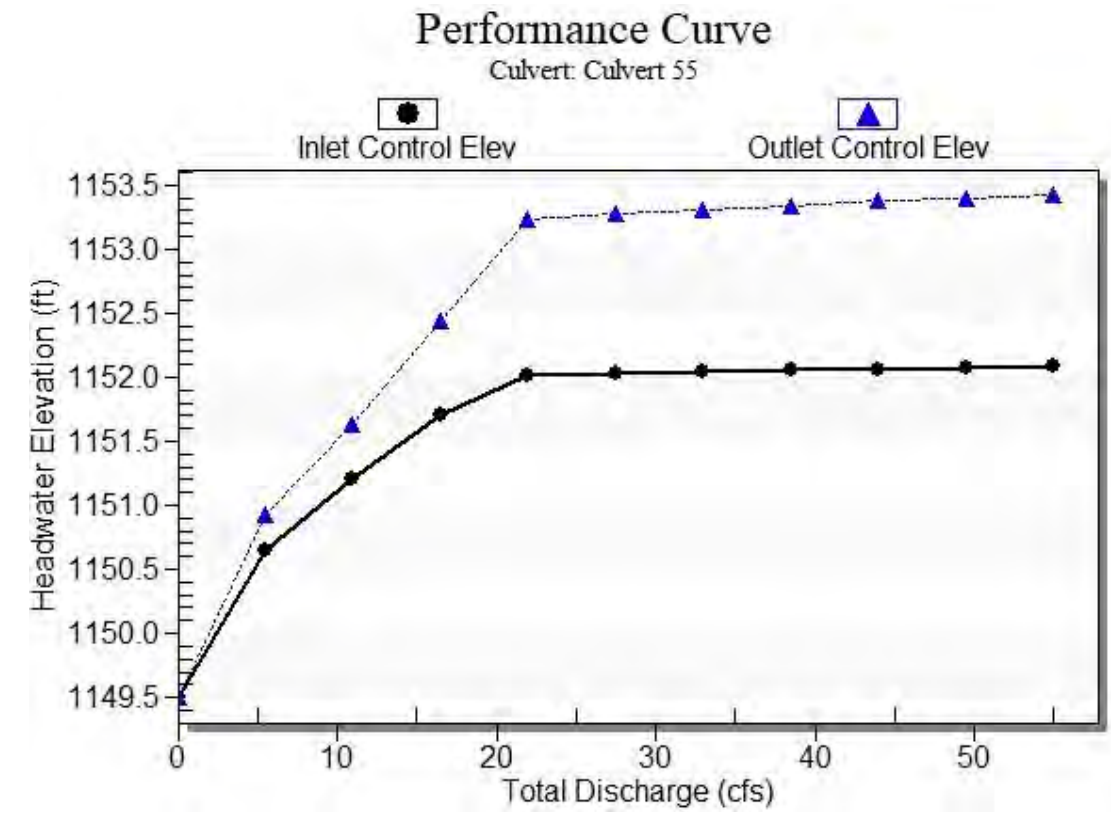


Table 2 - Culvert Summary Table: Culvert 55

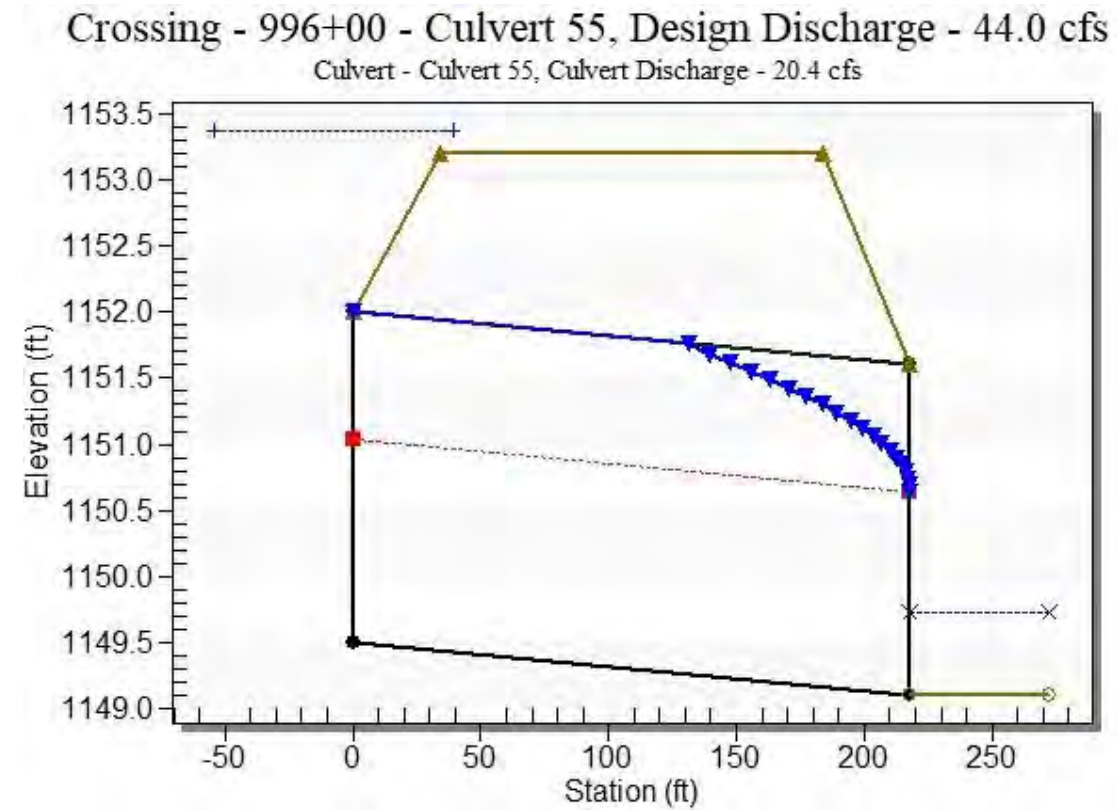
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1149.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.50	5.50	1150.93	1.152	1.428	2-M2c	1.338	0.771	0.771	0.181	4.272	1.954
11.00	11.00	1151.64	1.702	2.136	2-M2c	2.500	1.110	1.110	0.274	5.227	2.541
16.50	16.50	1152.44	2.201	2.944	7-M2c	2.500	1.369	1.369	0.348	6.000	2.956
22.00	19.87	1153.23	2.513	3.727	7-M2c	2.500	1.507	1.507	0.412	6.422	3.286
27.50	20.06	1153.28	2.531	3.775	7-M2c	2.500	1.515	1.515	0.470	6.447	3.563
33.00	20.21	1153.31	2.545	3.813	7-M2c	2.500	1.521	1.521	0.524	6.466	3.804
38.50	20.33	1153.35	2.557	3.843	7-M2c	2.500	1.525	1.525	0.573	6.481	4.019
44.00	20.38	1153.37	2.562	3.875	7-M2c	2.500	1.531	1.531	0.620	6.469	4.213
49.50	20.50	1153.40	2.573	3.901	7-M2c	2.500	1.535	1.535	0.664	6.484	4.391
55.00	20.61	1153.43	2.584	3.927	7-M2c	2.500	1.540	1.540	0.706	6.498	4.554

 Straight Culvert
 Inlet Elevation (invert): 1149.50 ft, Outlet Elevation (invert): 1149.11 ft
 Culvert Length: 218.10 ft, Culvert Slope: 0.0018

Culvert Performance Curve Plot: Culvert 55



Water Surface Profile Plot for Culvert: Culvert 55



Site Data - Culvert 55

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1149.50 ft
 Outlet Station: 218.10 ft
 Outlet Elevation: 1149.11 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 55

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 996+00 - Culvert 55)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1149.11	0.00	0.00	0.00	0.00
5.50	1149.29	0.18	1.95	0.03	0.82
11.00	1149.38	0.27	2.54	0.05	0.88
16.50	1149.46	0.35	2.96	0.07	0.91
22.00	1149.52	0.41	3.29	0.08	0.94
27.50	1149.58	0.47	3.56	0.09	0.95
33.00	1149.63	0.52	3.80	0.10	0.97
38.50	1149.68	0.57	4.02	0.11	0.98
44.00	1149.73	0.62	4.21	0.12	0.99
49.50	1149.77	0.66	4.39	0.12	1.00
55.00	1149.82	0.71	4.55	0.13	1.01

Tailwater Channel Data - 996+00 - Culvert 55

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1149.11 ft

Roadway Data for Crossing: 996+00 - Culvert 55

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1153.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 60

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 16 cfs

Maximum Flow: 20 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1002+50 - Culvert 60

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 60 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1150.75	0.00	0.00	0.00	1
1151.57	2.00	2.00	0.00	1
1151.94	4.00	4.00	0.00	1
1152.24	6.00	6.00	0.00	1
1152.50	8.00	8.00	0.00	1
1152.75	10.00	10.00	0.00	1
1153.00	12.00	12.00	0.00	1
1153.27	14.00	14.00	0.00	1
1153.60	16.00	16.00	0.00	1
1154.07	18.00	18.00	0.00	1
1154.22	20.00	18.66	1.26	12
1154.19	18.55	18.55	0.00	Overtopping

Rating Curve Plot for Crossing: 1002+50 - Culvert 60

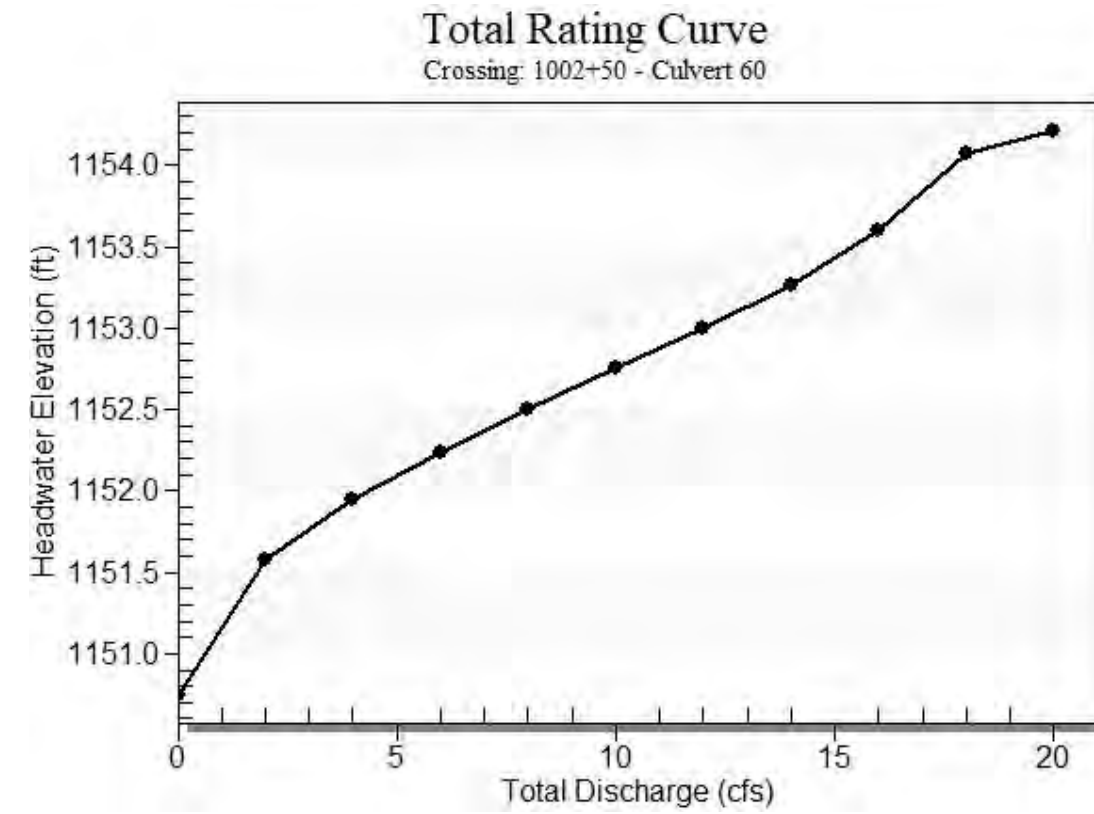
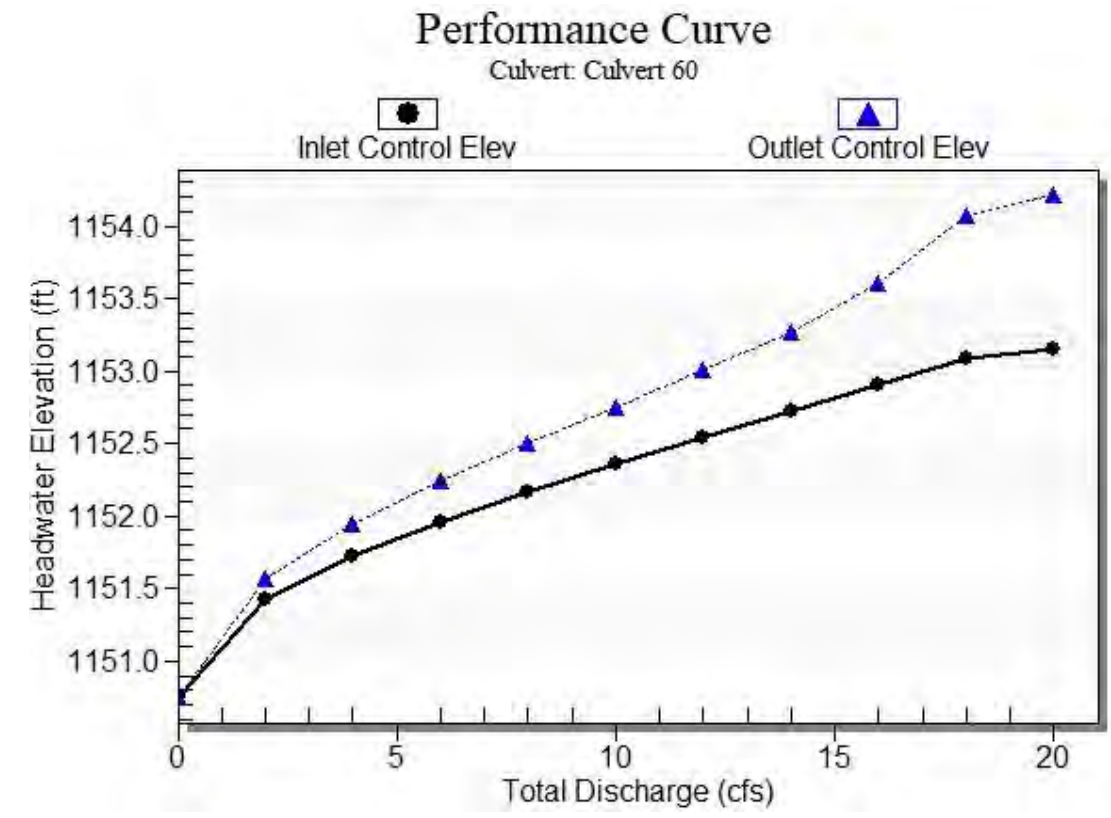


Table 2 - Culvert Summary Table: Culvert 60

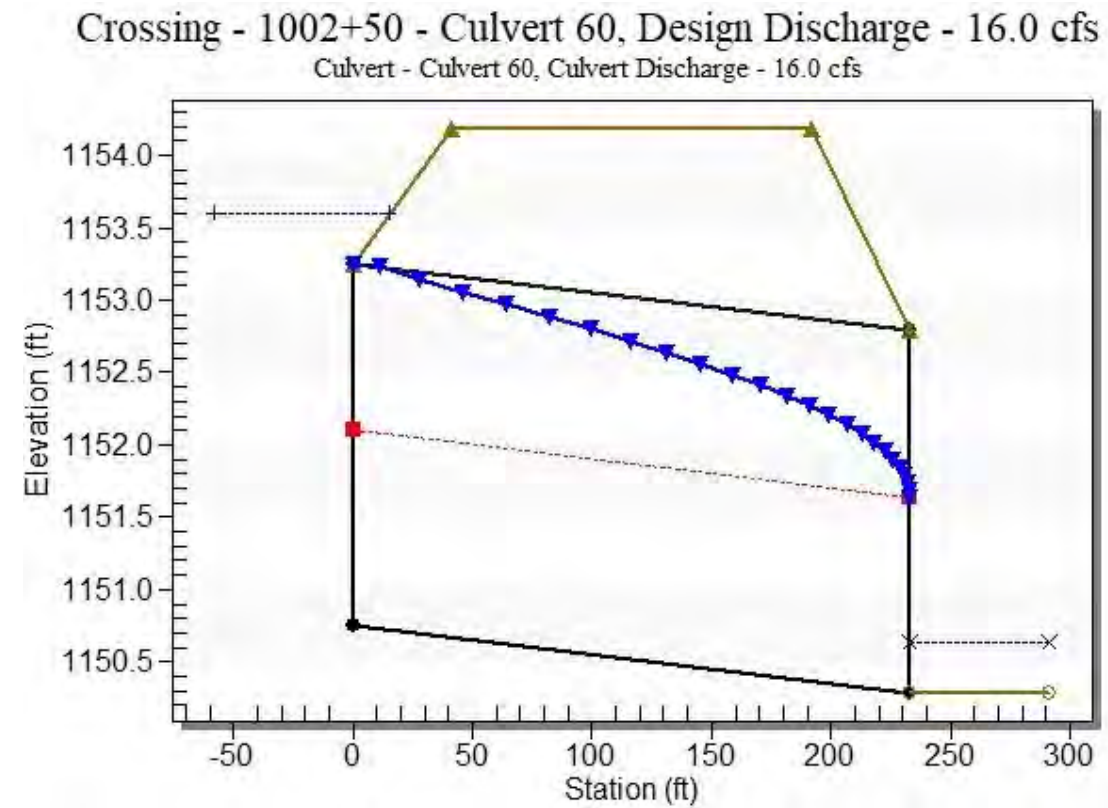
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1150.75	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
2.00	2.00	1151.57	0.678	0.822	2-M2c	0.743	0.456	0.456	0.099	3.263	1.322
4.00	4.00	1151.94	0.973	1.193	2-M2c	1.078	0.655	0.655	0.150	3.900	1.728
6.00	6.00	1152.24	1.208	1.487	2-M2c	1.370	0.807	0.807	0.191	4.375	2.020
8.00	8.00	1152.50	1.414	1.752	2-M2c	1.662	0.937	0.937	0.226	4.759	2.254
10.00	10.00	1152.75	1.608	2.003	2-M2c	2.500	1.054	1.054	0.259	5.084	2.452
12.00	12.00	1153.00	1.794	2.253	2-M2c	2.500	1.162	1.162	0.288	5.369	2.627
14.00	14.00	1153.27	1.976	2.517	7-M2c	2.500	1.259	1.259	0.316	5.652	2.781
16.00	16.00	1153.60	2.156	2.849	7-M2c	2.500	1.348	1.348	0.342	5.930	2.923
18.00	18.00	1154.07	2.338	3.320	7-M2c	2.500	1.434	1.434	0.366	6.182	3.053
20.00	18.66	1154.22	2.399	3.466	7-M2c	2.500	1.460	1.460	0.390	6.267	3.173

 Straight Culvert
 Inlet Elevation (invert): 1150.75 ft, Outlet Elevation (invert): 1150.29 ft
 Culvert Length: 233.20 ft, Culvert Slope: 0.0020

Culvert Performance Curve Plot: Culvert 60



Water Surface Profile Plot for Culvert: Culvert 60



Site Data - Culvert 60

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1150.75 ft
 Outlet Station: 233.20 ft
 Outlet Elevation: 1150.29 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 60

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1002+50 - Culvert 60)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1150.29	0.00	0.00	0.00	0.00
2.00	1150.39	0.10	1.32	0.02	0.75
4.00	1150.44	0.15	1.73	0.03	0.80
6.00	1150.48	0.19	2.02	0.04	0.83
8.00	1150.52	0.23	2.25	0.04	0.85
10.00	1150.55	0.26	2.45	0.05	0.87
12.00	1150.58	0.29	2.63	0.05	0.89
14.00	1150.61	0.32	2.78	0.06	0.90
16.00	1150.63	0.34	2.92	0.06	0.91
18.00	1150.66	0.37	3.05	0.07	0.92
20.00	1150.68	0.39	3.17	0.07	0.93

Tailwater Channel Data - 1002+50 - Culvert 60

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1150.29 ft

Roadway Data for Crossing: 1002+50 - Culvert 60

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1154.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 65

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 67 cfs

Maximum Flow: 83 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1008+10 - Culvert 65

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 65 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1150.97	0.00	0.00	0.00	1
1152.76	8.30	8.30	0.00	1
1154.09	16.60	16.60	0.00	1
1154.28	24.90	17.31	7.49	9
1154.33	33.20	17.51	15.61	5
1154.38	41.50	17.67	23.72	4
1154.42	49.80	17.79	31.96	4
1154.45	58.10	17.87	40.07	3
1154.49	66.40	18.01	48.30	3
1154.49	67.00	18.02	48.83	2
1154.55	83.00	18.27	64.70	3
1154.19	16.94	16.94	0.00	Overtopping

Rating Curve Plot for Crossing: 1008+10 - Culvert 65

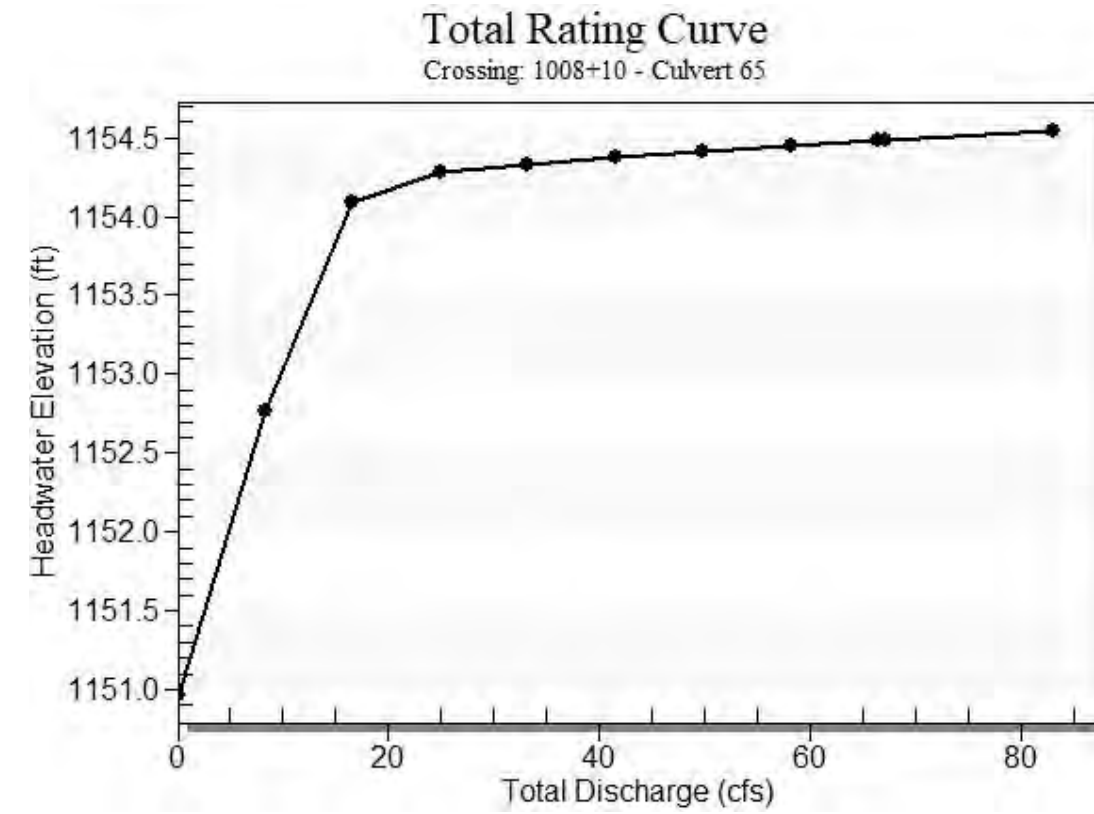
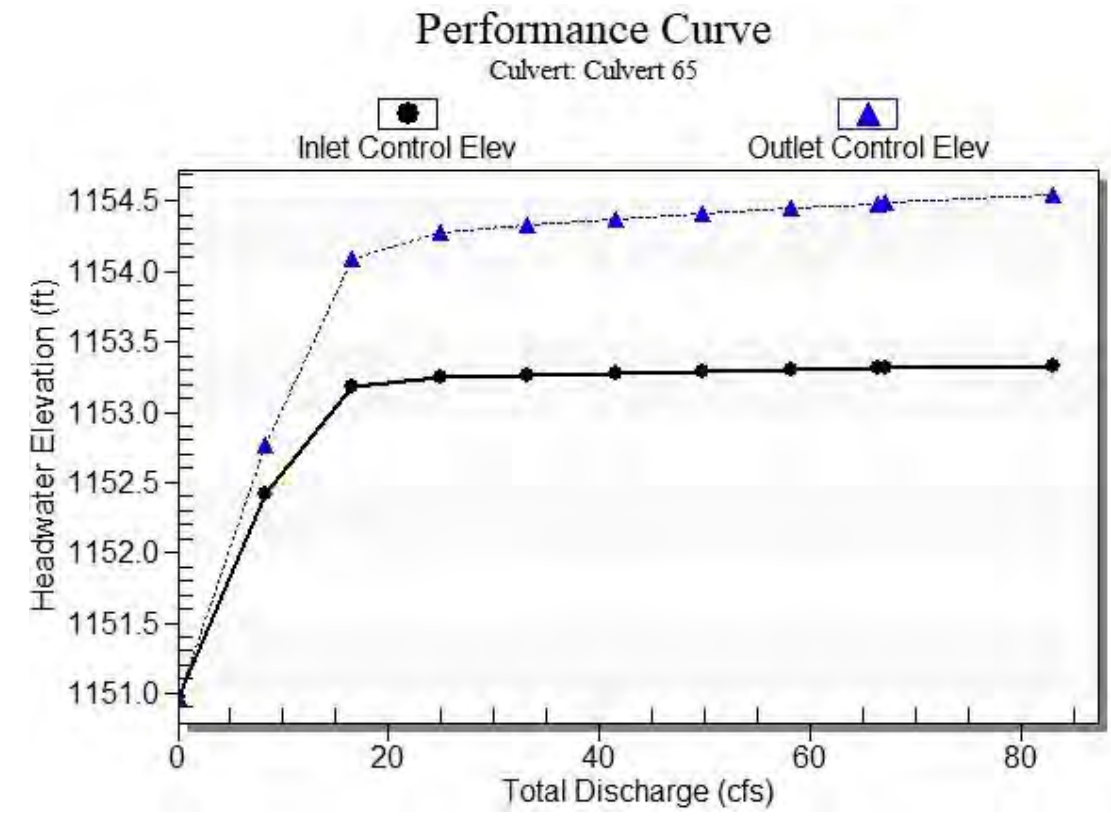


Table 2 - Culvert Summary Table: Culvert 65

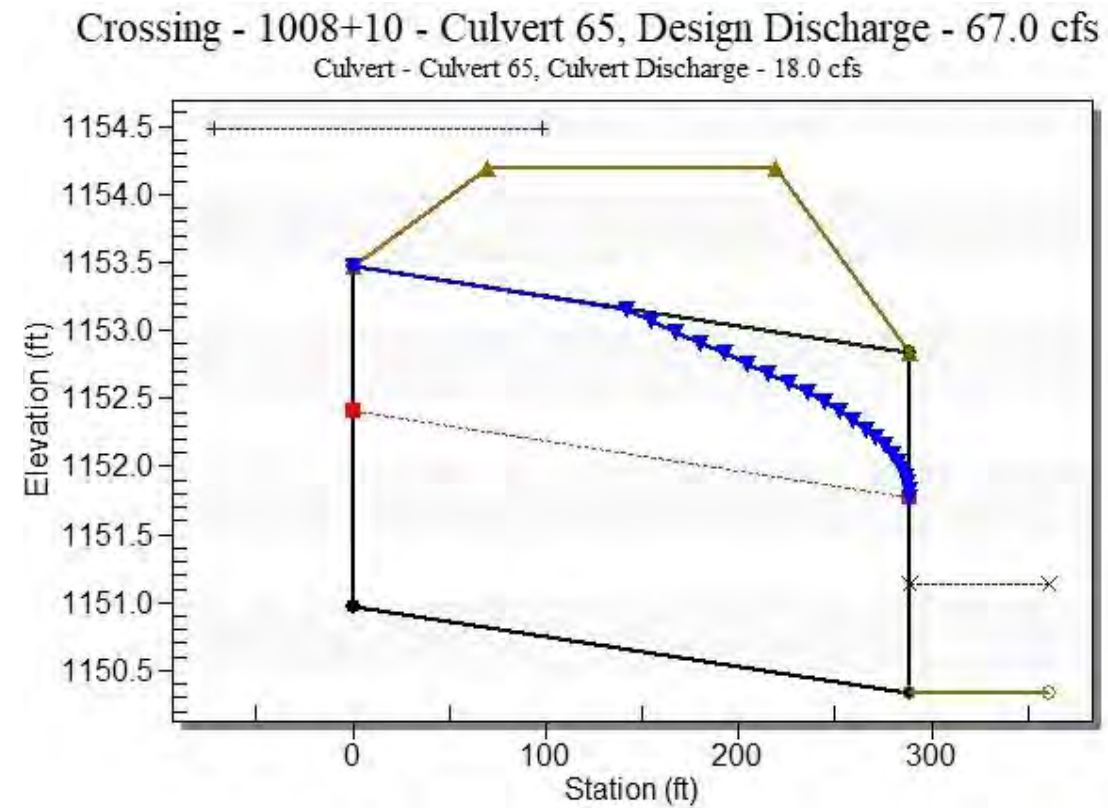
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1150.97	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
8.30	8.30	1152.76	1.444	1.790	2-M2c	1.646	0.956	0.956	0.231	4.808	2.285
16.60	16.60	1154.09	2.210	3.117	7-M2c	2.500	1.373	1.373	0.349	6.013	2.964
24.90	17.31	1154.28	2.274	3.307	7-M2c	2.500	1.405	1.405	0.444	6.092	3.437
33.20	17.51	1154.33	2.293	3.361	7-M2c	2.500	1.414	1.414	0.525	6.118	3.812
41.50	17.67	1154.38	2.307	3.406	7-M2c	2.500	1.420	1.420	0.599	6.139	4.128
49.80	17.79	1154.42	2.318	3.438	7-M2c	2.500	1.425	1.425	0.666	6.154	4.400
58.10	17.87	1154.45	2.326	3.483	7-M2c	2.500	1.428	1.428	0.728	6.165	4.642
66.40	18.01	1154.49	2.339	3.516	7-M2c	2.500	1.434	1.434	0.787	6.183	4.860
67.00	18.02	1154.49	2.339	3.518	7-M2c	2.500	1.434	1.434	0.791	6.184	4.875
83.00	18.27	1154.55	2.362	3.578	7-M2c	2.500	1.444	1.444	0.895	6.216	5.243

 Straight Culvert
 Inlet Elevation (invert): 1150.97 ft, Outlet Elevation (invert): 1150.34 ft
 Culvert Length: 289.00 ft, Culvert Slope: 0.0022

Culvert Performance Curve Plot: Culvert 65



Water Surface Profile Plot for Culvert: Culvert 65



Site Data - Culvert 65

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1150.97 ft
 Outlet Station: 289.00 ft
 Outlet Elevation: 1150.34 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 65

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1008+10 - Culvert 65)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1150.34	0.00	0.00	0.00	0.00
8.30	1150.57	0.23	2.29	0.04	0.86
16.60	1150.69	0.35	2.96	0.07	0.91
24.90	1150.78	0.44	3.44	0.08	0.95
33.20	1150.87	0.53	3.81	0.10	0.97
41.50	1150.94	0.60	4.13	0.11	0.99
49.80	1151.01	0.67	4.40	0.12	1.00
58.10	1151.07	0.73	4.64	0.14	1.02
66.40	1151.13	0.79	4.86	0.15	1.03
67.00	1151.13	0.79	4.88	0.15	1.03
83.00	1151.24	0.90	5.24	0.17	1.05

Tailwater Channel Data - 1008+10 - Culvert 65

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1150.34 ft

Roadway Data for Crossing: 1008+10 - Culvert 65

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1154.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 70

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 5 cfs

Maximum Flow: 6 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1014+00 - Culvert 70

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 70 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1151.00	0.00	0.00	0.00	1
1151.42	0.60	0.60	0.00	1
1151.60	1.20	1.20	0.00	1
1151.73	1.80	1.80	0.00	1
1151.85	2.40	2.40	0.00	1
1151.96	3.00	3.00	0.00	1
1152.06	3.60	3.60	0.00	1
1152.15	4.20	4.20	0.00	1
1152.24	4.80	4.80	0.00	1
1152.26	5.00	5.00	0.00	1
1152.40	6.00	6.00	0.00	1
1154.81	21.62	21.62	0.00	Overtopping

Rating Curve Plot for Crossing: 1014+00 - Culvert 70

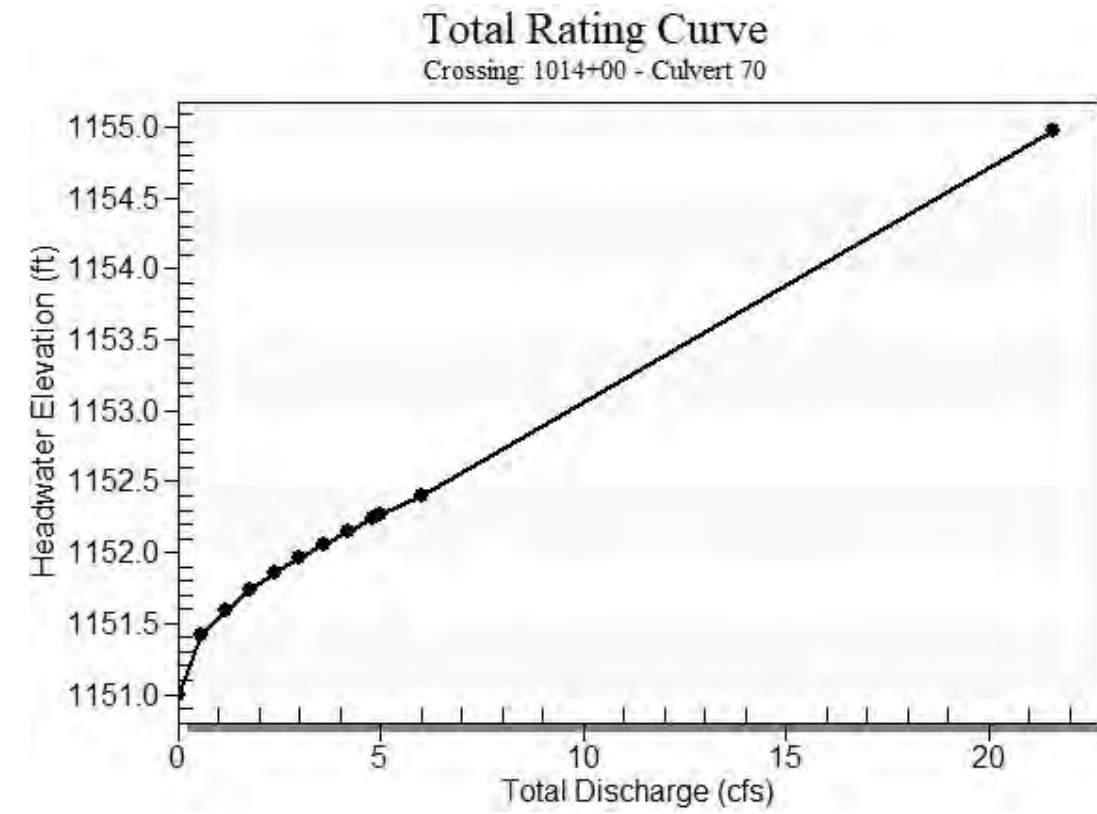
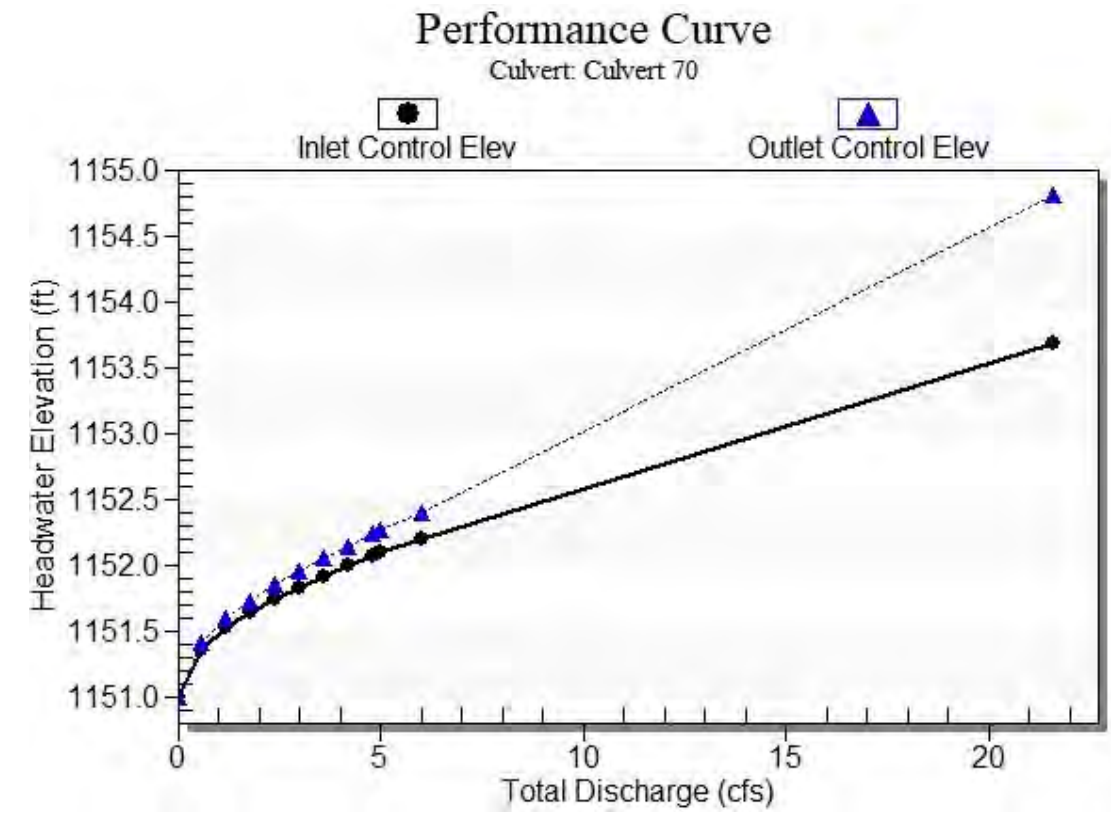


Table 2 - Culvert Summary Table: Culvert 70

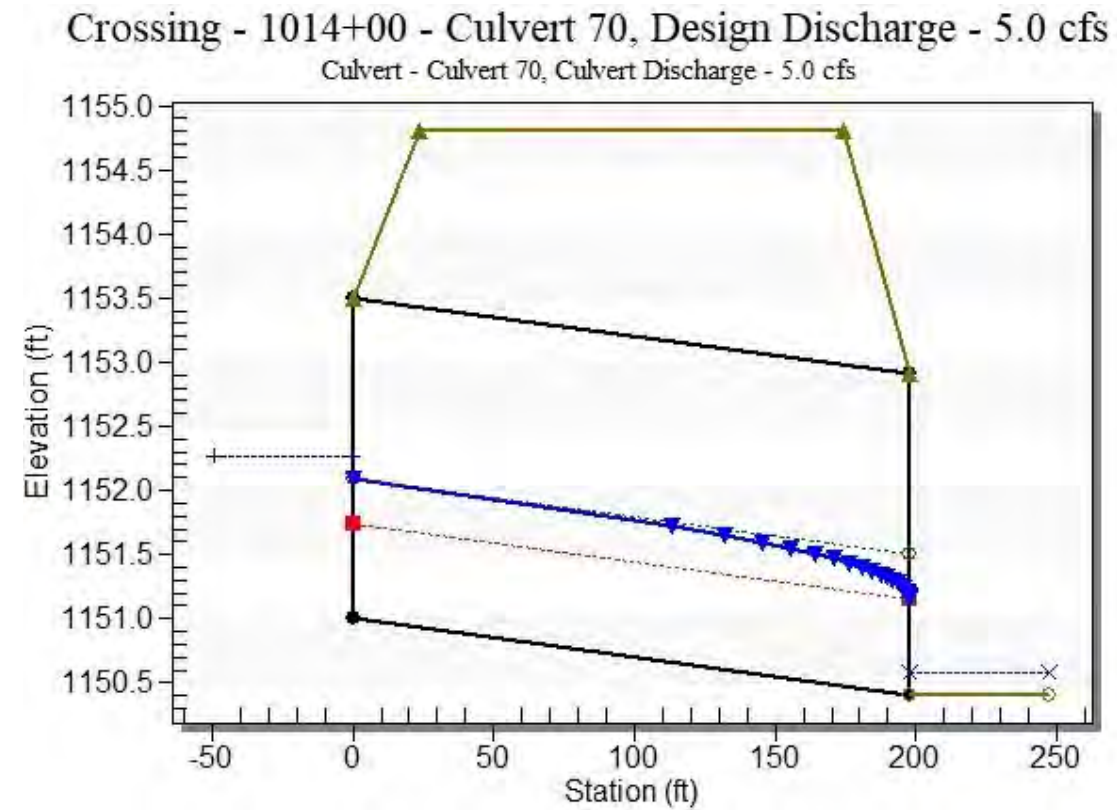
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1151.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.60	0.60	1151.42	0.365	0.420	2-M2c	0.367	0.245	0.245	0.048	2.415	0.822
1.20	1.20	1151.60	0.523	0.596	2-M2c	0.517	0.353	0.353	0.073	2.840	1.081
1.80	1.80	1151.73	0.645	0.733	2-M2c	0.633	0.432	0.432	0.093	3.181	1.267
2.40	2.40	1151.85	0.744	0.851	2-M2c	0.733	0.502	0.502	0.110	3.414	1.419
3.00	3.00	1151.96	0.835	0.958	2-M2c	0.824	0.564	0.564	0.126	3.614	1.546
3.60	3.60	1152.06	0.921	1.056	2-M2c	0.908	0.620	0.620	0.141	3.791	1.660
4.20	4.20	1152.15	0.999	1.148	2-M2c	0.988	0.669	0.669	0.154	3.980	1.762
4.80	4.80	1152.24	1.071	1.235	2-M2c	1.064	0.718	0.718	0.167	4.120	1.855
5.00	5.00	1152.26	1.095	1.264	2-M2c	1.089	0.733	0.733	0.171	4.165	1.884
6.00	6.00	1152.40	1.207	1.401	2-M2c	1.209	0.807	0.807	0.191	4.375	2.020

 Straight Culvert
 Inlet Elevation (invert): 1151.00 ft, Outlet Elevation (invert): 1150.41 ft
 Culvert Length: 198.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 70



Water Surface Profile Plot for Culvert: Culvert 70



Site Data - Culvert 70

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1151.00 ft
 Outlet Station: 198.00 ft
 Outlet Elevation: 1150.41 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 70

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1014+00 - Culvert 70)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1150.41	0.00	0.00	0.00	0.00
0.60	1150.46	0.05	0.82	0.01	0.66
1.20	1150.48	0.07	1.08	0.01	0.71
1.80	1150.50	0.09	1.27	0.02	0.74
2.40	1150.52	0.11	1.42	0.02	0.76
3.00	1150.54	0.13	1.55	0.02	0.78
3.60	1150.55	0.14	1.66	0.03	0.79
4.20	1150.56	0.15	1.76	0.03	0.80
4.80	1150.58	0.17	1.85	0.03	0.81
5.00	1150.58	0.17	1.88	0.03	0.82
6.00	1150.60	0.19	2.02	0.04	0.83

Tailwater Channel Data - 1014+00 - Culvert 70

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1150.41 ft

Roadway Data for Crossing: 1014+00 - Culvert 70

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1154.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 75

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 10 cfs

Maximum Flow: 12 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1018+00 - Culvert 75

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 75 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1151.00	0.00	0.00	0.00	1
1151.60	1.20	1.20	0.00	1
1151.85	2.40	2.40	0.00	1
1152.06	3.60	3.60	0.00	1
1152.24	4.80	4.80	0.00	1
1152.40	6.00	6.00	0.00	1
1152.56	7.20	7.20	0.00	1
1152.70	8.40	8.40	0.00	1
1152.85	9.60	9.60	0.00	1
1152.89	10.00	10.00	0.00	1
1153.12	12.00	12.00	0.00	1
1155.31	23.59	23.59	0.00	Overtopping

Rating Curve Plot for Crossing: 1018+00 - Culvert 75

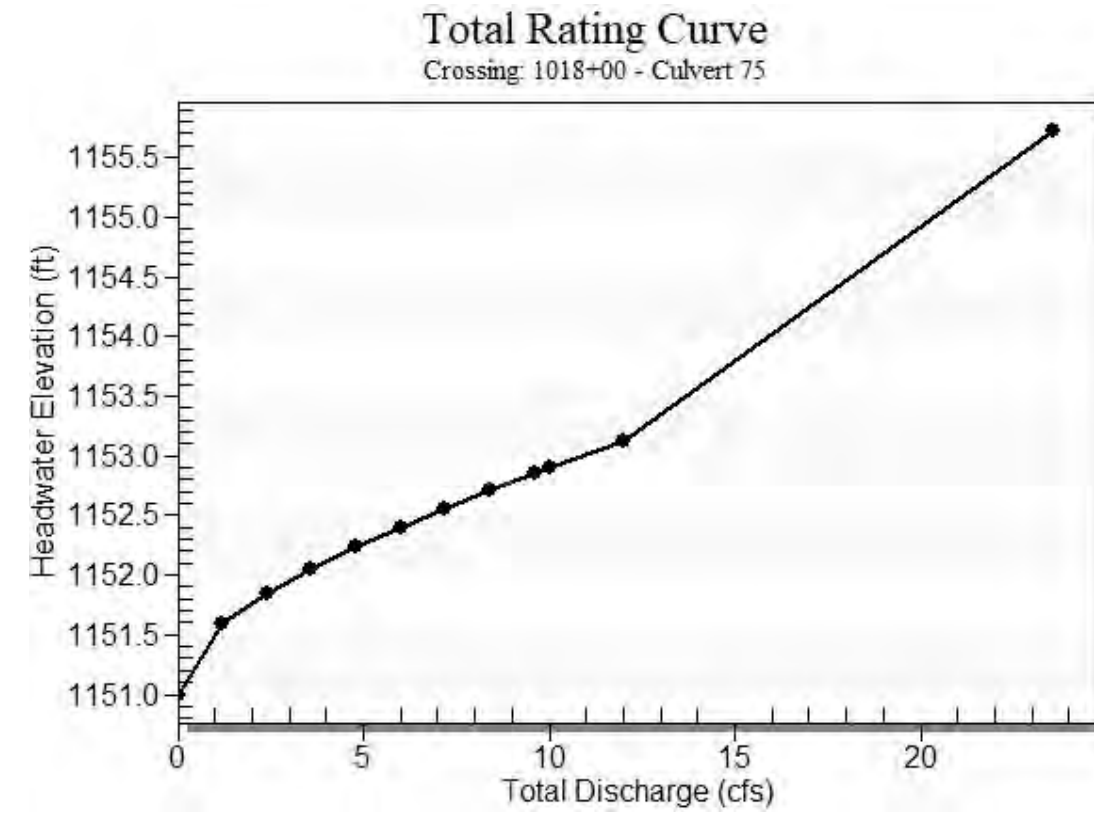
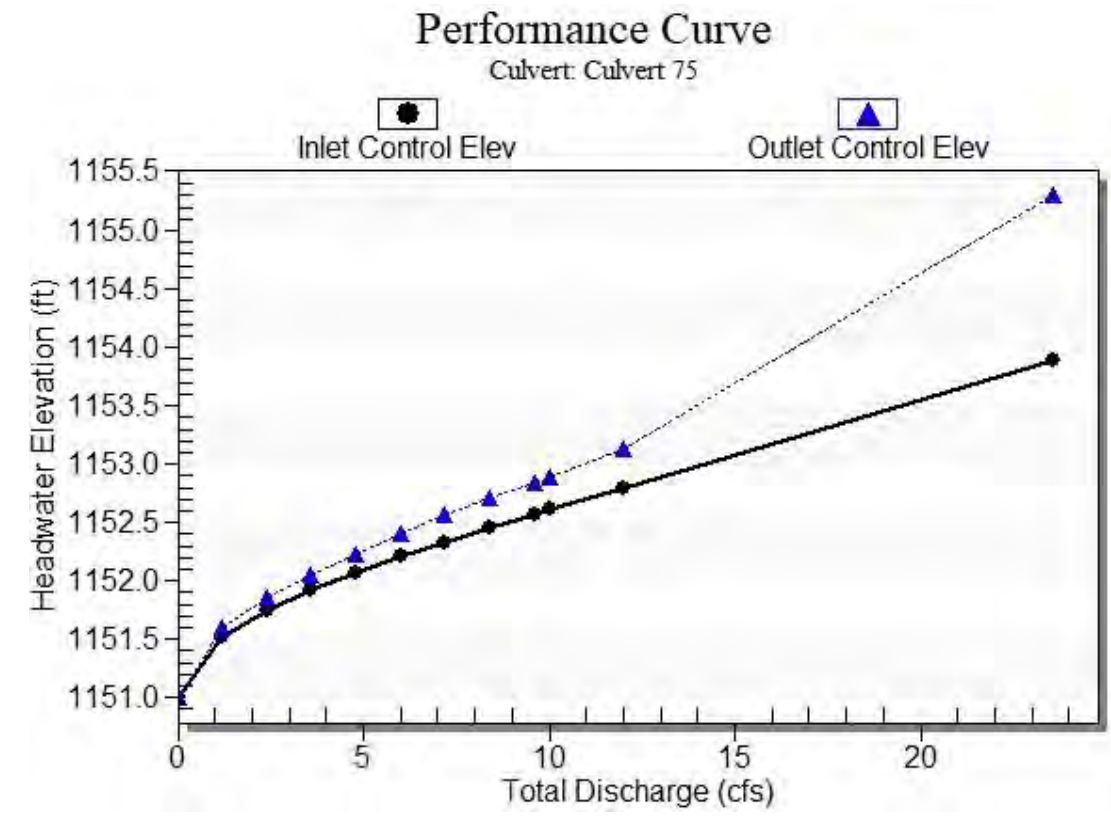


Table 2 - Culvert Summary Table: Culvert 75

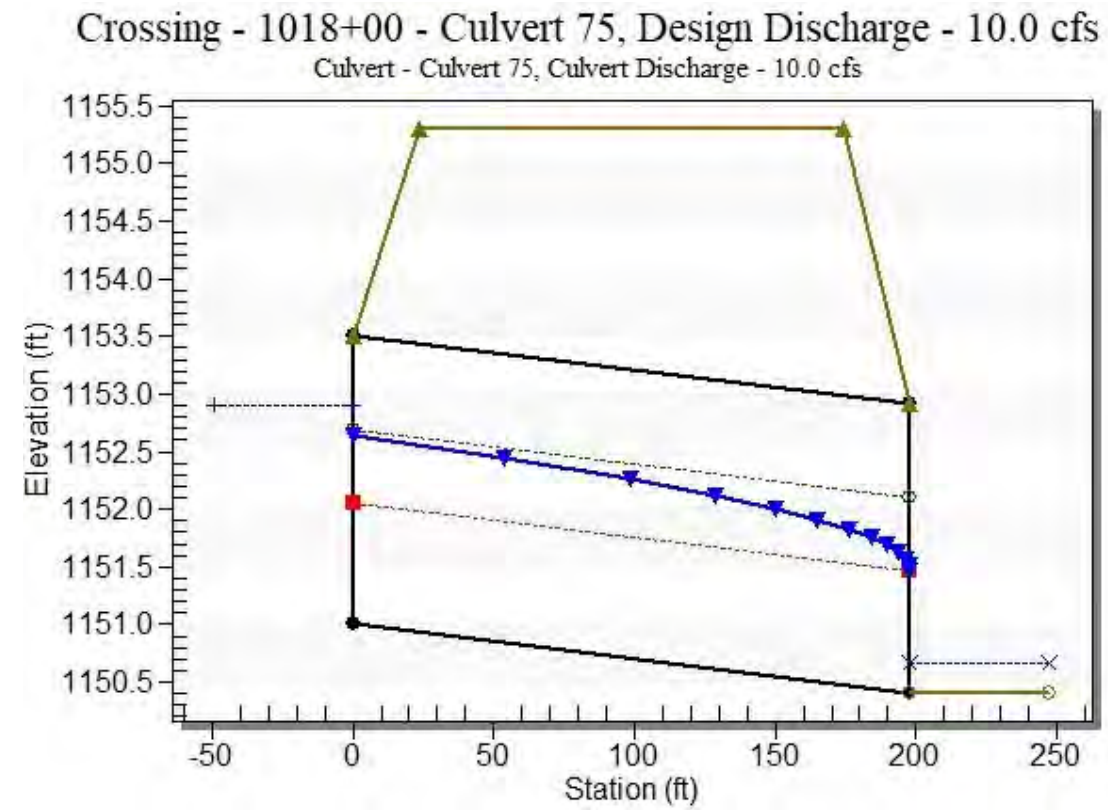
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1151.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.20	1.20	1151.60	0.523	0.596	2-M2c	0.517	0.353	0.353	0.073	2.840	1.081
2.40	2.40	1151.85	0.744	0.851	2-M2c	0.733	0.502	0.502	0.110	3.414	1.419
3.60	3.60	1152.06	0.921	1.056	2-M2c	0.908	0.620	0.620	0.141	3.791	1.660
4.80	4.80	1152.24	1.071	1.235	2-M2c	1.064	0.718	0.718	0.167	4.120	1.855
6.00	6.00	1152.40	1.207	1.401	2-M2c	1.209	0.807	0.807	0.191	4.375	2.020
7.20	7.20	1152.56	1.332	1.559	2-M2c	1.349	0.886	0.886	0.213	4.624	2.165
8.40	8.40	1152.70	1.452	1.705	2-M2c	1.489	0.962	0.962	0.233	4.825	2.297
9.60	9.60	1152.85	1.569	1.846	2-M2c	1.633	1.031	1.031	0.252	5.027	2.414
10.00	10.00	1152.89	1.607	1.894	2-M2c	1.683	1.054	1.054	0.259	5.084	2.452
12.00	12.00	1153.12	1.793	2.124	2-M2c	1.970	1.162	1.162	0.288	5.369	2.627

 Straight Culvert
 Inlet Elevation (invert): 1151.00 ft, Outlet Elevation (invert): 1150.41 ft
 Culvert Length: 198.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 75



Water Surface Profile Plot for Culvert: Culvert 75



Site Data - Culvert 75

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1151.00 ft
 Outlet Station: 198.00 ft
 Outlet Elevation: 1150.41 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 75

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1018+00 - Culvert 75)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1150.41	0.00	0.00	0.00	0.00
1.20	1150.48	0.07	1.08	0.01	0.71
2.40	1150.52	0.11	1.42	0.02	0.76
3.60	1150.55	0.14	1.66	0.03	0.79
4.80	1150.58	0.17	1.85	0.03	0.81
6.00	1150.60	0.19	2.02	0.04	0.83
7.20	1150.62	0.21	2.16	0.04	0.84
8.40	1150.64	0.23	2.30	0.04	0.86
9.60	1150.66	0.25	2.41	0.05	0.87
10.00	1150.67	0.26	2.45	0.05	0.87
12.00	1150.70	0.29	2.63	0.05	0.89

Tailwater Channel Data - 1018+00 - Culvert 75

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1150.41 ft

Roadway Data for Crossing: 1018+00 - Culvert 75

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1155.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 80

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 13 cfs

Maximum Flow: 15 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1029+00 - Culvert 80

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 80 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1152.50	0.00	0.00	0.00	1
1152.97	1.50	1.50	0.00	1
1153.20	3.00	3.00	0.00	1
1153.41	4.50	4.50	0.00	1
1153.60	6.00	6.00	0.00	1
1153.78	7.50	7.50	0.00	1
1153.96	9.00	9.00	0.00	1
1154.15	10.50	10.50	0.00	1
1154.34	12.00	12.00	0.00	1
1154.49	13.00	13.00	0.00	1
1154.97	15.00	15.00	0.00	1
1156.31	19.61	19.61	0.00	Overtopping

Rating Curve Plot for Crossing: 1029+00 - Culvert 80

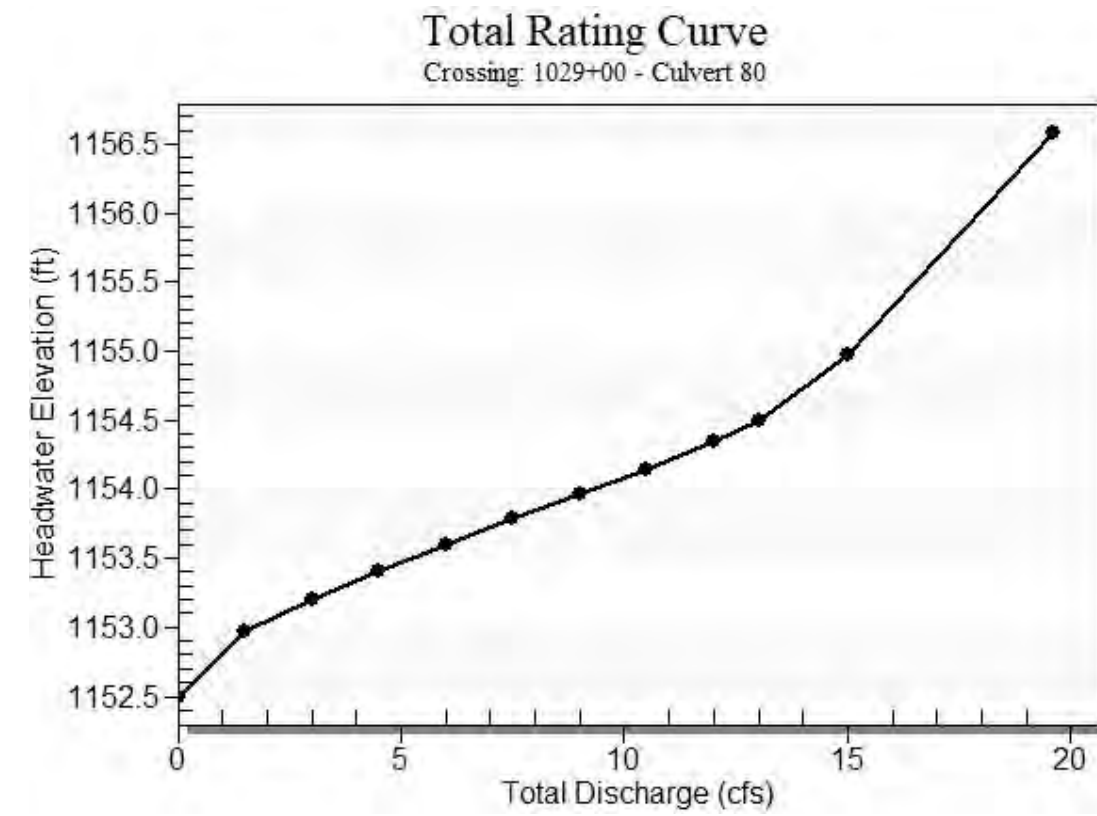
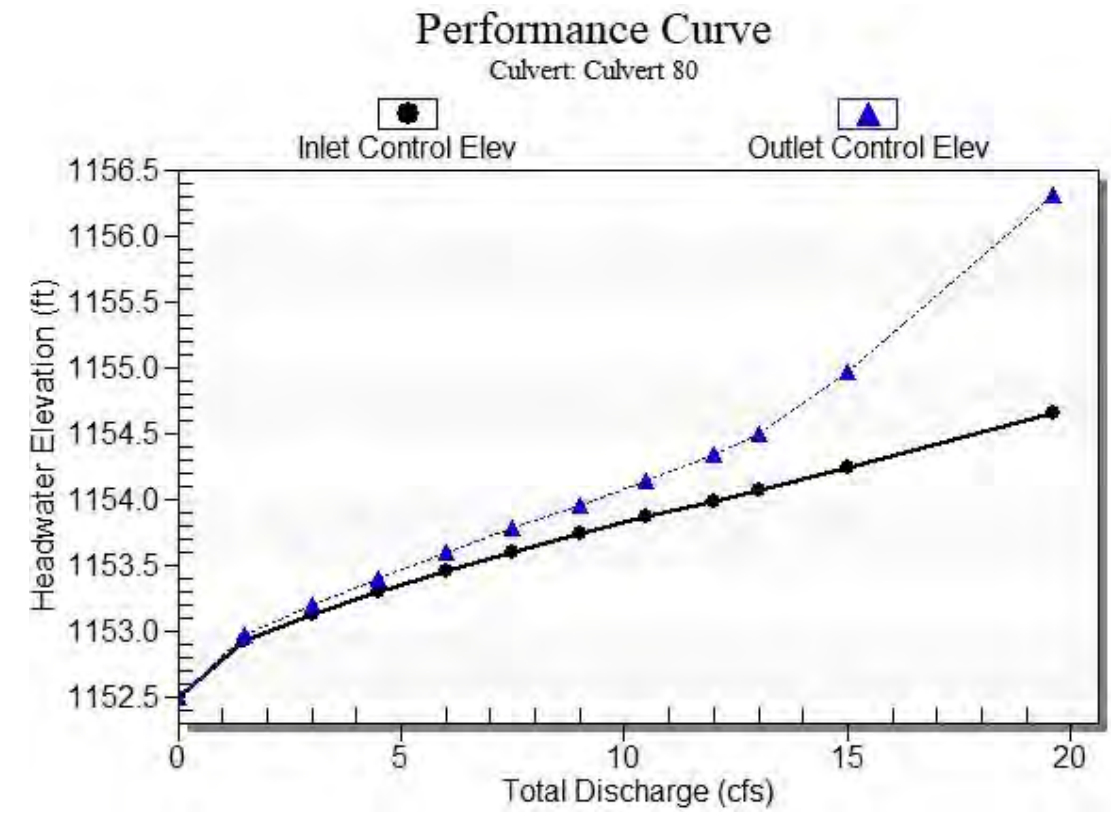


Table 2 - Culvert Summary Table: Culvert 80

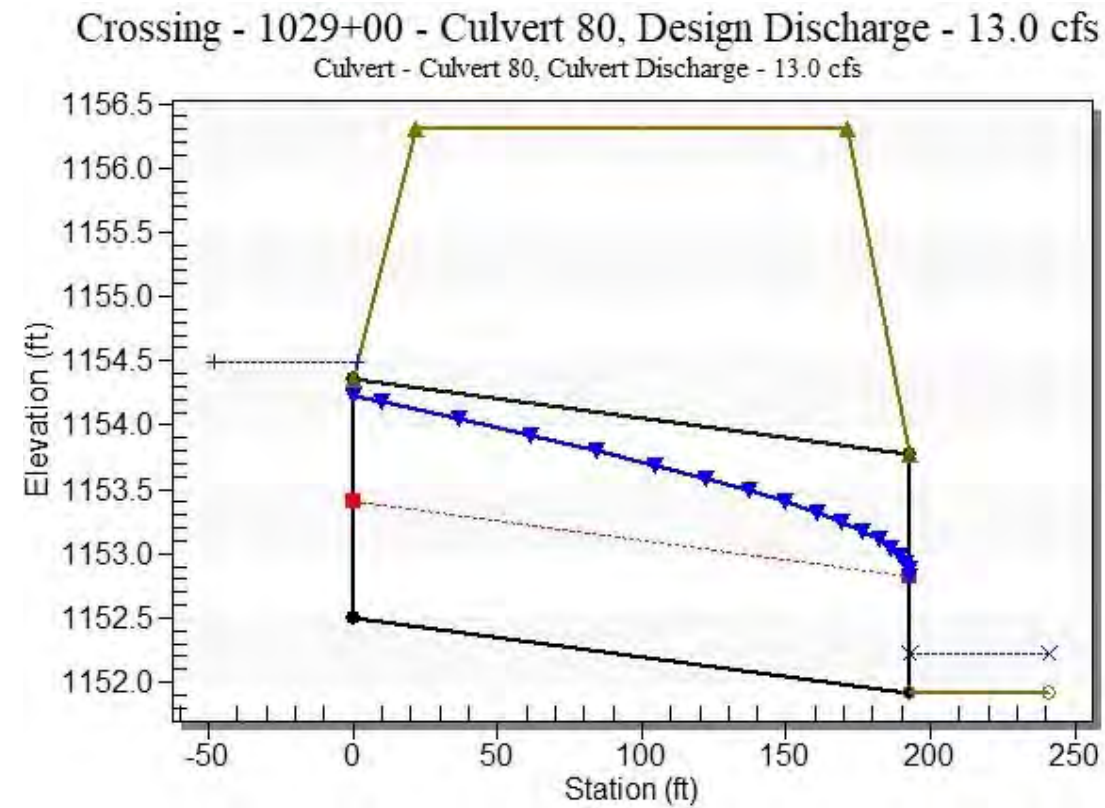
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1152.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.50	1.50	1152.97	0.425	0.471	2-M2c	0.401	0.263	0.263	0.083	2.616	1.180
3.00	3.00	1153.20	0.632	0.703	2-M2c	0.593	0.384	0.384	0.126	3.239	1.546
4.50	4.50	1153.41	0.805	0.905	2-M2c	0.764	0.483	0.483	0.161	3.684	1.810
6.00	6.00	1153.60	0.959	1.097	2-M2c	0.932	0.571	0.571	0.191	4.032	2.020
7.50	7.50	1153.78	1.105	1.283	2-M2c	1.107	0.655	0.655	0.218	4.313	2.199
9.00	9.00	1153.96	1.239	1.461	2-M2c	1.307	0.731	0.731	0.243	4.586	2.356
10.50	10.50	1154.15	1.366	1.646	2-M2c	1.850	0.800	0.800	0.266	4.853	2.497
12.00	12.00	1154.34	1.488	1.844	2-M2c	1.850	0.864	0.864	0.288	5.115	2.627
13.00	13.00	1154.49	1.570	1.994	7-M2c	1.850	0.903	0.903	0.302	5.287	2.706
15.00	15.00	1154.97	1.736	2.469	7-M2c	1.850	0.977	0.977	0.329	5.629	2.855

 Straight Culvert
 Inlet Elevation (invert): 1152.50 ft, Outlet Elevation (invert): 1151.92 ft
 Culvert Length: 193.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 80



Water Surface Profile Plot for Culvert: Culvert 80



Site Data - Culvert 80

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1152.50 ft
 Outlet Station: 193.00 ft
 Outlet Elevation: 1151.92 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 80

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1029+00 - Culvert 80)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1151.92	0.00	0.00	0.00	0.00
1.50	1152.00	0.08	1.18	0.02	0.73
3.00	1152.05	0.13	1.55	0.02	0.78
4.50	1152.08	0.16	1.81	0.03	0.81
6.00	1152.11	0.19	2.02	0.04	0.83
7.50	1152.14	0.22	2.20	0.04	0.85
9.00	1152.16	0.24	2.36	0.05	0.86
10.50	1152.19	0.27	2.50	0.05	0.87
12.00	1152.21	0.29	2.63	0.05	0.89
13.00	1152.22	0.30	2.71	0.06	0.89
15.00	1152.25	0.33	2.85	0.06	0.90

Tailwater Channel Data - 1029+00 - Culvert 80

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1151.92 ft

Roadway Data for Crossing: 1029+00 - Culvert 80

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1156.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 85

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 487 cfs

Maximum Flow: 609 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1033+00 - Culvert 85

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 85 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1153.70	0.00	0.00	0.00	1
1156.59	60.90	15.68	45.15	7
1156.80	121.80	16.34	105.17	5
1156.98	182.70	16.78	165.79	5
1157.13	243.60	17.26	226.00	4
1157.27	304.50	17.65	286.70	4
1157.41	365.40	17.96	347.38	4
1157.53	426.30	18.32	407.68	3
1157.65	487.00	18.64	468.23	3
1157.76	548.10	18.93	529.14	3
1157.87	609.00	19.15	589.49	2
1156.31	14.65	14.65	0.00	Overtopping

Rating Curve Plot for Crossing: 1033+00 - Culvert 85

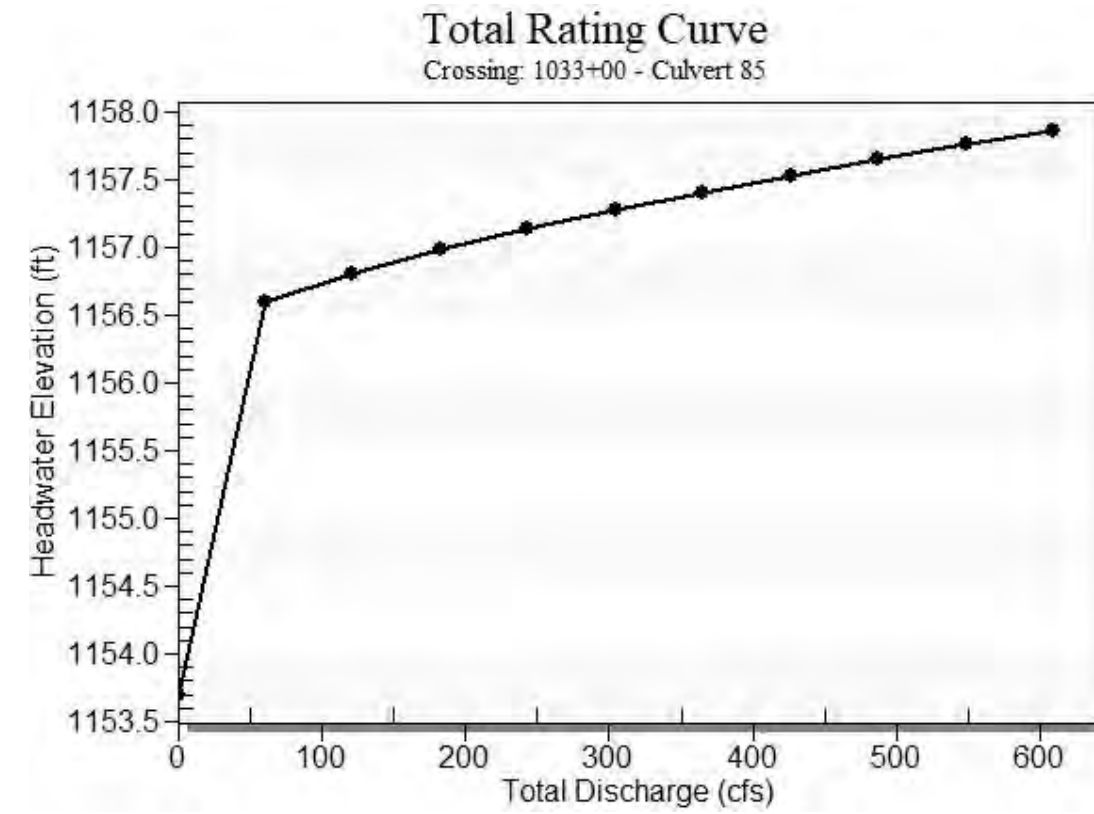
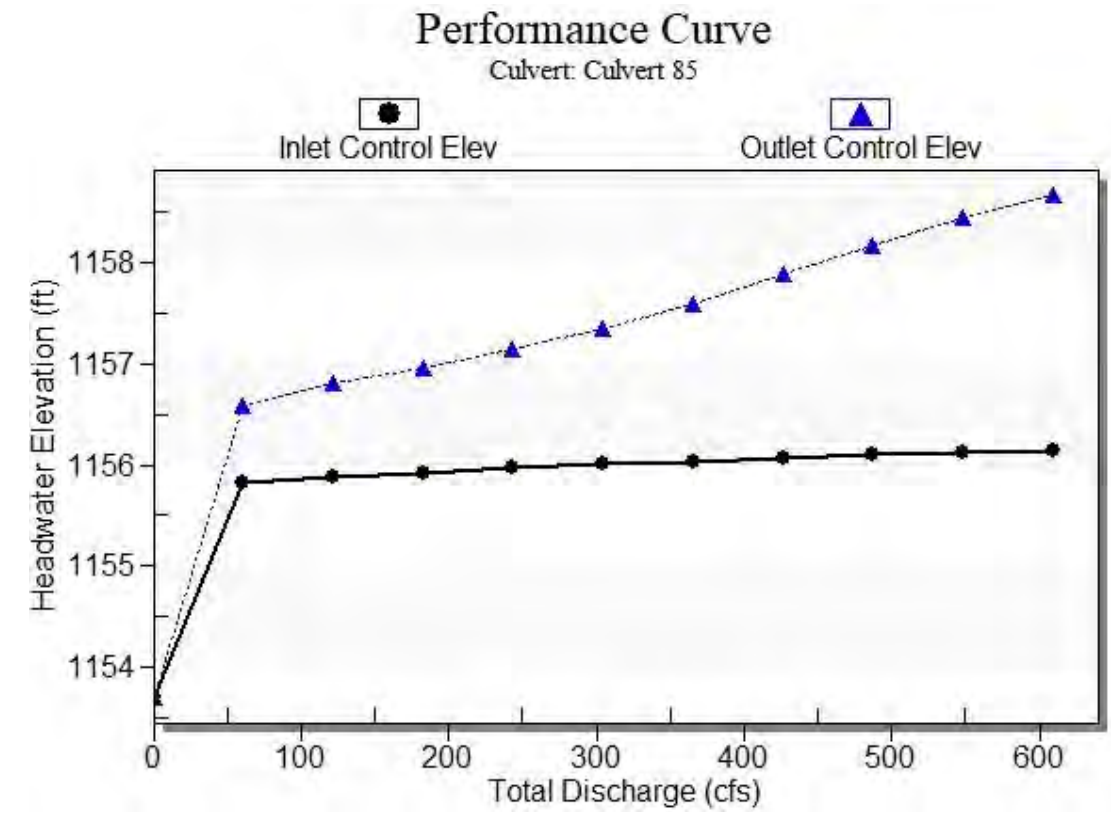


Table 2 - Culvert Summary Table: Culvert 85

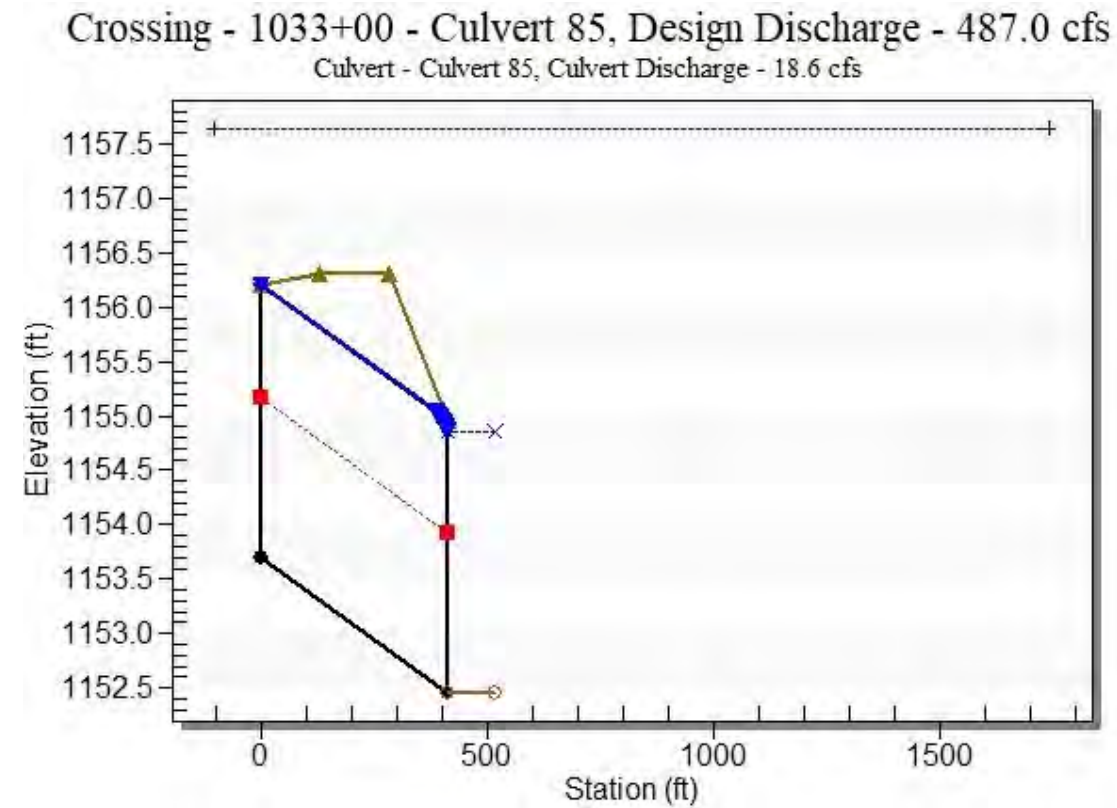
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1153.70	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
60.90	15.68	1156.59	2.126	2.894	7-M2c	2.500	1.334	1.334	0.749	5.886	4.718
121.80	16.34	1156.80	2.185	3.104	7-M2c	2.500	1.362	1.362	1.115	5.977	5.955
182.70	16.78	1156.98	2.225	3.260	7-M2t	2.500	1.380	1.402	1.402	5.923	6.785
243.60	17.26	1157.13	2.269	3.456	7-M2t	2.500	1.403	1.646	1.646	5.037	7.424
304.50	17.65	1157.27	2.305	3.659	7-M2t	2.500	1.419	1.861	1.861	4.505	7.950
365.40	17.96	1157.41	2.333	3.887	7-M2t	2.500	1.432	2.055	2.055	4.159	8.399
426.30	18.32	1157.53	2.366	4.185	7-M2t	2.500	1.447	2.234	2.234	3.958	8.793
487.00	18.64	1157.65	2.396	4.476	7-M2t	2.500	1.459	2.399	2.399	3.849	9.144
548.10	18.93	1157.76	2.423	4.749	4-FFf	2.500	1.471	2.500	2.555	3.856	9.464
609.00	19.15	1157.87	2.443	4.976	4-FFf	2.500	1.480	2.500	2.702	3.901	9.757

 Straight Culvert
 Inlet Elevation (invert): 1153.70 ft, Outlet Elevation (invert): 1152.46 ft
 Culvert Length: 415.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 85



Water Surface Profile Plot for Culvert: Culvert 85



Site Data - Culvert 85

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1153.70 ft
 Outlet Station: 415.00 ft
 Outlet Elevation: 1152.46 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 85

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1033+00 - Culvert 85)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1152.46	0.00	0.00	0.00	0.00
60.90	1153.21	0.75	4.72	0.14	1.02
121.80	1153.57	1.11	5.96	0.21	1.08
182.70	1153.86	1.40	6.79	0.26	1.11
243.60	1154.11	1.65	7.42	0.31	1.14
304.50	1154.32	1.86	7.95	0.35	1.16
365.40	1154.52	2.06	8.40	0.38	1.17
426.30	1154.69	2.23	8.79	0.42	1.19
487.00	1154.86	2.40	9.14	0.45	1.20
548.10	1155.02	2.56	9.46	0.48	1.21
609.00	1155.16	2.70	9.76	0.51	1.22

Tailwater Channel Data - 1033+00 - Culvert 85

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1152.46 ft

Roadway Data for Crossing: 1033+00 - Culvert 85

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1156.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 90

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 46 cfs

Maximum Flow: 56 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1041+00 - Culvert 90

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 90 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1154.03	0.00	0.00	0.00	1
1155.49	5.60	5.60	0.00	1
1156.21	11.20	11.20	0.00	1
1156.83	16.80	15.57	1.13	31
1156.89	22.40	15.91	6.33	5
1156.93	28.00	16.13	11.73	4
1156.96	33.60	16.29	17.25	4
1156.99	39.20	16.44	22.60	3
1157.02	44.80	16.57	28.12	3
1157.02	46.00	16.59	29.17	2
1157.07	56.00	16.70	39.24	3
1156.81	15.49	15.49	0.00	Overtopping

Rating Curve Plot for Crossing: 1041+00 - Culvert 90

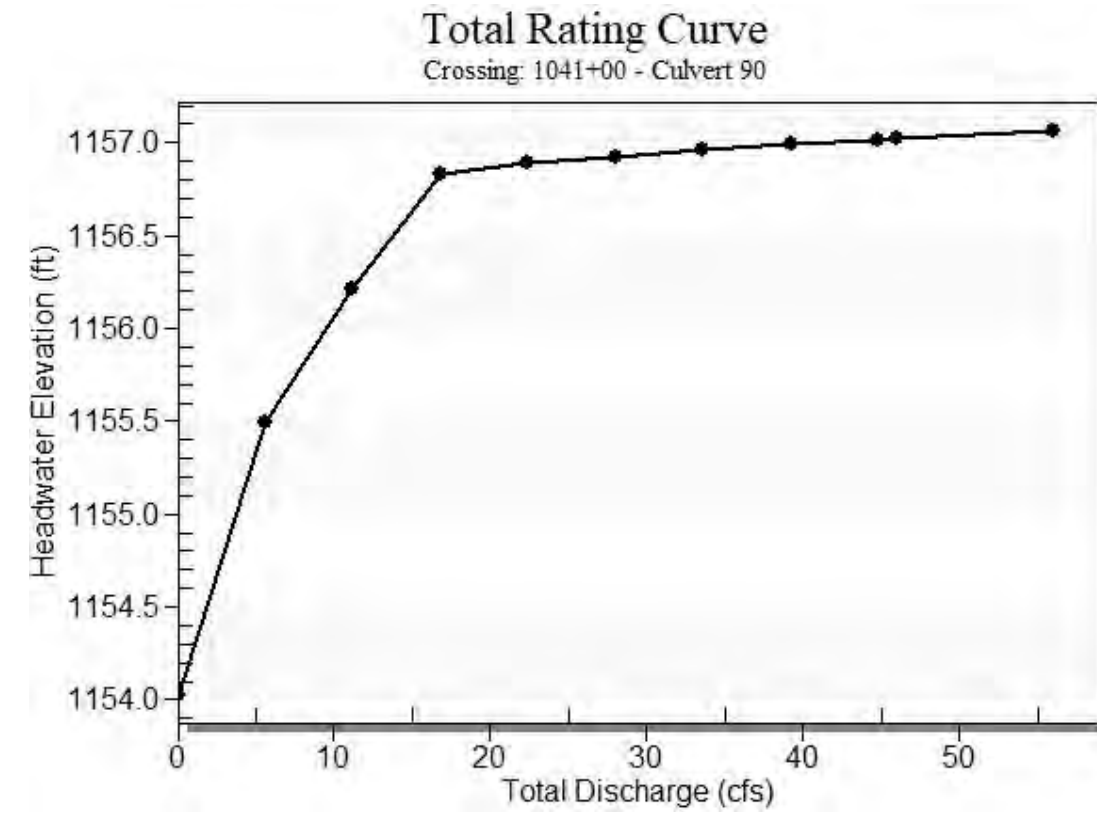
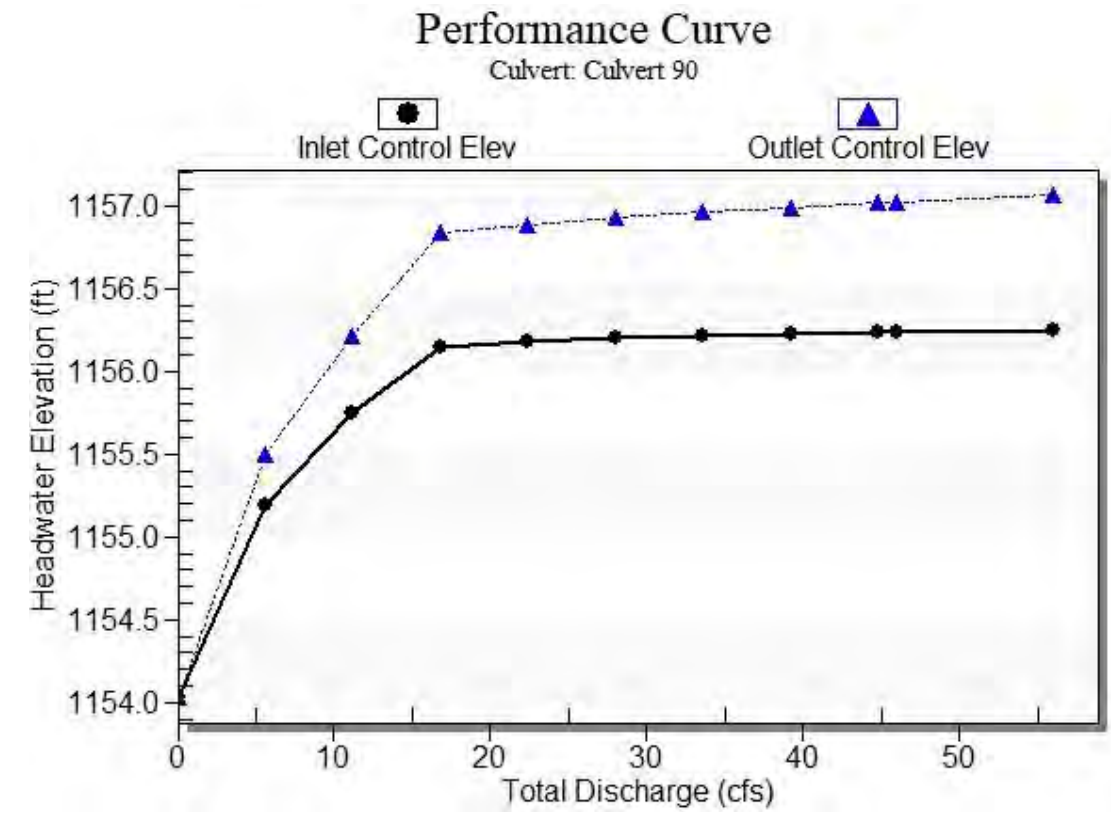


Table 2 - Culvert Summary Table: Culvert 90

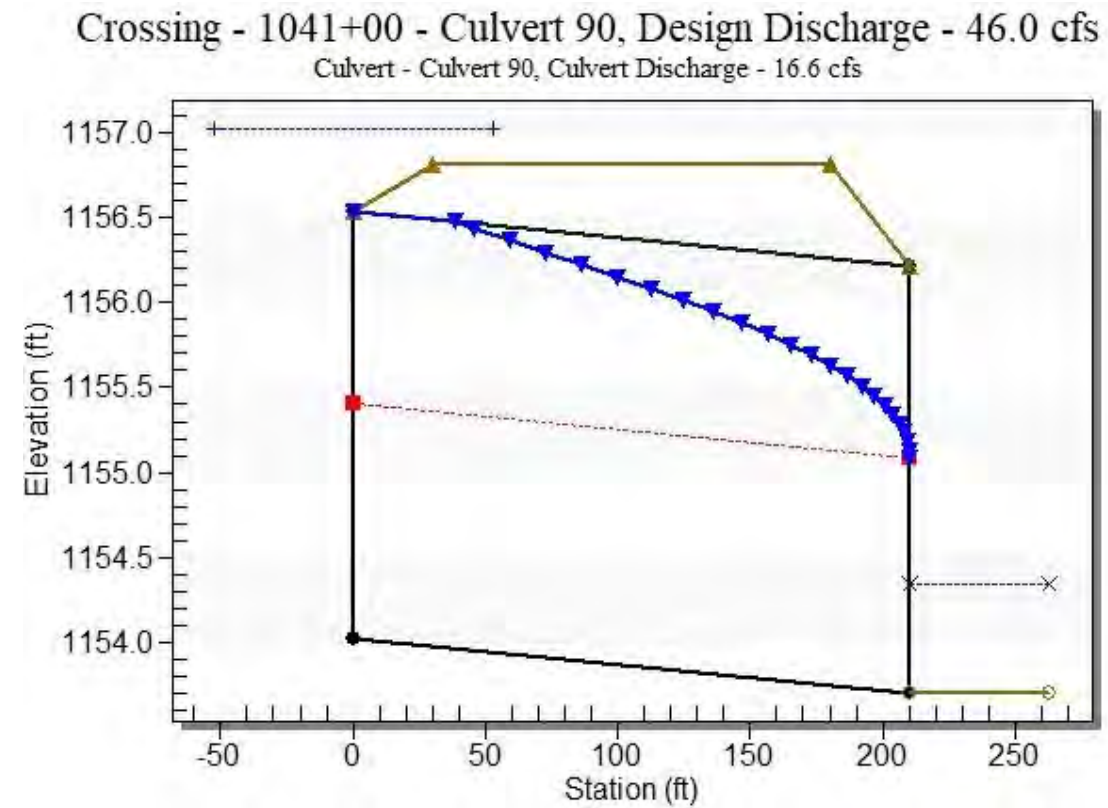
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1154.03	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.60	5.60	1155.49	1.164	1.465	2-M2c	1.424	0.779	0.779	0.183	4.293	1.968
11.20	11.20	1156.21	1.721	2.184	2-M2c	2.500	1.120	1.120	0.276	5.256	2.560
16.80	15.57	1156.83	2.117	2.805	7-M2c	2.500	1.329	1.329	0.352	5.870	2.975
22.40	15.91	1156.89	2.148	2.858	7-M2c	2.500	1.344	1.344	0.417	5.917	3.308
28.00	16.13	1156.93	2.168	2.897	7-M2c	2.500	1.353	1.353	0.475	5.948	3.586
33.60	16.29	1156.96	2.183	2.930	7-M2c	2.500	1.360	1.360	0.529	5.971	3.828
39.20	16.44	1156.99	2.196	2.960	7-M2c	2.500	1.366	1.366	0.579	5.991	4.045
44.80	16.57	1157.02	2.208	2.987	7-M2c	2.500	1.371	1.371	0.626	6.009	4.240
46.00	16.59	1157.02	2.210	2.992	7-M2c	2.500	1.372	1.372	0.636	6.013	4.280
56.00	16.70	1157.07	2.220	3.039	7-M2c	2.500	1.377	1.377	0.713	6.028	4.583

 Straight Culvert
 Inlet Elevation (invert): 1154.03 ft, Outlet Elevation (invert): 1153.71 ft
 Culvert Length: 210.50 ft, Culvert Slope: 0.0015

Culvert Performance Curve Plot: Culvert 90



Water Surface Profile Plot for Culvert: Culvert 90



Site Data - Culvert 90

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1154.03 ft
 Outlet Station: 210.50 ft
 Outlet Elevation: 1153.71 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 90

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1041+00 - Culvert 90)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1153.71	0.00	0.00	0.00	0.00
5.60	1153.89	0.18	1.97	0.03	0.82
11.20	1153.99	0.28	2.56	0.05	0.88
16.80	1154.06	0.35	2.98	0.07	0.91
22.40	1154.13	0.42	3.31	0.08	0.94
28.00	1154.19	0.48	3.59	0.09	0.96
33.60	1154.24	0.53	3.83	0.10	0.97
39.20	1154.29	0.58	4.05	0.11	0.98
44.80	1154.34	0.63	4.24	0.12	1.00
46.00	1154.35	0.64	4.28	0.12	1.00
56.00	1154.42	0.71	4.58	0.13	1.01

Tailwater Channel Data - 1041+00 - Culvert 90

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1153.71 ft

Roadway Data for Crossing: 1041+00 - Culvert 90

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1156.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 95

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 11 cfs

Maximum Flow: 13 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1047+00 - Culvert 95

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 95 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1154.14	0.00	0.00	0.00	1
1154.60	1.30	1.30	0.00	1
1154.82	2.60	2.60	0.00	1
1155.02	3.90	3.90	0.00	1
1155.20	5.20	5.20	0.00	1
1155.36	6.50	6.50	0.00	1
1155.53	7.80	7.80	0.00	1
1155.69	9.10	9.10	0.00	1
1155.86	10.40	10.40	0.00	1
1155.94	11.00	11.00	0.00	1
1156.28	13.00	13.00	0.00	1
1157.81	18.52	18.52	0.00	Overtopping

Rating Curve Plot for Crossing: 1047+00 - Culvert 95

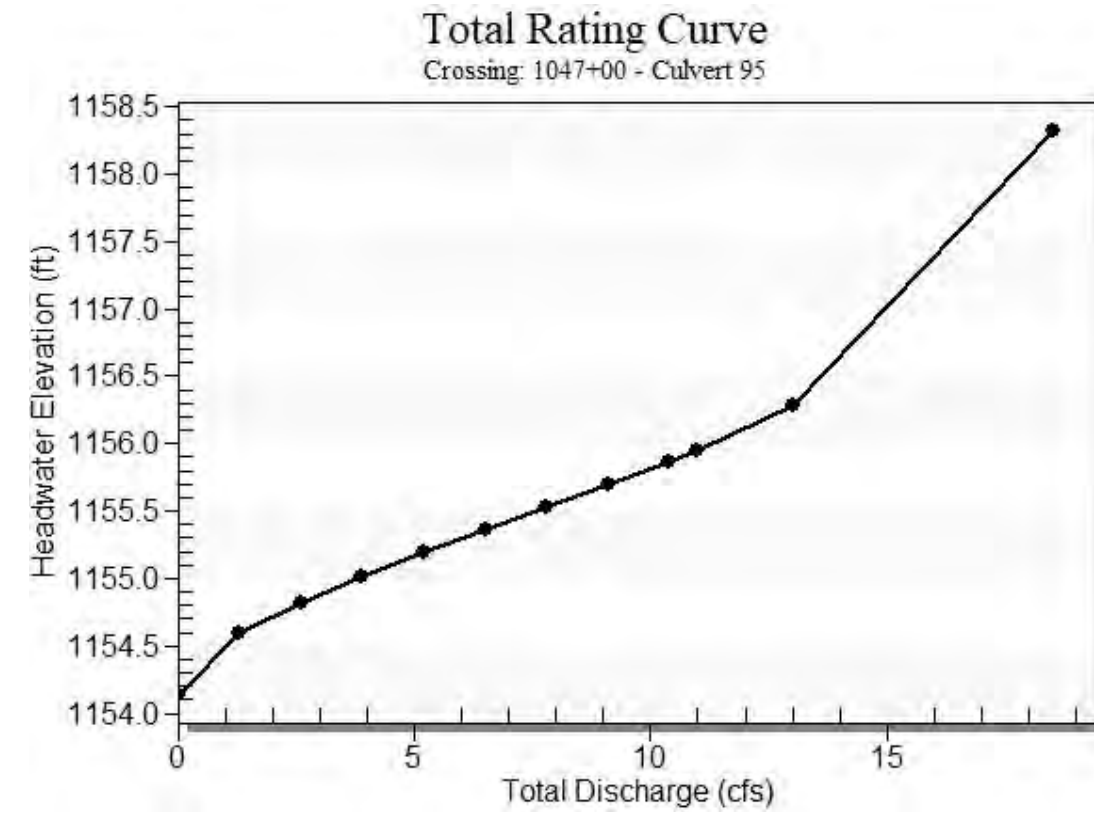
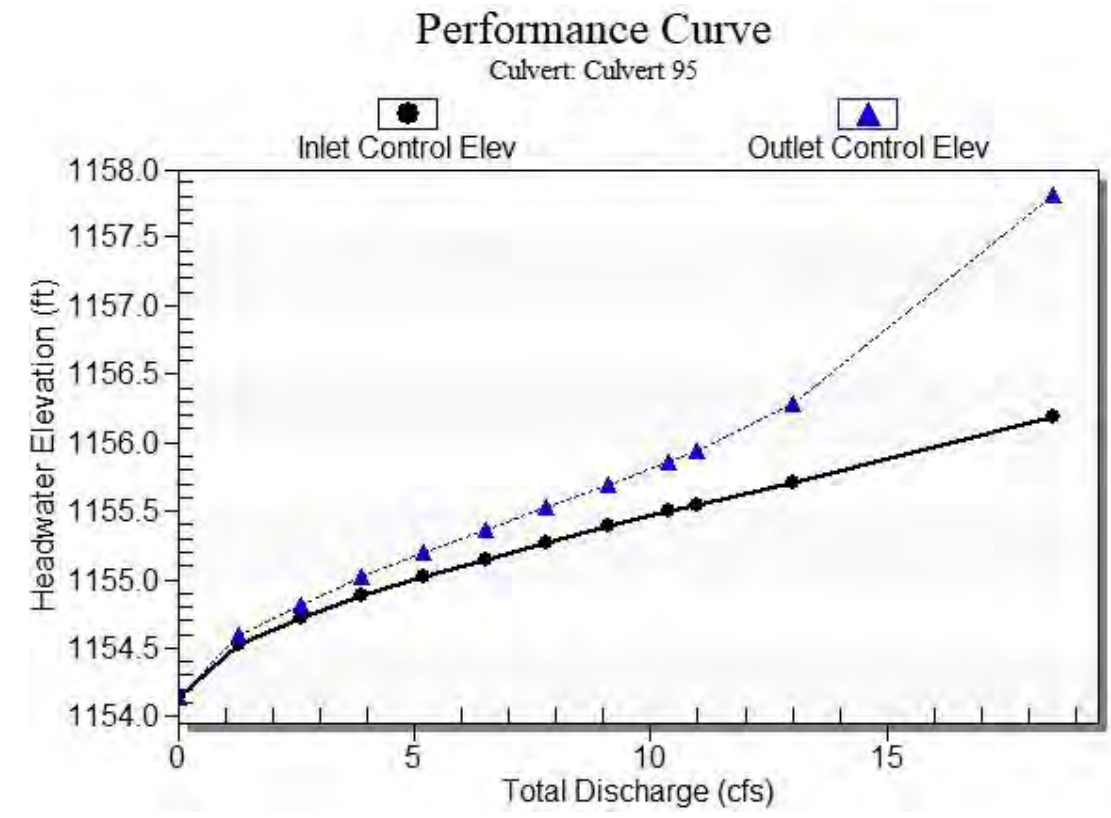


Table 2 - Culvert Summary Table: Culvert 95

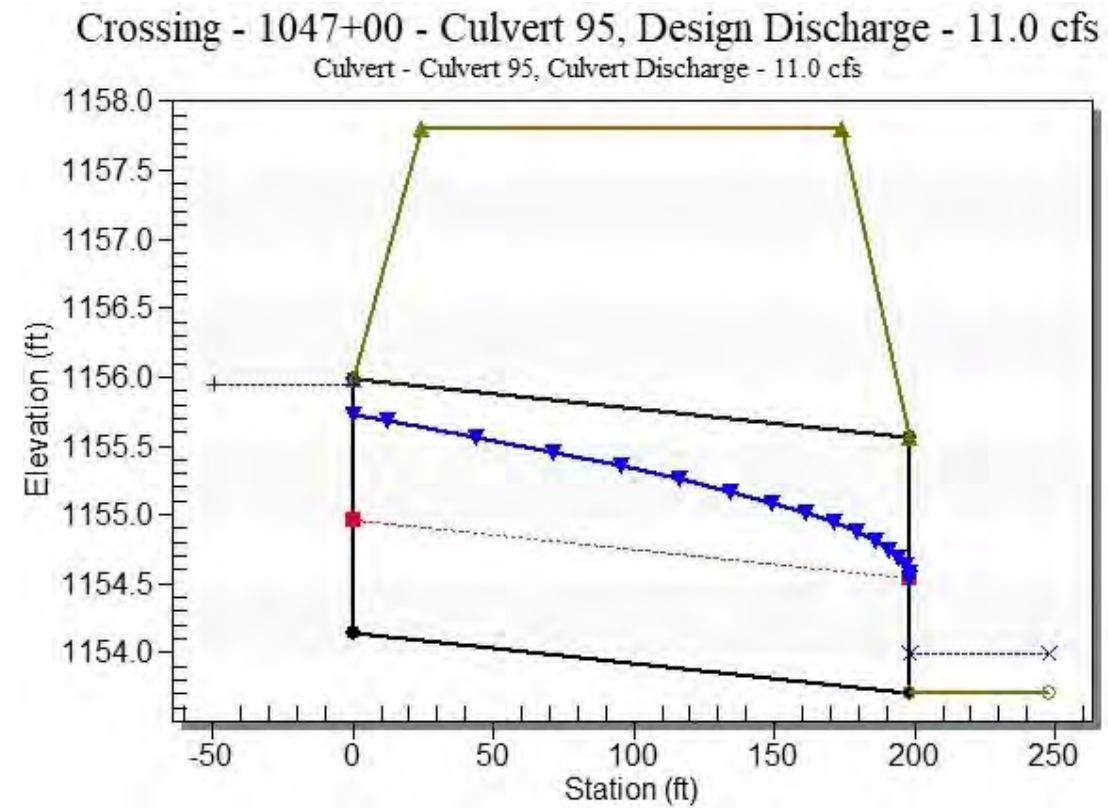
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1154.14	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.30	1.30	1154.60	0.392	0.456	2-M2c	0.405	0.243	0.243	0.076	2.511	1.116
2.60	2.60	1154.82	0.583	0.681	2-M2c	0.600	0.354	0.354	0.116	3.110	1.462
3.90	3.90	1155.02	0.741	0.878	2-M2c	0.775	0.443	0.443	0.147	3.540	1.713
5.20	5.20	1155.20	0.881	1.055	2-M2c	0.946	0.522	0.522	0.175	3.878	1.913
6.50	6.50	1155.36	1.010	1.221	2-M2c	1.126	0.600	0.600	0.200	4.126	2.084
7.80	7.80	1155.53	1.133	1.387	2-M2c	1.336	0.671	0.671	0.223	4.368	2.232
9.10	9.10	1155.69	1.248	1.550	2-M2c	1.850	0.736	0.736	0.244	4.604	2.366
10.40	10.40	1155.86	1.358	1.721	2-M2c	1.850	0.796	0.796	0.265	4.835	2.489
11.00	11.00	1155.94	1.407	1.804	2-M2c	1.850	0.822	0.822	0.274	4.941	2.541
13.00	13.00	1156.28	1.571	2.145	7-M2c	1.850	0.903	0.903	0.302	5.287	2.706

 Straight Culvert
 Inlet Elevation (invert): 1154.14 ft, Outlet Elevation (invert): 1153.71 ft
 Culvert Length: 198.50 ft, Culvert Slope: 0.0022

Culvert Performance Curve Plot: Culvert 95



Water Surface Profile Plot for Culvert: Culvert 95



Site Data - Culvert 95

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1154.14 ft
 Outlet Station: 198.50 ft
 Outlet Elevation: 1153.71 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 95

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1047+00 - Culvert 95)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1153.71	0.00	0.00	0.00	0.00
1.30	1153.79	0.08	1.12	0.01	0.72
2.60	1153.83	0.12	1.46	0.02	0.77
3.90	1153.86	0.15	1.71	0.03	0.80
5.20	1153.89	0.18	1.91	0.03	0.82
6.50	1153.91	0.20	2.08	0.04	0.84
7.80	1153.93	0.22	2.23	0.04	0.85
9.10	1153.95	0.24	2.37	0.05	0.86
10.40	1153.97	0.26	2.49	0.05	0.87
11.00	1153.98	0.27	2.54	0.05	0.88
13.00	1154.01	0.30	2.71	0.06	0.89

Tailwater Channel Data - 1047+00 - Culvert 95

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1153.71 ft

Roadway Data for Crossing: 1047+00 - Culvert 95

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1157.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 100

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 96 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1050+00 - Culvert 100

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 100 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1155.00	0.00	0.00	0.00	1
1156.53	9.60	9.60	0.00	1
1158.33	19.20	18.39	0.66	35
1158.41	28.80	18.68	9.94	6
1158.47	38.40	18.88	19.44	5
1158.52	48.00	18.99	28.88	4
1158.57	57.60	19.11	38.44	4
1158.60	67.20	19.25	47.79	3
1158.64	76.80	19.39	57.32	3
1158.64	77.00	19.39	57.50	2
1158.71	96.00	19.63	76.34	3
1158.31	18.33	18.33	0.00	Overtopping

Rating Curve Plot for Crossing: 1050+00 - Culvert 100

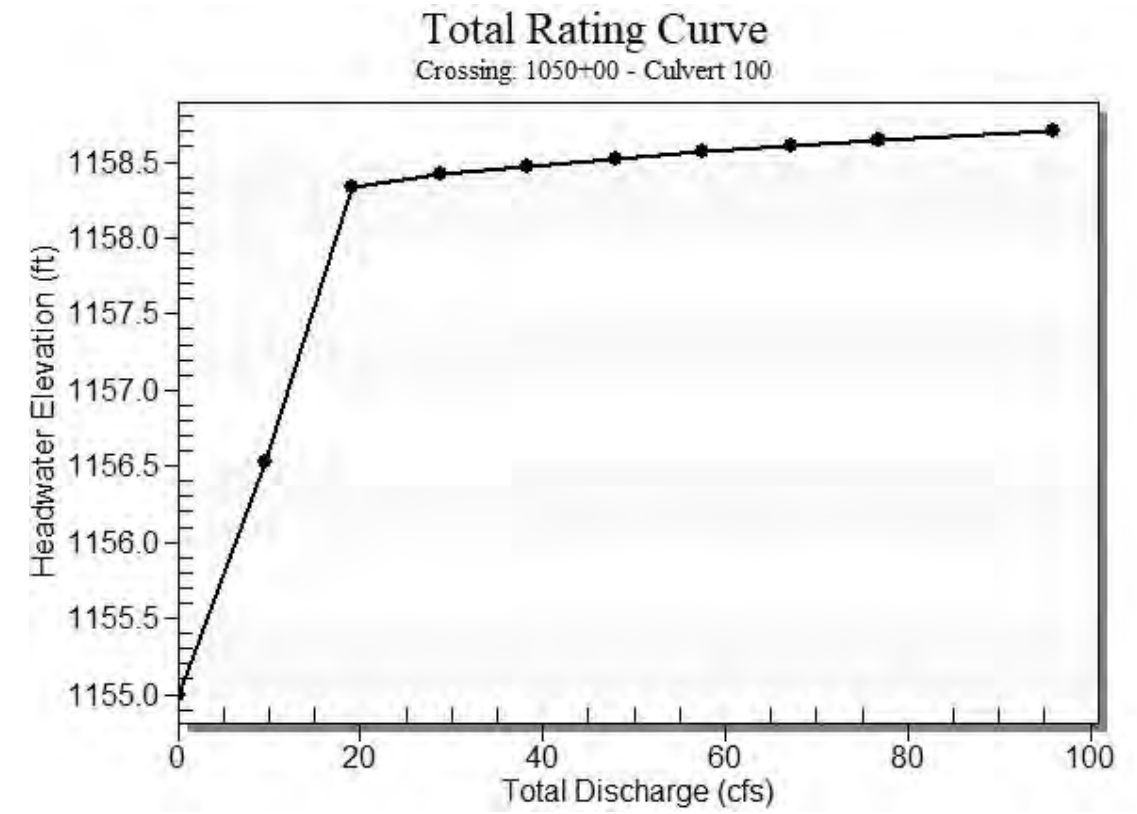
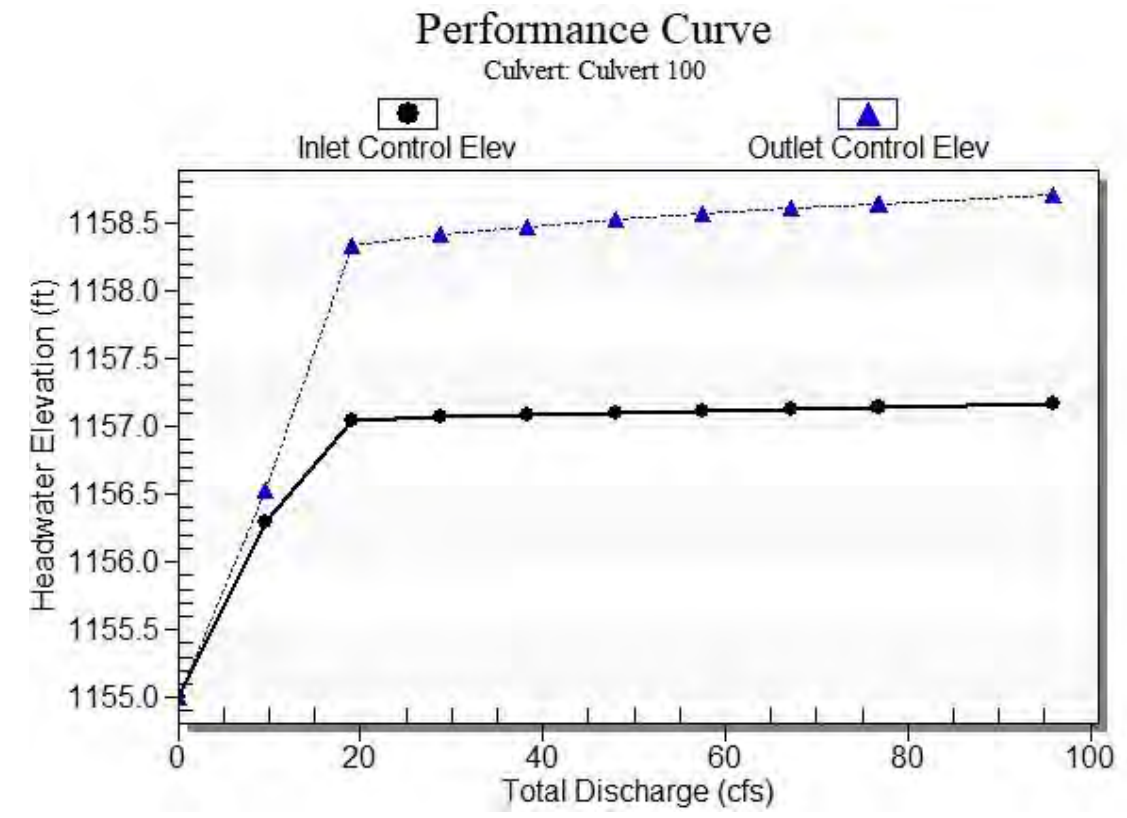


Table 2 - Culvert Summary Table: Culvert 100

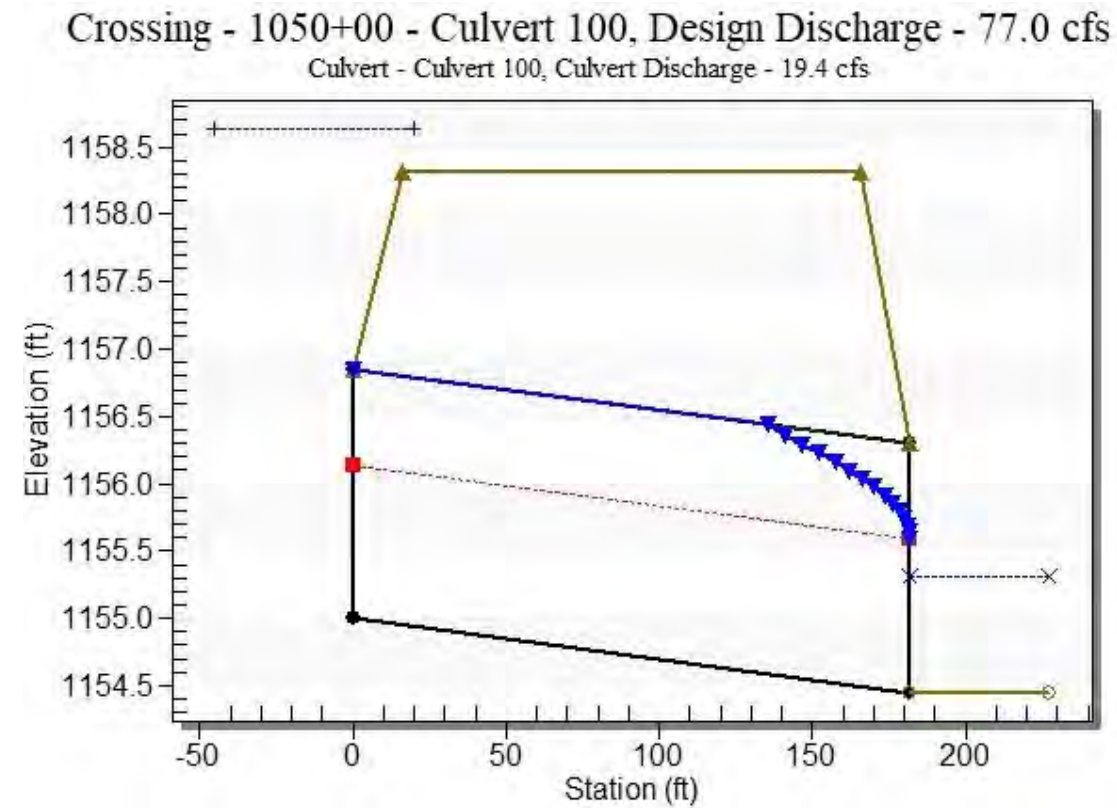
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1155.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
9.60	9.60	1156.53	1.290	1.529	2-M2c	1.401	0.759	0.759	0.252	4.694	2.414
19.20	18.39	1158.33	2.040	3.327	7-M2c	1.850	1.105	1.105	0.380	6.118	3.127
28.80	18.68	1158.41	2.068	3.414	7-M2c	1.850	1.115	1.115	0.483	6.161	3.624
38.40	18.88	1158.47	2.087	3.473	7-M2c	1.850	1.121	1.121	0.572	6.190	4.016
48.00	18.99	1158.52	2.098	3.532	7-M2c	1.850	1.125	1.125	0.652	6.207	4.343
57.60	19.11	1158.57	2.110	3.565	7-M2c	1.850	1.129	1.129	0.725	6.225	4.628
67.20	19.25	1158.60	2.124	3.604	7-M2c	1.850	1.134	1.134	0.792	6.246	4.880
76.80	19.39	1158.64	2.137	3.641	7-M2c	1.850	1.138	1.138	0.856	6.265	5.107
77.00	19.39	1158.64	2.138	3.642	7-M2c	1.850	1.139	1.139	0.857	6.266	5.111
96.00	19.63	1158.71	2.162	3.710	7-M2c	1.850	1.147	1.147	0.973	6.302	5.504

 Straight Culvert
 Inlet Elevation (invert): 1155.00 ft, Outlet Elevation (invert): 1154.45 ft
 Culvert Length: 182.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 100



Water Surface Profile Plot for Culvert: Culvert 100



Site Data - Culvert 100

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1155.00 ft
 Outlet Station: 182.00 ft
 Outlet Elevation: 1154.45 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 100

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1050+00 - Culvert 100)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1154.45	0.00	0.00	0.00	0.00
9.60	1154.70	0.25	2.41	0.05	0.87
19.20	1154.83	0.38	3.13	0.07	0.92
28.80	1154.93	0.48	3.62	0.09	0.96
38.40	1155.02	0.57	4.02	0.11	0.98
48.00	1155.10	0.65	4.34	0.12	1.00
57.60	1155.17	0.72	4.63	0.14	1.02
67.20	1155.24	0.79	4.88	0.15	1.03
76.80	1155.31	0.86	5.11	0.16	1.04
77.00	1155.31	0.86	5.11	0.16	1.04
96.00	1155.42	0.97	5.50	0.18	1.06

Tailwater Channel Data - 1050+00 - Culvert 100

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1154.45 ft

Roadway Data for Crossing: 1050+00 - Culvert 100

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1158.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 105

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 31 cfs

Maximum Flow: 38.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1061+00 - Culvert 105

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 105 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1155.50	0.00	0.00	0.00	1
1156.59	3.85	3.85	0.00	1
1157.12	7.70	7.70	0.00	1
1157.57	11.55	11.55	0.00	1
1158.03	15.40	15.40	0.00	1
1158.72	19.25	19.25	0.00	1
1159.34	23.10	21.82	1.17	28
1159.38	26.95	22.00	4.85	5
1159.41	30.80	22.13	8.58	4
1159.41	31.00	22.14	8.72	2
1159.45	38.50	22.34	16.13	4
1159.31	21.70	21.70	0.00	Overtopping

Rating Curve Plot for Crossing: 1061+00 - Culvert 105

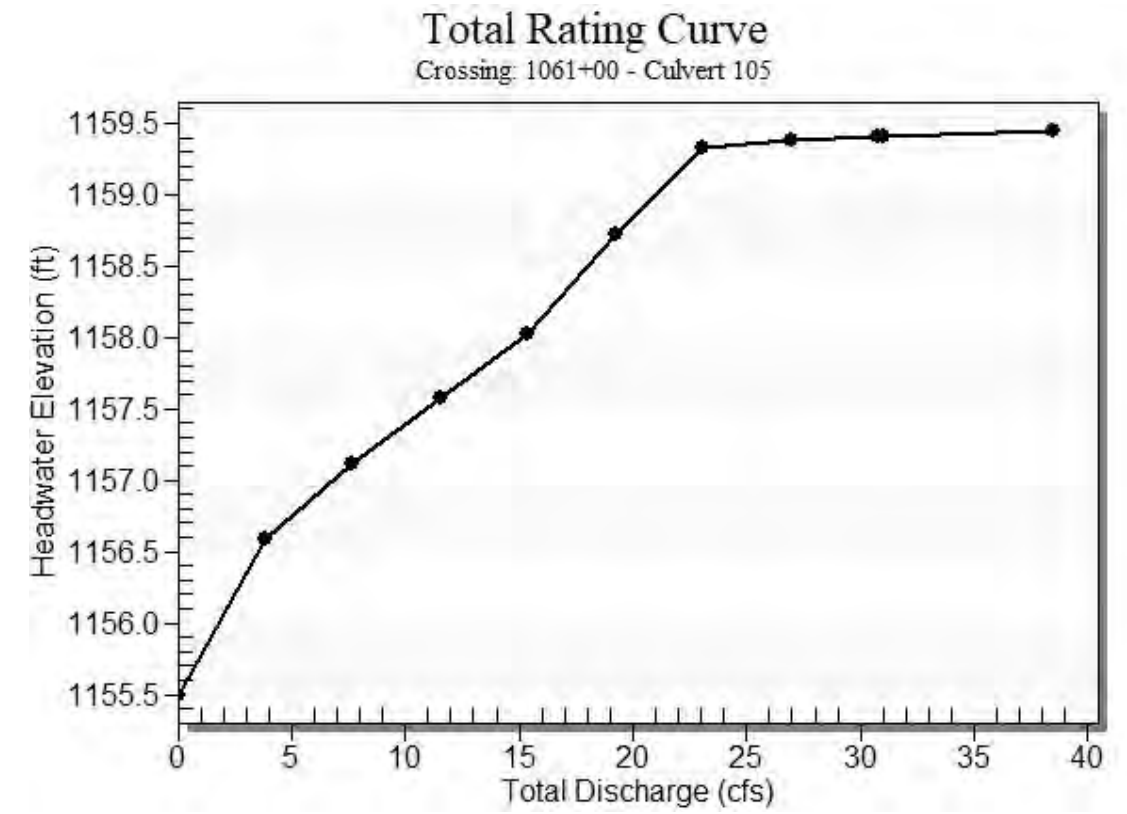
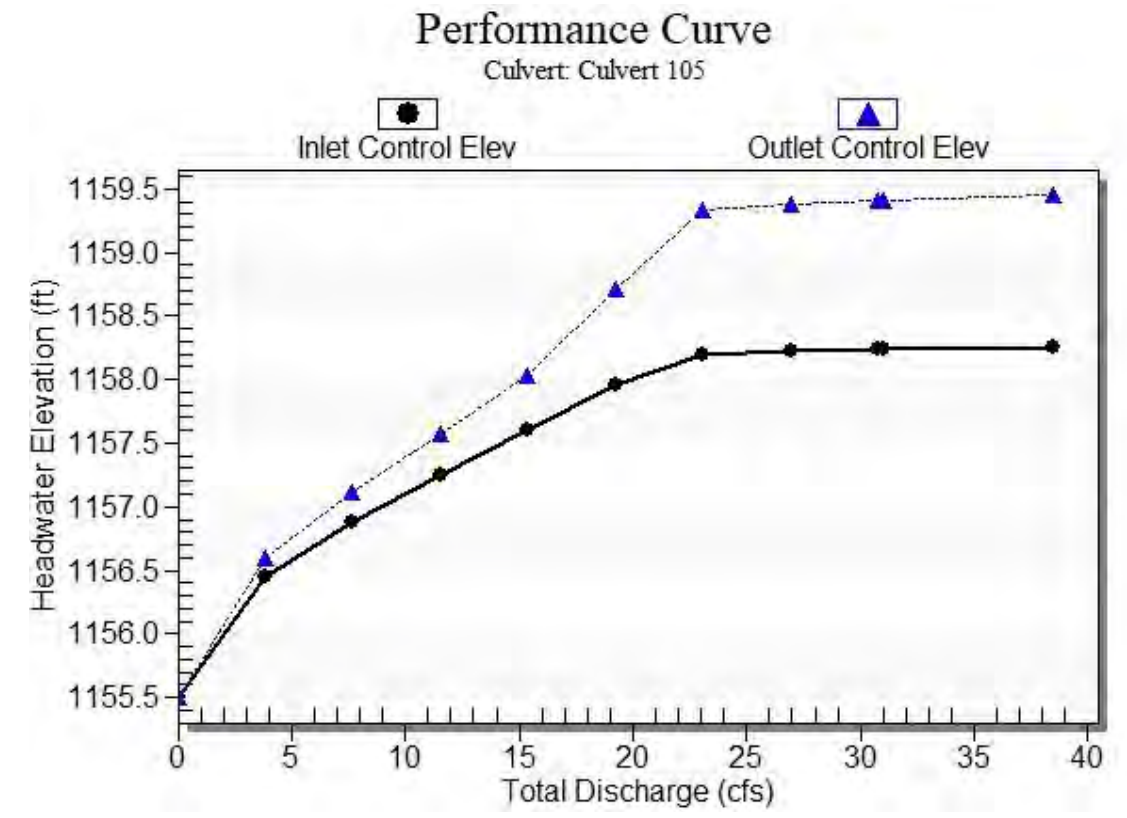


Table 2 - Culvert Summary Table: Culvert 105

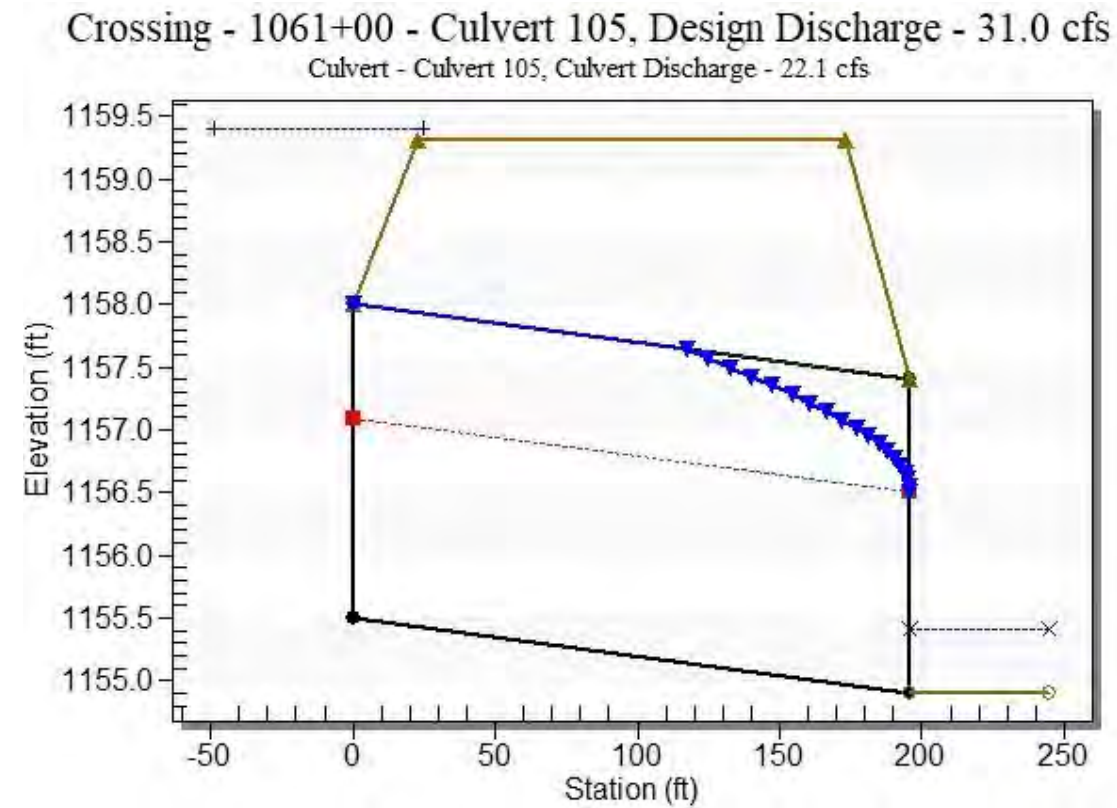
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1155.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.85	3.85	1156.59	0.952	1.093	2-M2c	0.939	0.642	0.642	0.146	3.860	1.704
7.70	7.70	1157.12	1.383	1.619	2-M2c	1.403	0.918	0.918	0.221	4.709	2.222
11.55	11.55	1157.57	1.752	2.069	2-M2c	1.888	1.139	1.139	0.282	5.305	2.588
15.40	15.40	1158.03	2.100	2.526	7-M2c	2.500	1.322	1.322	0.334	5.846	2.882
19.25	19.25	1158.72	2.453	3.217	7-M2c	2.500	1.484	1.484	0.381	6.343	3.130
23.10	21.82	1159.34	2.701	3.835	7-M2c	2.500	1.585	1.585	0.424	6.647	3.345
26.95	22.00	1159.38	2.719	3.875	7-M2c	2.500	1.592	1.592	0.465	6.670	3.538
30.80	22.13	1159.41	2.732	3.904	7-M2c	2.500	1.597	1.597	0.503	6.686	3.712
31.00	22.14	1159.41	2.733	3.905	7-M2c	2.500	1.597	1.597	0.505	6.687	3.720
38.50	22.34	1159.45	2.753	3.954	7-M2c	2.500	1.604	1.604	0.573	6.711	4.019

 Straight Culvert
 Inlet Elevation (invert): 1155.50 ft, Outlet Elevation (invert): 1154.91 ft
 Culvert Length: 196.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 105



Water Surface Profile Plot for Culvert: Culvert 105



Site Data - Culvert 105

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1155.50 ft
 Outlet Station: 196.00 ft
 Outlet Elevation: 1154.91 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 105

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1061+00 - Culvert 105)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1154.91	0.00	0.00	0.00	0.00
3.85	1155.06	0.15	1.70	0.03	0.80
7.70	1155.13	0.22	2.22	0.04	0.85
11.55	1155.19	0.28	2.59	0.05	0.88
15.40	1155.24	0.33	2.88	0.06	0.91
19.25	1155.29	0.38	3.13	0.07	0.92
23.10	1155.33	0.42	3.35	0.08	0.94
26.95	1155.37	0.46	3.54	0.09	0.95
30.80	1155.41	0.50	3.71	0.09	0.96
31.00	1155.41	0.50	3.72	0.09	0.96
38.50	1155.48	0.57	4.02	0.11	0.98

Tailwater Channel Data - 1061+00 - Culvert 105

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1154.91 ft

Roadway Data for Crossing: 1061+00 - Culvert 105

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1159.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 110

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 31 cfs

Maximum Flow: 38.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1064+00 - Culvert 110

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 110 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1155.80	0.00	0.00	0.00	1
1156.89	3.85	3.85	0.00	1
1157.42	7.70	7.70	0.00	1
1157.87	11.55	11.55	0.00	1
1158.33	15.40	15.40	0.00	1
1159.01	19.25	19.25	0.00	1
1159.35	23.10	20.73	2.28	16
1159.38	26.95	20.90	5.88	4
1159.41	30.80	21.02	9.71	4
1159.41	31.00	21.02	9.86	2
1159.46	38.50	21.21	17.12	3
1159.31	20.54	20.54	0.00	Overtopping

Rating Curve Plot for Crossing: 1064+00 - Culvert 110

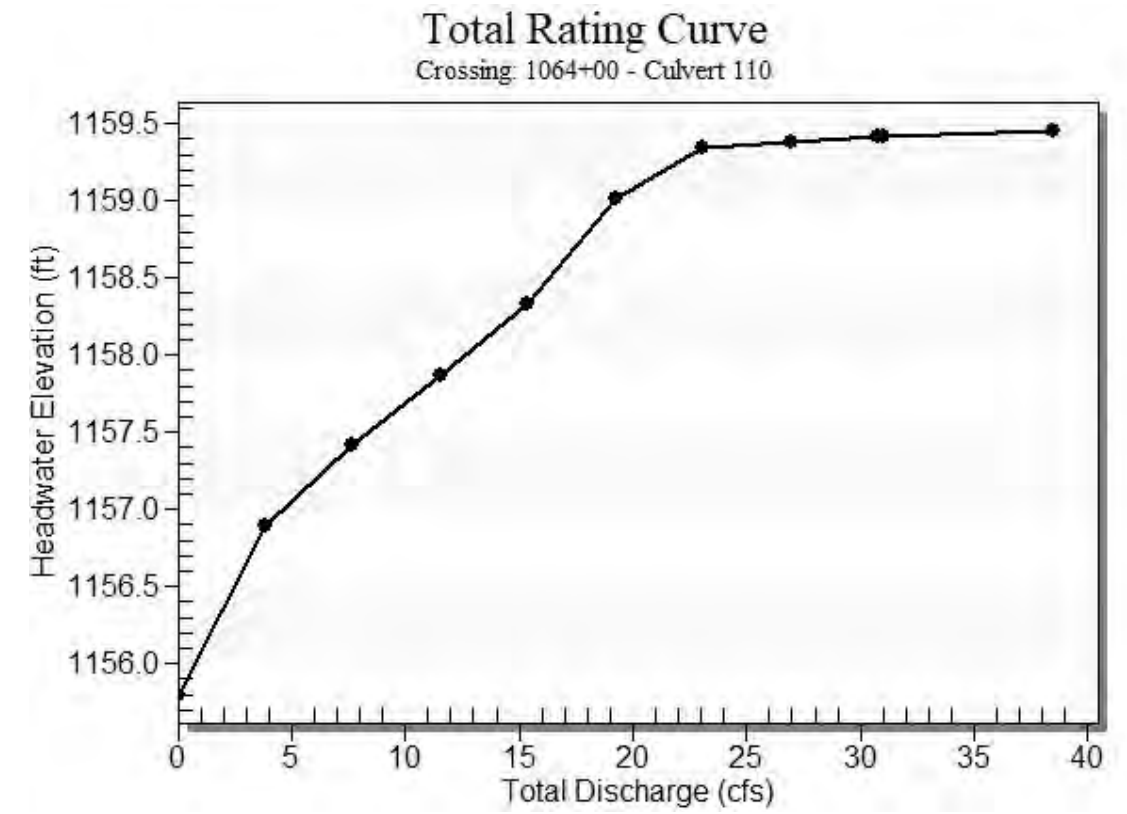
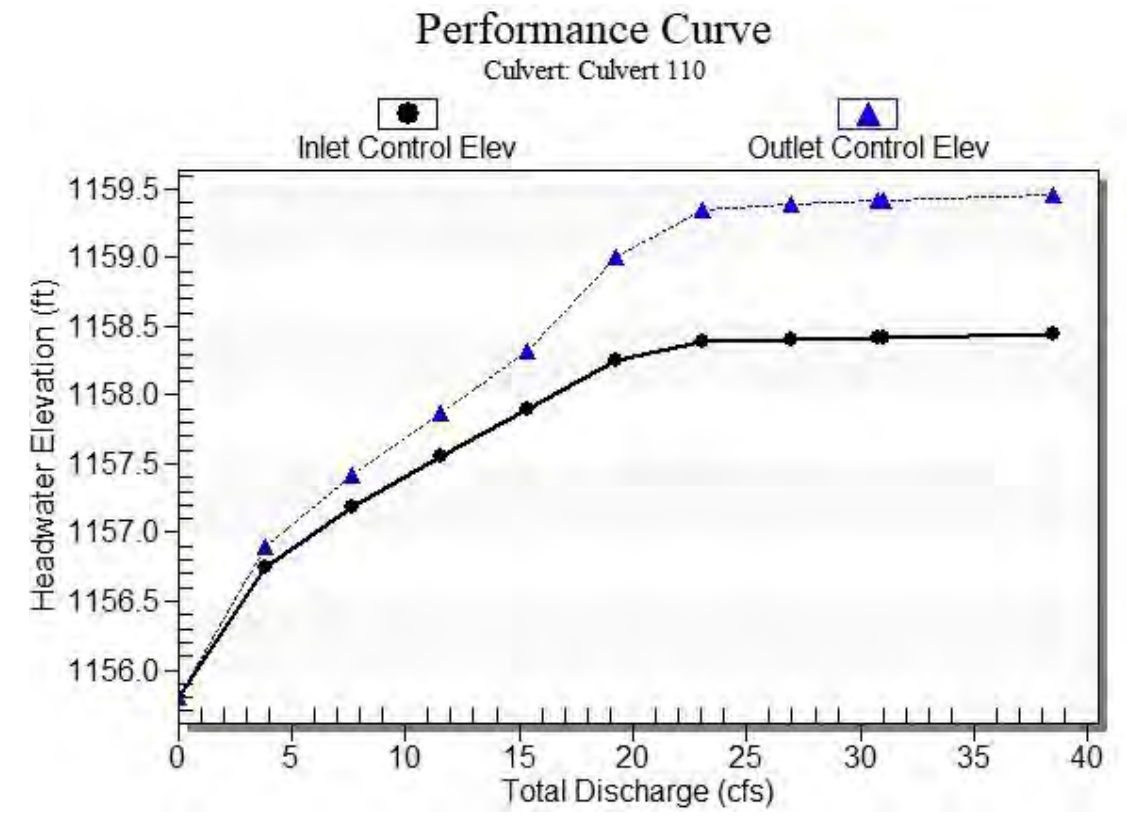


Table 2 - Culvert Summary Table: Culvert 110

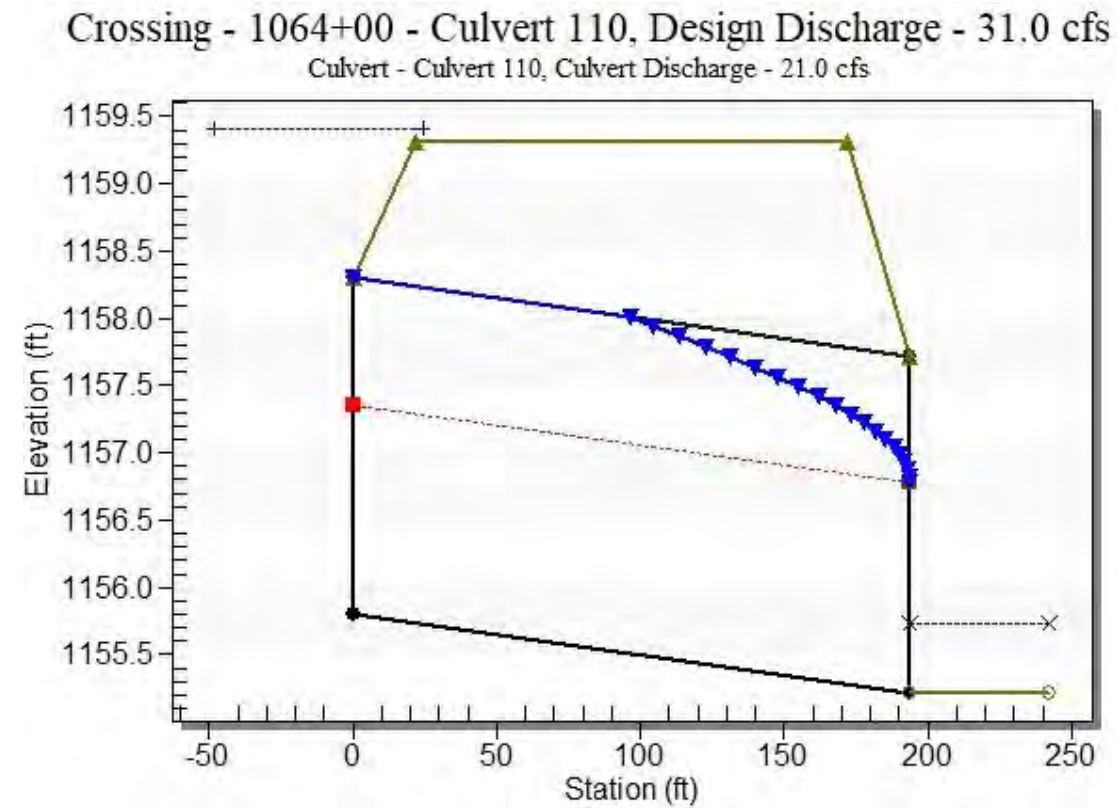
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1155.80	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.85	3.85	1156.89	0.952	1.094	2-M2c	0.941	0.642	0.642	0.146	3.860	1.704
7.70	7.70	1157.42	1.383	1.620	2-M2c	1.406	0.918	0.918	0.221	4.709	2.222
11.55	11.55	1157.87	1.752	2.070	2-M2c	1.894	1.139	1.139	0.282	5.305	2.588
15.40	15.40	1158.33	2.100	2.525	7-M2c	2.500	1.322	1.322	0.334	5.846	2.882
19.25	19.25	1159.01	2.453	3.213	7-M2c	2.500	1.484	1.484	0.381	6.343	3.130
23.10	20.73	1159.35	2.595	3.549	7-M2c	2.500	1.544	1.544	0.424	6.513	3.345
26.95	20.90	1159.38	2.610	3.584	7-M2c	2.500	1.550	1.550	0.465	6.533	3.538
30.80	21.02	1159.41	2.622	3.613	7-M2c	2.500	1.555	1.555	0.503	6.548	3.712
31.00	21.02	1159.41	2.622	3.614	7-M2c	2.500	1.555	1.555	0.505	6.549	3.720
38.50	21.21	1159.46	2.641	3.660	7-M2c	2.500	1.562	1.562	0.573	6.572	4.019

 Straight Culvert
 Inlet Elevation (invert): 1155.80 ft, Outlet Elevation (invert): 1155.22 ft
 Culvert Length: 194.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 110



Water Surface Profile Plot for Culvert: Culvert 110



Site Data - Culvert 110

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1155.80 ft
 Outlet Station: 194.00 ft
 Outlet Elevation: 1155.22 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 110

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1064+00 - Culvert 110)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1155.22	0.00	0.00	0.00	0.00
3.85	1155.37	0.15	1.70	0.03	0.80
7.70	1155.44	0.22	2.22	0.04	0.85
11.55	1155.50	0.28	2.59	0.05	0.88
15.40	1155.55	0.33	2.88	0.06	0.91
19.25	1155.60	0.38	3.13	0.07	0.92
23.10	1155.64	0.42	3.35	0.08	0.94
26.95	1155.68	0.46	3.54	0.09	0.95
30.80	1155.72	0.50	3.71	0.09	0.96
31.00	1155.72	0.50	3.72	0.09	0.96
38.50	1155.79	0.57	4.02	0.11	0.98

Tailwater Channel Data - 1064+00 - Culvert 110

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1155.22 ft

Roadway Data for Crossing: 1064+00 - Culvert 110

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1159.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 115

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 87 cfs

Maximum Flow: 107 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1070+00 - Culvert 115

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 115 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1155.20	0.00	0.00	0.00	1
1157.18	10.70	10.70	0.00	1
1158.98	21.40	21.40	0.00	1
1159.90	32.10	24.70	7.35	8
1159.96	42.80	24.96	17.70	5
1160.02	53.50	25.15	28.17	4
1160.07	64.20	25.32	38.81	4
1160.11	74.90	25.47	49.22	3
1160.15	85.60	25.60	59.87	3
1160.16	87.00	25.62	61.13	2
1160.23	107.00	25.78	81.17	3
1159.81	24.37	24.37	0.00	Overtopping

Rating Curve Plot for Crossing: 1070+00 - Culvert 115

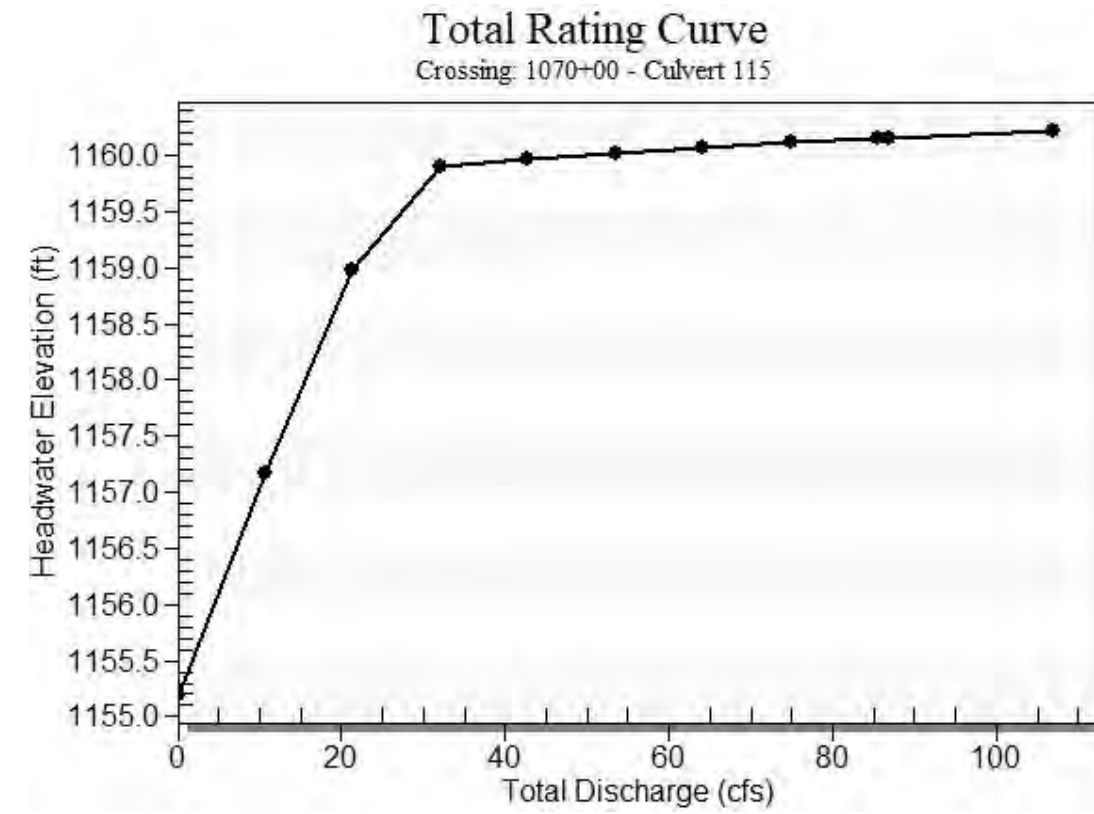
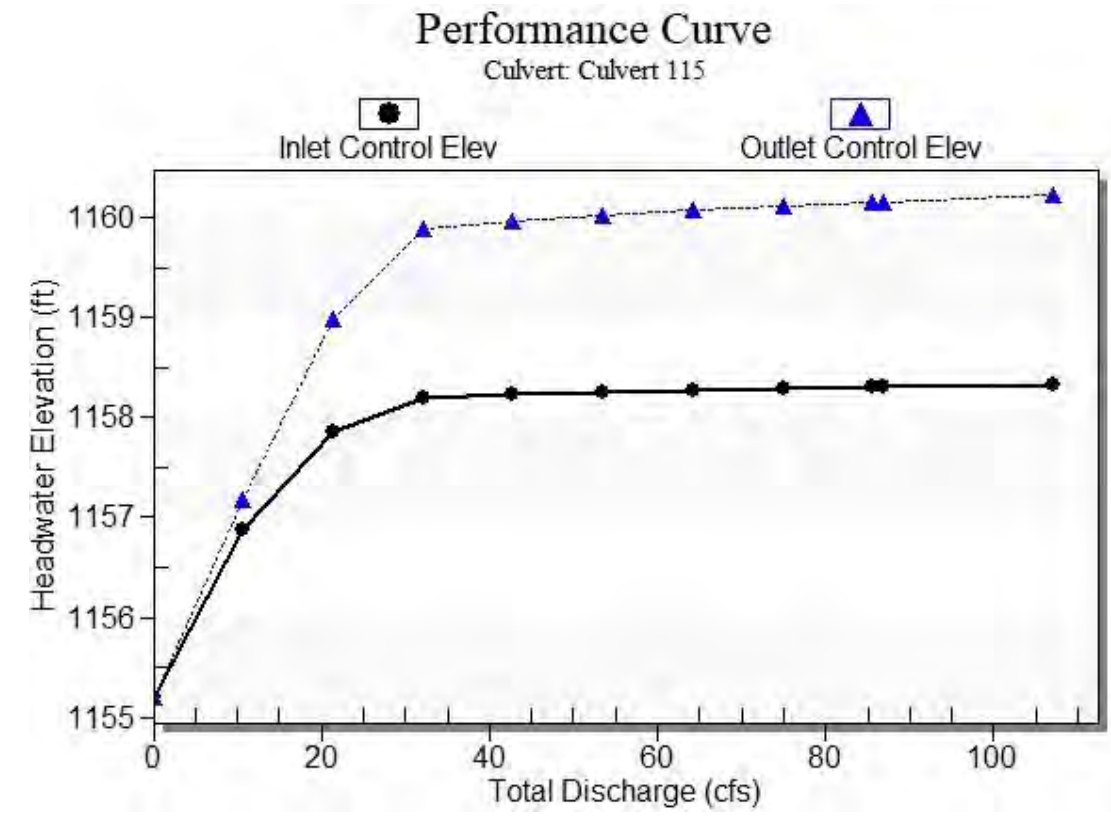


Table 2 - Culvert Summary Table: Culvert 115

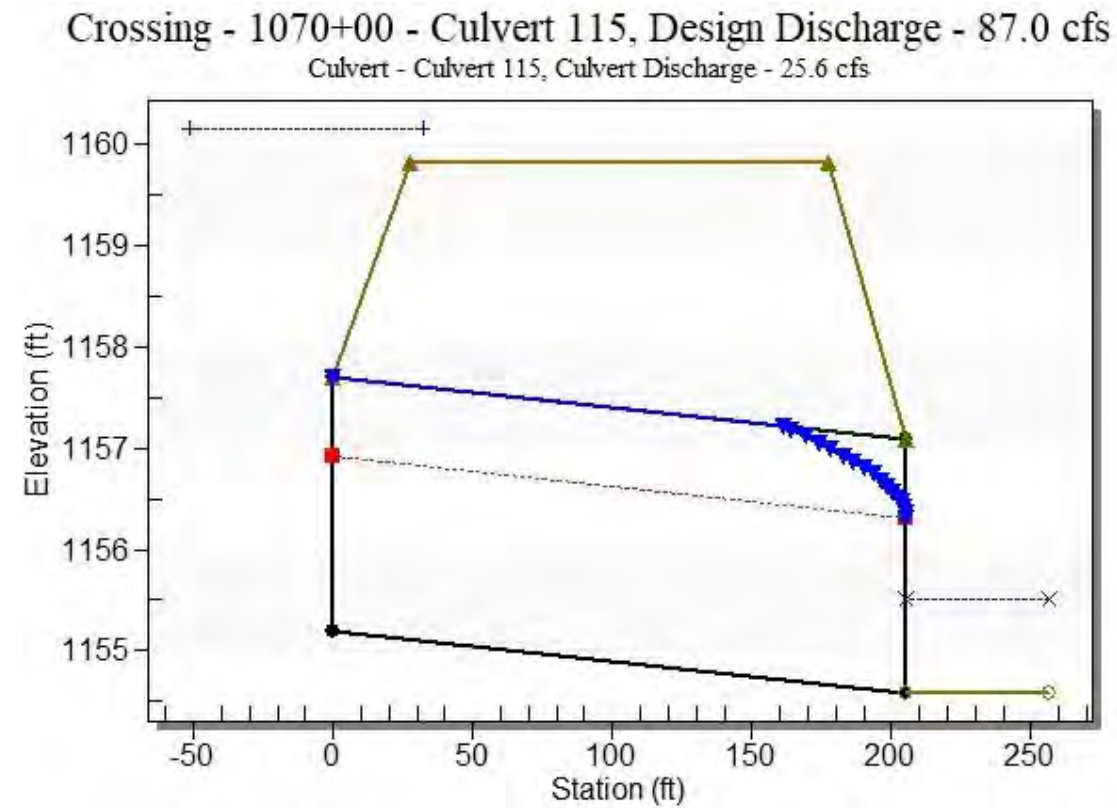
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1155.20	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.70	10.70	1157.18	1.673	1.977	2-M2c	1.776	1.093	1.093	0.269	5.184	2.516
21.40	21.40	1158.98	2.660	3.778	7-M2c	2.500	1.570	1.570	0.406	6.596	3.253
32.10	24.70	1159.90	2.999	4.696	7-M2c	2.500	1.689	1.689	0.515	7.001	3.767
42.80	24.96	1159.96	3.027	4.763	7-M2c	2.500	1.698	1.698	0.610	7.033	4.172
53.50	25.15	1160.02	3.048	4.818	7-M2c	2.500	1.704	1.704	0.694	7.057	4.511
64.20	25.32	1160.07	3.066	4.867	7-M2c	2.500	1.710	1.710	0.772	7.077	4.804
74.90	25.47	1160.11	3.082	4.910	7-M2c	2.500	1.715	1.715	0.844	7.095	5.064
85.60	25.60	1160.15	3.098	4.951	7-M2c	2.500	1.720	1.720	0.911	7.112	5.297
87.00	25.62	1160.16	3.099	4.956	7-M2c	2.500	1.720	1.720	0.920	7.114	5.326
107.00	25.78	1160.23	3.117	5.028	7-M2c	2.500	1.725	1.725	1.036	7.133	5.706

 Straight Culvert
 Inlet Elevation (invert): 1155.20 ft, Outlet Elevation (invert): 1154.59 ft
 Culvert Length: 205.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 115



Water Surface Profile Plot for Culvert: Culvert 115



Site Data - Culvert 115

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1155.20 ft
 Outlet Station: 205.00 ft
 Outlet Elevation: 1154.59 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 115

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1070+00 - Culvert 115)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1154.59	0.00	0.00	0.00	0.00
10.70	1154.86	0.27	2.52	0.05	0.88
21.40	1155.00	0.41	3.25	0.08	0.93
32.10	1155.11	0.52	3.77	0.10	0.97
42.80	1155.20	0.61	4.17	0.11	0.99
53.50	1155.28	0.69	4.51	0.13	1.01
64.20	1155.36	0.77	4.80	0.14	1.03
74.90	1155.43	0.84	5.06	0.16	1.04
85.60	1155.50	0.91	5.30	0.17	1.05
87.00	1155.51	0.92	5.33	0.17	1.05
107.00	1155.63	1.04	5.71	0.19	1.07

Tailwater Channel Data - 1070+00 - Culvert 115

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1154.59 ft

Roadway Data for Crossing: 1070+00 - Culvert 115

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1159.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 120

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 33 cfs

Maximum Flow: 39 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1077+00 - Culvert 120

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 120 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1156.00	0.00	0.00	0.00	1
1157.10	3.90	3.90	0.00	1
1157.63	7.80	7.80	0.00	1
1158.09	11.70	11.70	0.00	1
1158.55	15.60	15.60	0.00	1
1159.28	19.50	19.50	0.00	1
1160.26	23.40	23.40	0.00	1
1160.36	27.30	23.77	3.35	7
1160.39	31.20	23.90	7.16	4
1160.41	33.00	23.94	8.90	3
1160.45	39.00	24.08	14.88	4
1160.31	23.59	23.59	0.00	Overtopping

Rating Curve Plot for Crossing: 1077+00 - Culvert 120

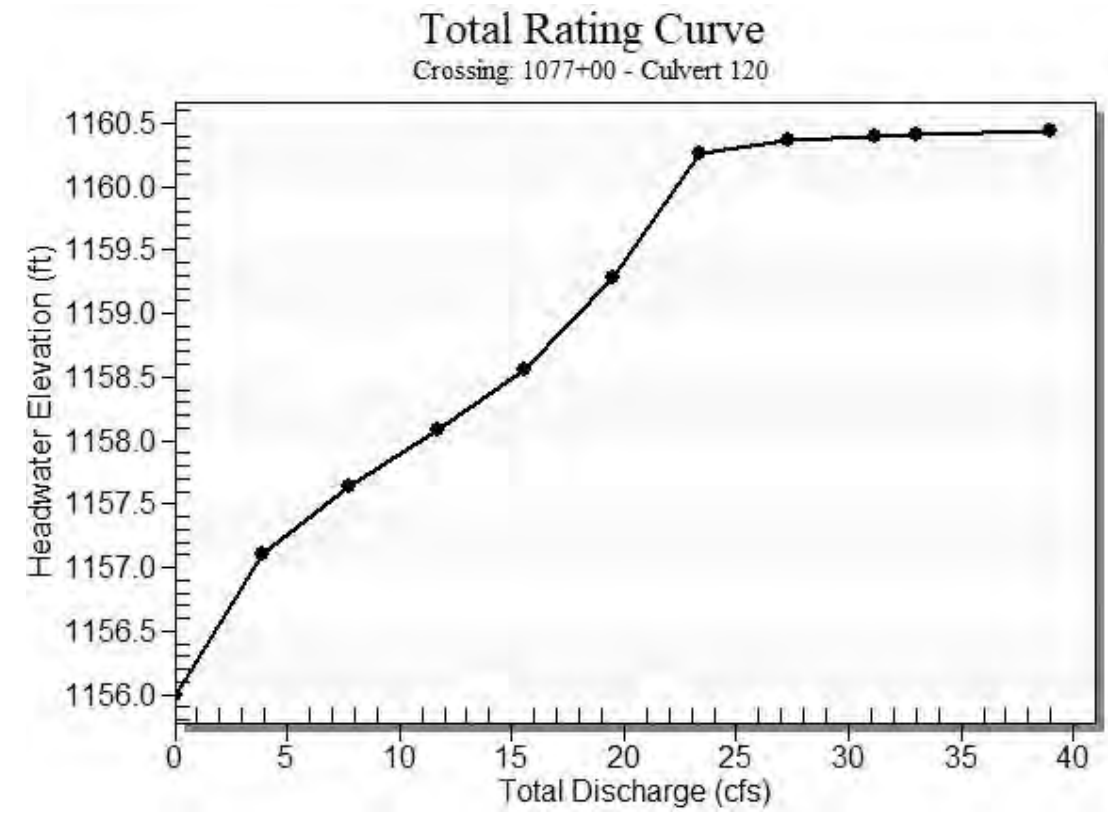
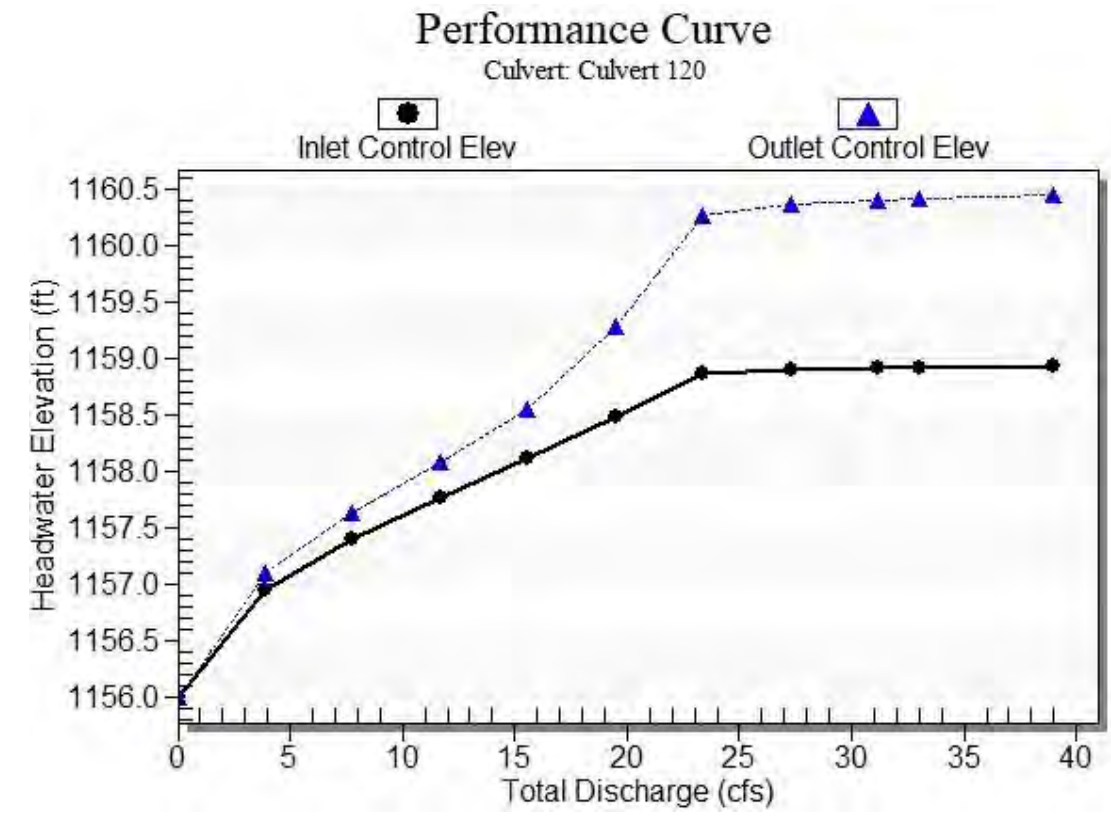


Table 2 - Culvert Summary Table: Culvert 120

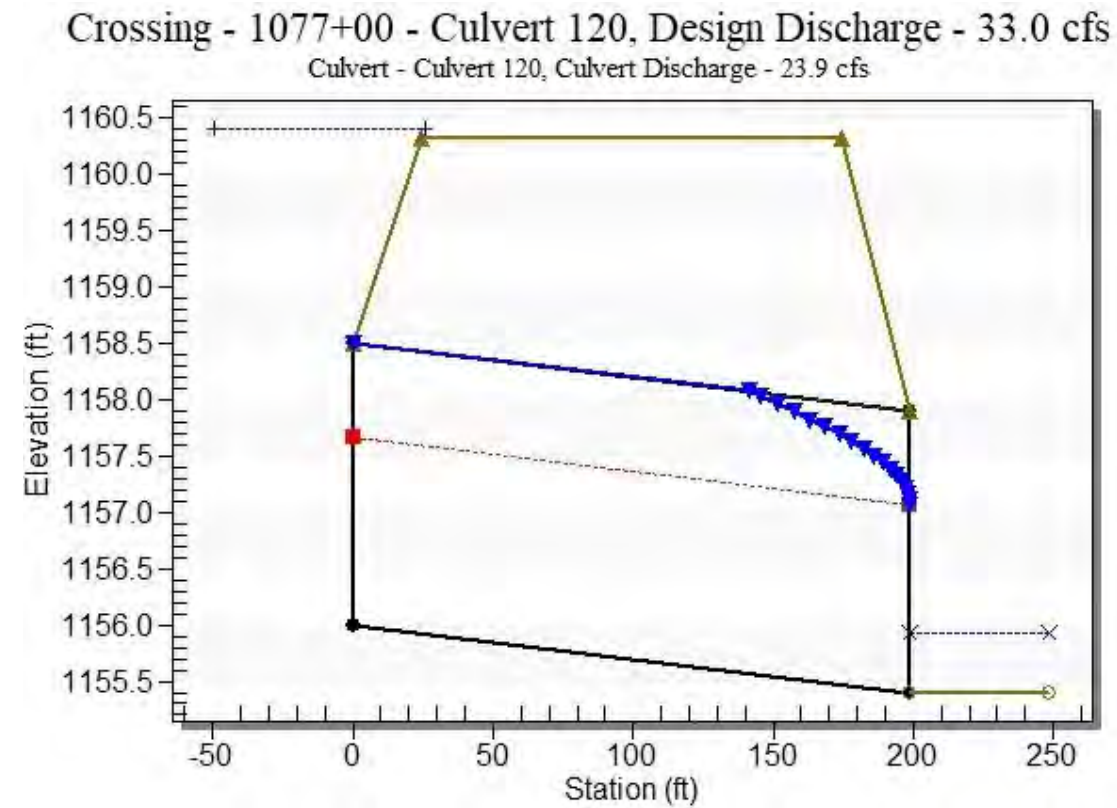
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1156.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.90	3.90	1157.10	0.958	1.101	2-M2c	0.945	0.647	0.647	0.147	3.873	1.713
7.80	7.80	1157.63	1.393	1.632	2-M2c	1.414	0.925	0.925	0.223	4.726	2.232
11.70	11.70	1158.09	1.765	2.087	2-M2c	1.909	1.147	1.147	0.284	5.327	2.602
15.60	15.60	1158.55	2.118	2.554	7-M2c	2.500	1.331	1.331	0.337	5.874	2.895
19.50	19.50	1159.28	2.476	3.278	7-M2c	2.500	1.493	1.493	0.384	6.375	3.144
23.40	23.40	1160.26	2.861	4.265	7-M2c	2.500	1.643	1.643	0.428	6.842	3.360
27.30	23.77	1160.36	2.900	4.361	7-M2c	2.500	1.656	1.656	0.468	6.888	3.554
31.20	23.90	1160.39	2.913	4.394	7-M2c	2.500	1.661	1.661	0.507	6.902	3.729
33.00	23.94	1160.41	2.918	4.407	7-M2c	2.500	1.662	1.662	0.524	6.908	3.804
39.00	24.08	1160.45	2.933	4.447	7-M2c	2.500	1.667	1.667	0.577	6.926	4.038

 Straight Culvert
 Inlet Elevation (invert): 1156.00 ft, Outlet Elevation (invert): 1155.40 ft
 Culvert Length: 199.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 120



Water Surface Profile Plot for Culvert: Culvert 120



Site Data - Culvert 120

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1156.00 ft
 Outlet Station: 199.00 ft
 Outlet Elevation: 1155.40 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 120

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1077+00 - Culvert 120)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1155.40	0.00	0.00	0.00	0.00
3.90	1155.55	0.15	1.71	0.03	0.80
7.80	1155.62	0.22	2.23	0.04	0.85
11.70	1155.68	0.28	2.60	0.05	0.88
15.60	1155.74	0.34	2.90	0.06	0.91
19.50	1155.78	0.38	3.14	0.07	0.93
23.40	1155.83	0.43	3.36	0.08	0.94
27.30	1155.87	0.47	3.55	0.09	0.95
31.20	1155.91	0.51	3.73	0.09	0.96
33.00	1155.92	0.52	3.80	0.10	0.97
39.00	1155.98	0.58	4.04	0.11	0.98

Tailwater Channel Data - 1077+00 - Culvert 120

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1155.40 ft

Roadway Data for Crossing: 1077+00 - Culvert 120

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1160.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 125

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 89 cfs

Maximum Flow: 109 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1083+00 - Culvert 125

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 125 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1156.50	0.00	0.00	0.00	1
1158.49	10.90	10.90	0.00	1
1160.35	21.80	21.80	0.00	1
1160.91	32.70	23.94	8.64	14
1160.97	43.60	24.18	19.30	5
1161.03	54.50	24.31	30.01	4
1161.08	65.40	24.48	40.85	4
1161.12	76.30	24.65	51.45	3
1161.16	87.20	24.82	62.27	3
1161.17	89.00	24.84	63.89	2
1161.24	109.00	25.10	83.86	3
1160.81	23.58	23.58	0.00	Overtopping

Rating Curve Plot for Crossing: 1083+00 - Culvert 125

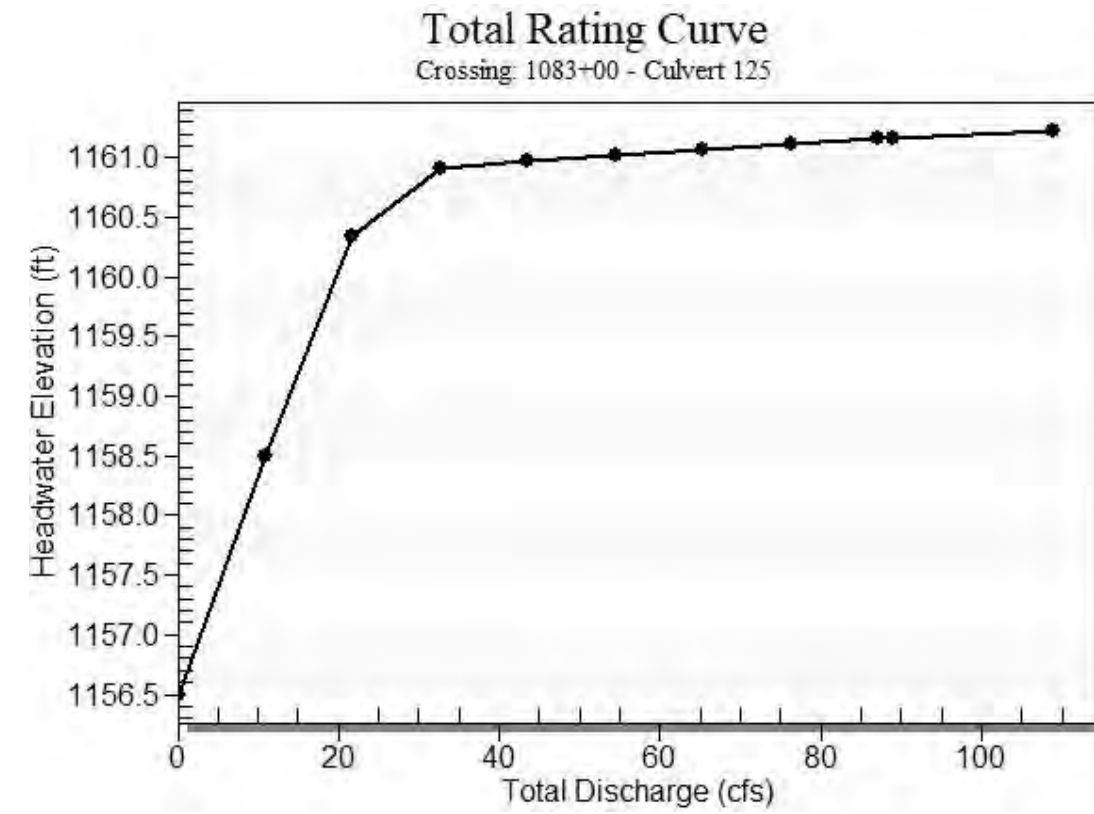
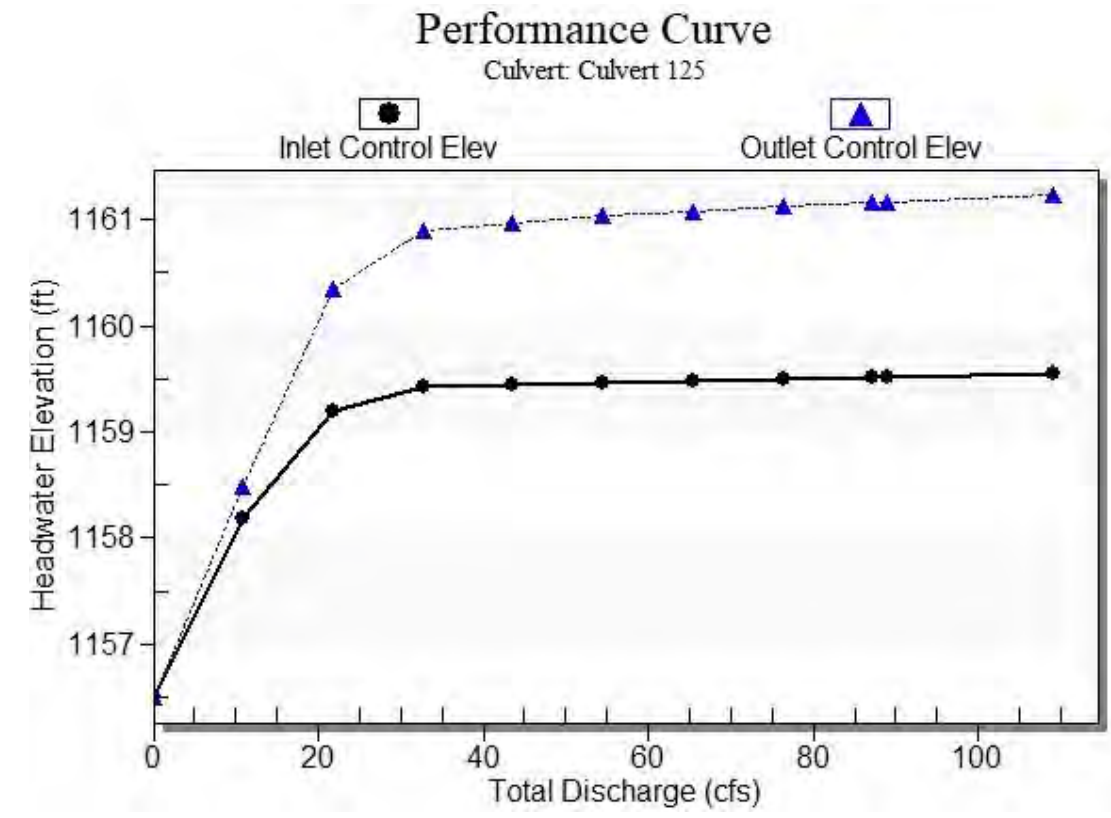


Table 2 - Culvert Summary Table: Culvert 125

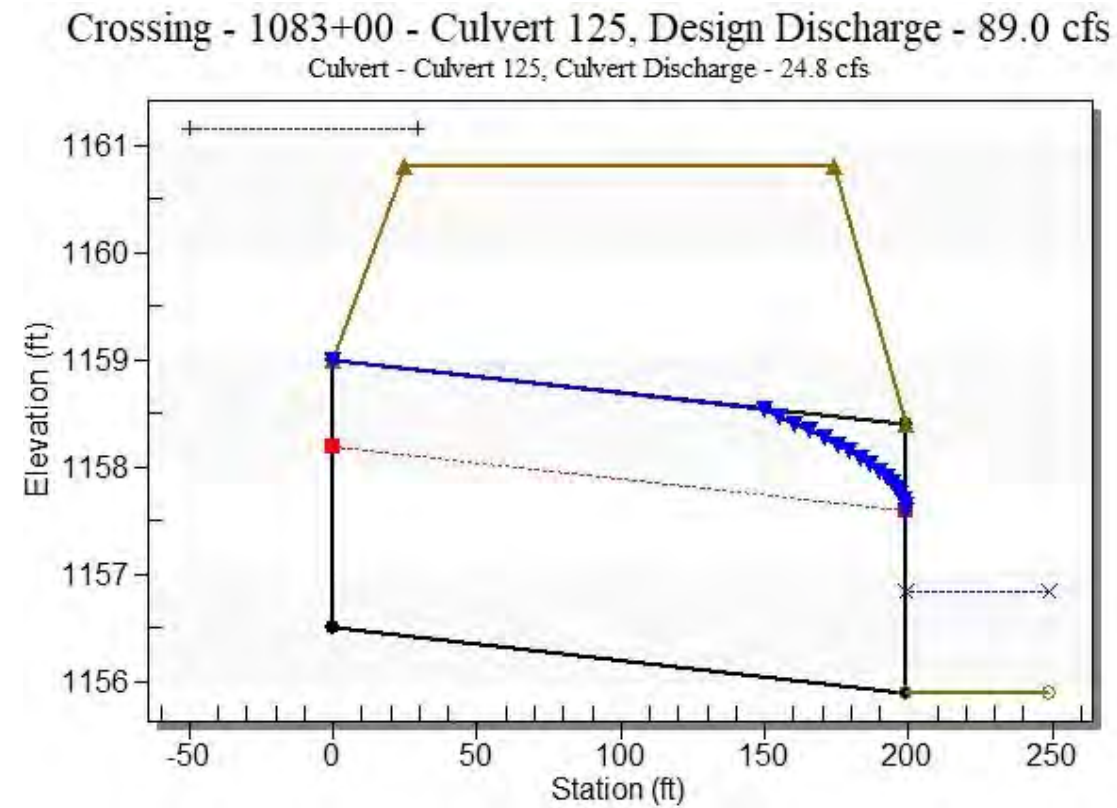
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1156.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.90	10.90	1158.49	1.691	1.994	2-M2c	1.793	1.104	1.104	0.272	5.213	2.533
21.80	21.80	1160.35	2.699	3.850	7-M2c	2.500	1.585	1.585	0.410	6.645	3.275
32.70	23.94	1160.91	2.917	4.405	7-M2c	2.500	1.662	1.662	0.521	6.907	3.792
43.60	24.18	1160.97	2.943	4.472	7-M2c	2.500	1.670	1.670	0.616	6.937	4.200
54.50	24.31	1161.03	2.957	4.534	7-M2c	2.500	1.675	1.675	0.702	6.953	4.540
65.40	24.48	1161.08	2.975	4.576	7-M2c	2.500	1.681	1.681	0.780	6.974	4.835
76.30	24.65	1161.12	2.994	4.619	7-M2c	2.500	1.687	1.687	0.853	6.995	5.096
87.20	24.82	1161.16	3.011	4.660	7-M2c	2.500	1.693	1.693	0.921	7.015	5.330
89.00	24.84	1161.17	3.014	4.666	7-M2c	2.500	1.693	1.693	0.932	7.018	5.367
109.00	25.10	1161.24	3.042	4.736	7-M2c	2.500	1.702	1.702	1.047	7.050	5.741

 Straight Culvert
 Inlet Elevation (invert): 1156.50 ft, Outlet Elevation (invert): 1155.90 ft
 Culvert Length: 199.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 125



Water Surface Profile Plot for Culvert: Culvert 125



Site Data - Culvert 125

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1156.50 ft
 Outlet Station: 199.00 ft
 Outlet Elevation: 1155.90 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 125

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1083+00 - Culvert 125)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1155.90	0.00	0.00	0.00	0.00
10.90	1156.17	0.27	2.53	0.05	0.88
21.80	1156.31	0.41	3.27	0.08	0.93
32.70	1156.42	0.52	3.79	0.10	0.97
43.60	1156.52	0.62	4.20	0.12	0.99
54.50	1156.60	0.70	4.54	0.13	1.01
65.40	1156.68	0.78	4.83	0.15	1.03
76.30	1156.75	0.85	5.10	0.16	1.04
87.20	1156.82	0.92	5.33	0.17	1.05
89.00	1156.83	0.93	5.37	0.17	1.05
109.00	1156.95	1.05	5.74	0.20	1.07

Tailwater Channel Data - 1083+00 - Culvert 125

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1155.90 ft

Roadway Data for Crossing: 1083+00 - Culvert 125

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1160.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 130

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 38.5 cfs

Maximum Flow: 47.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1093+00 - Culvert 130

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 130 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1158.00	0.00	0.00	0.00	1
1159.23	4.75	4.75	0.00	1
1159.83	9.50	9.50	0.00	1
1160.39	14.25	14.25	0.00	1
1161.15	19.00	19.00	0.00	1
1161.36	23.75	19.92	3.74	11
1161.40	28.50	20.08	8.24	4
1161.43	33.25	20.22	12.96	4
1161.46	38.00	20.33	17.50	3
1161.47	38.50	20.33	18.12	3
1161.51	47.50	20.47	26.92	3
1161.31	19.68	19.68	0.00	Overtopping

Rating Curve Plot for Crossing: 1093+00 - Culvert 130

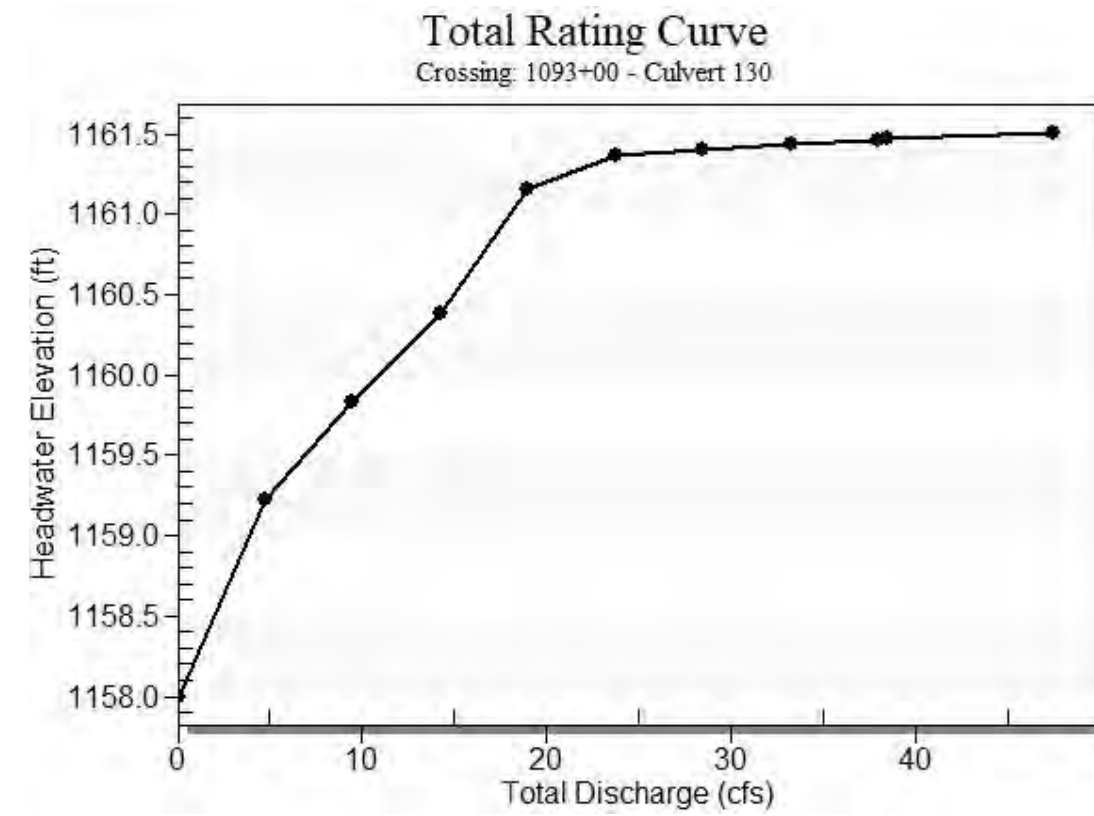
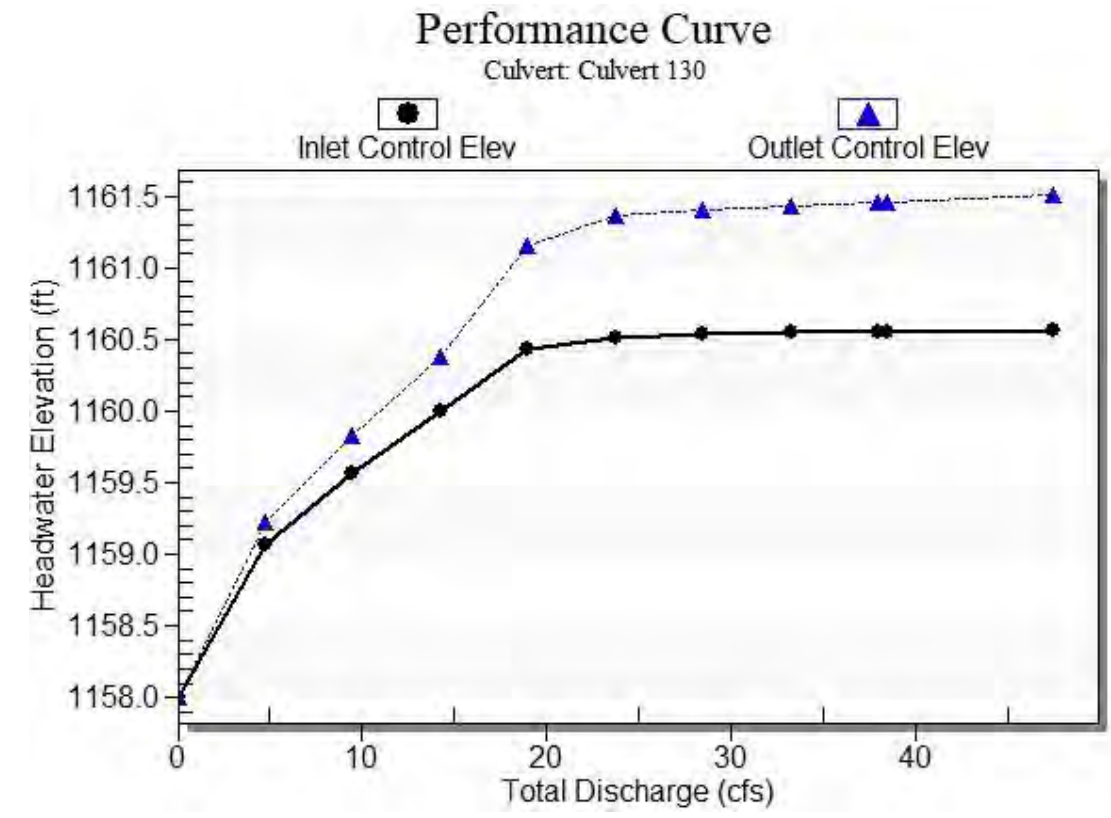


Table 2 - Culvert Summary Table: Culvert 130

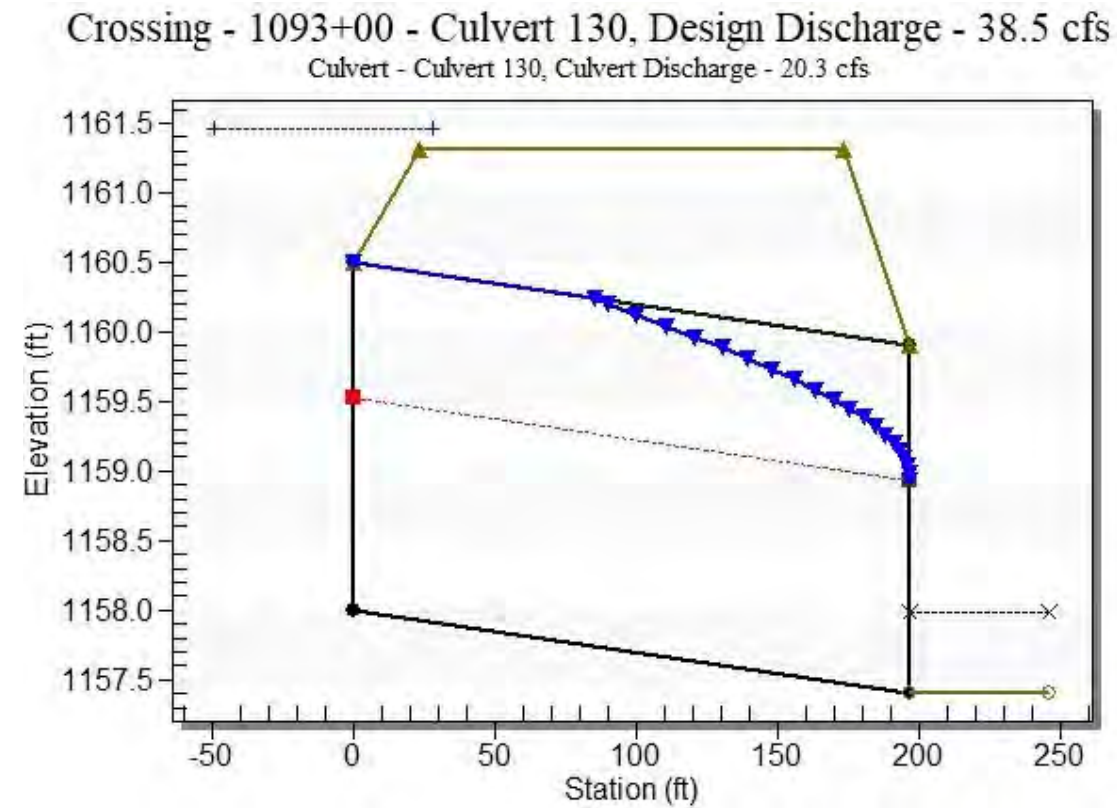
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1158.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
4.75	4.75	1159.23	1.065	1.227	2-M2c	1.056	0.714	0.714	0.166	4.109	1.848
9.50	9.50	1159.83	1.559	1.833	2-M2c	1.618	1.025	1.025	0.251	5.013	2.405
14.25	14.25	1160.39	1.997	2.386	2-M2c	2.500	1.271	1.271	0.319	5.686	2.800
19.00	19.00	1161.15	2.429	3.152	7-M2c	2.500	1.474	1.474	0.378	6.311	3.114
23.75	19.92	1161.36	2.516	3.365	7-M2c	2.500	1.509	1.509	0.431	6.429	3.378
28.50	20.08	1161.40	2.532	3.403	7-M2c	2.500	1.516	1.516	0.480	6.450	3.610
33.25	20.22	1161.43	2.545	3.435	7-M2c	2.500	1.521	1.521	0.526	6.467	3.815
38.00	20.33	1161.46	2.555	3.461	7-M2c	2.500	1.525	1.525	0.569	6.481	4.001
38.50	20.33	1161.47	2.555	3.461	7-M2c	2.500	1.525	1.525	0.573	6.481	4.019
47.50	20.47	1161.51	2.569	3.512	7-M2c	2.500	1.534	1.534	0.648	6.481	4.328

 Straight Culvert
 Inlet Elevation (invert): 1158.00 ft, Outlet Elevation (invert): 1157.41 ft
 Culvert Length: 197.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 130



Water Surface Profile Plot for Culvert: Culvert 130



Site Data - Culvert 130

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1158.00 ft
 Outlet Station: 197.00 ft
 Outlet Elevation: 1157.41 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 130

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1093+00 - Culvert 130)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1157.41	0.00	0.00	0.00	0.00
4.75	1157.58	0.17	1.85	0.03	0.81
9.50	1157.66	0.25	2.40	0.05	0.87
14.25	1157.73	0.32	2.80	0.06	0.90
19.00	1157.79	0.38	3.11	0.07	0.92
23.75	1157.84	0.43	3.38	0.08	0.94
28.50	1157.89	0.48	3.61	0.09	0.96
33.25	1157.94	0.53	3.82	0.10	0.97
38.00	1157.98	0.57	4.00	0.11	0.98
38.50	1157.98	0.57	4.02	0.11	0.98
47.50	1158.06	0.65	4.33	0.12	1.00

Tailwater Channel Data - 1093+00 - Culvert 130

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1157.41 ft

Roadway Data for Crossing: 1093+00 - Culvert 130

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1161.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 135

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 38.5 cfs

Maximum Flow: 47.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1097+00 - Culvert 135

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 135 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1158.20	0.00	0.00	0.00	1
1159.43	4.75	4.75	0.00	1
1160.03	9.50	9.50	0.00	1
1160.58	14.25	14.25	0.00	1
1161.32	19.00	19.00	0.00	1
1161.85	23.75	21.28	2.36	20
1161.89	28.50	21.45	6.96	5
1161.93	33.25	21.54	11.60	4
1161.95	38.00	21.61	16.18	3
1161.96	38.50	21.63	16.82	3
1162.01	47.50	21.85	25.52	3
1161.81	21.11	21.11	0.00	Overtopping

Rating Curve Plot for Crossing: 1097+00 - Culvert 135

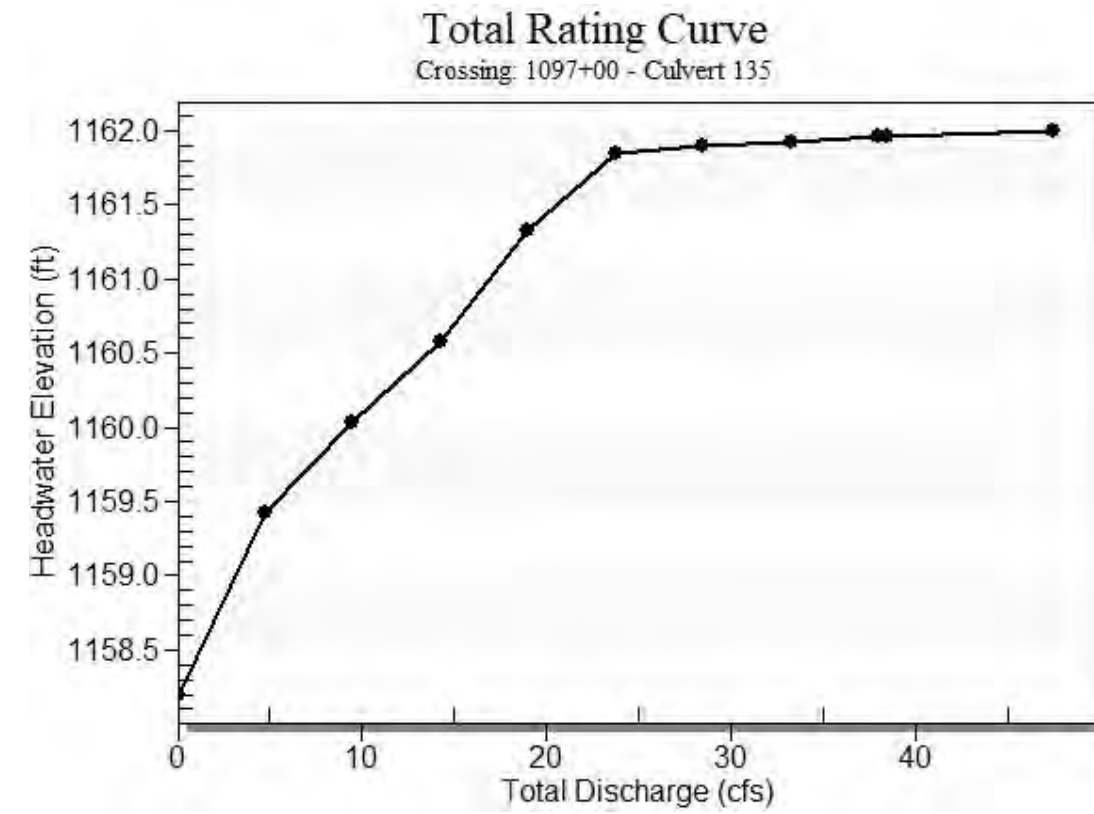
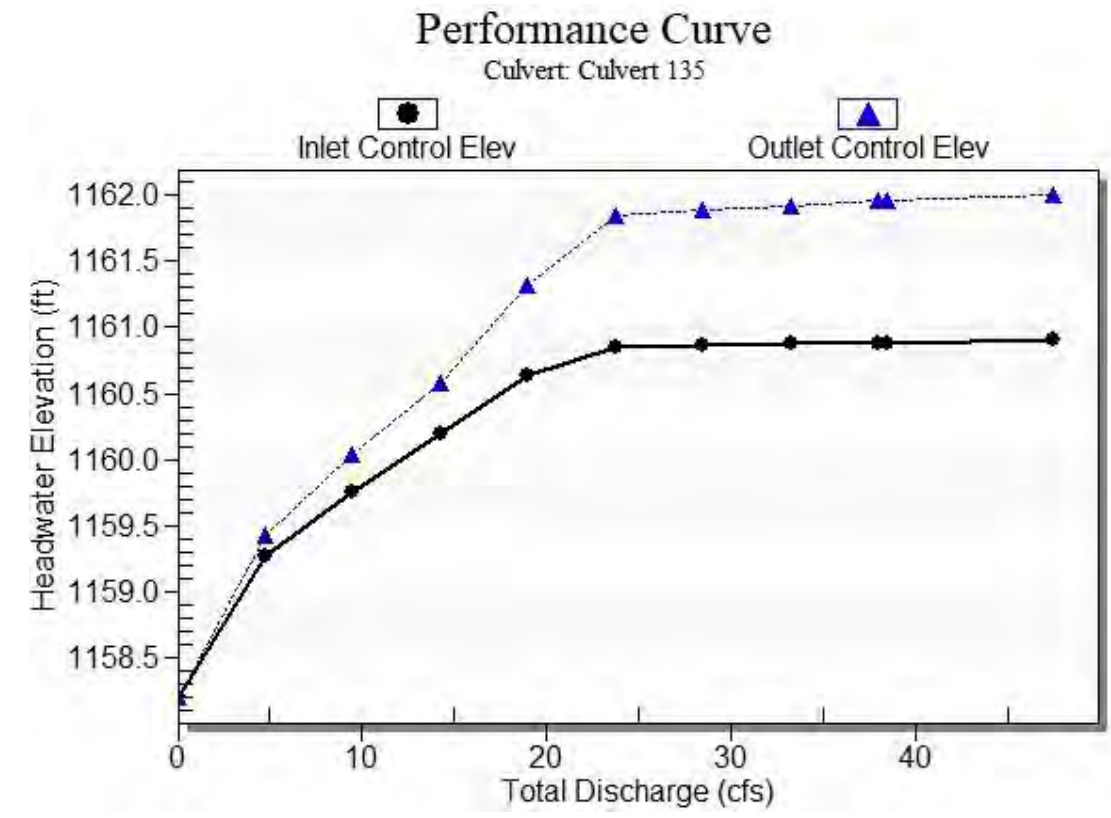


Table 2 - Culvert Summary Table: Culvert 135

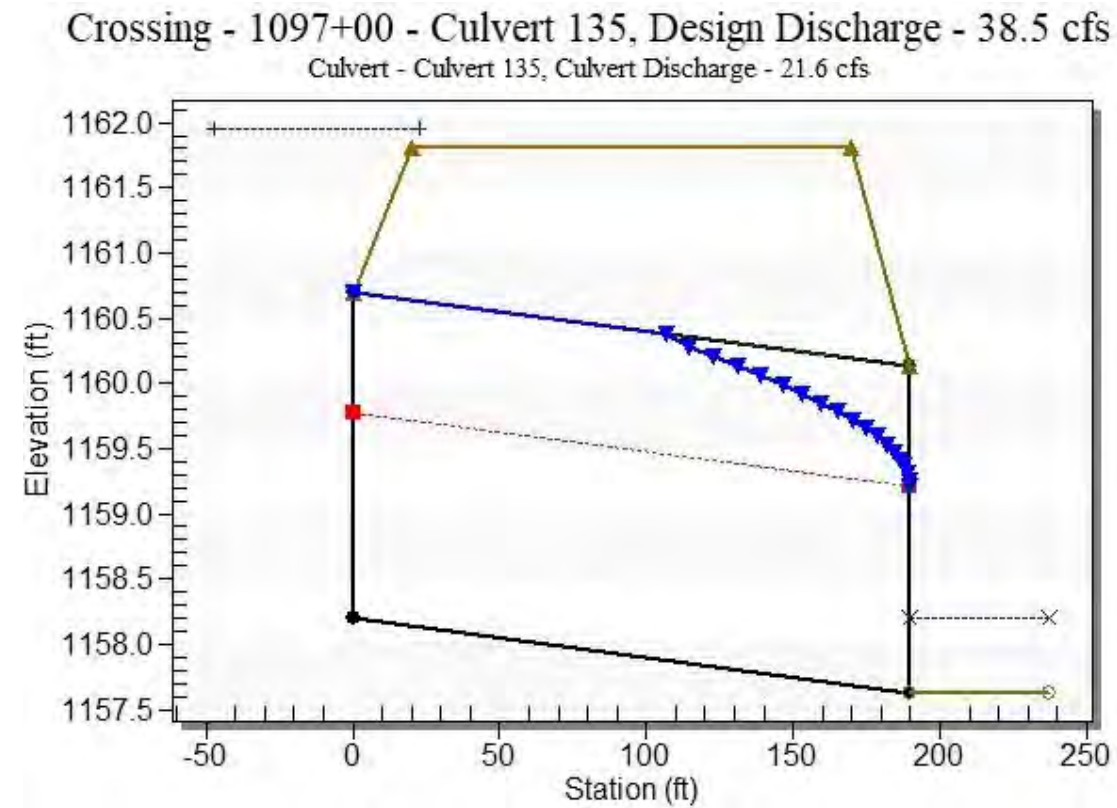
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1158.20	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
4.75	4.75	1159.43	1.065	1.227	2-M2c	1.055	0.714	0.714	0.166	4.109	1.848
9.50	9.50	1160.03	1.559	1.831	2-M2c	1.617	1.025	1.025	0.251	5.013	2.405
14.25	14.25	1160.58	1.997	2.379	2-M2c	2.500	1.271	1.271	0.319	5.686	2.800
19.00	19.00	1161.32	2.429	3.121	7-M2c	2.500	1.474	1.474	0.378	6.311	3.114
23.75	21.28	1161.85	2.648	3.650	7-M2c	2.500	1.565	1.565	0.431	6.581	3.378
28.50	21.45	1161.89	2.665	3.693	7-M2c	2.500	1.572	1.572	0.480	6.602	3.610
33.25	21.54	1161.93	2.674	3.715	7-M2c	2.500	1.575	1.575	0.526	6.613	3.815
38.00	21.61	1161.95	2.680	3.754	7-M2c	2.500	1.577	1.577	0.569	6.621	4.001
38.50	21.63	1161.96	2.682	3.757	7-M2c	2.500	1.578	1.578	0.573	6.624	4.019
47.50	21.85	1162.01	2.704	3.805	7-M2c	2.500	1.587	1.587	0.648	6.651	4.328

 Straight Culvert
 Inlet Elevation (invert): 1158.20 ft, Outlet Elevation (invert): 1157.63 ft
 Culvert Length: 190.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 135



Water Surface Profile Plot for Culvert: Culvert 135



Site Data - Culvert 135

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1158.20 ft
 Outlet Station: 190.00 ft
 Outlet Elevation: 1157.63 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 135

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1097+00 - Culvert 135)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1157.63	0.00	0.00	0.00	0.00
4.75	1157.80	0.17	1.85	0.03	0.81
9.50	1157.88	0.25	2.40	0.05	0.87
14.25	1157.95	0.32	2.80	0.06	0.90
19.00	1158.01	0.38	3.11	0.07	0.92
23.75	1158.06	0.43	3.38	0.08	0.94
28.50	1158.11	0.48	3.61	0.09	0.96
33.25	1158.16	0.53	3.82	0.10	0.97
38.00	1158.20	0.57	4.00	0.11	0.98
38.50	1158.20	0.57	4.02	0.11	0.98
47.50	1158.28	0.65	4.33	0.12	1.00

Tailwater Channel Data - 1097+00 - Culvert 135

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1157.63 ft

Roadway Data for Crossing: 1097+00 - Culvert 135

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1161.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 140

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 93 cfs

Maximum Flow: 115 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1105+50 - Culvert 140

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 140 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1159.00	0.00	0.00	0.00	1
1161.07	11.50	11.50	0.00	1
1163.29	23.00	23.00	0.00	1
1163.42	34.50	23.52	10.81	7
1163.49	46.00	23.76	22.13	5
1163.54	57.50	23.95	33.41	4
1163.59	69.00	24.12	44.82	4
1163.64	80.50	24.27	56.04	3
1163.68	92.00	24.34	67.55	3
1163.68	93.00	24.35	68.45	2
1163.76	115.00	24.63	90.35	3
1163.31	23.08	23.08	0.00	Overtopping

Rating Curve Plot for Crossing: 1105+50 - Culvert 140

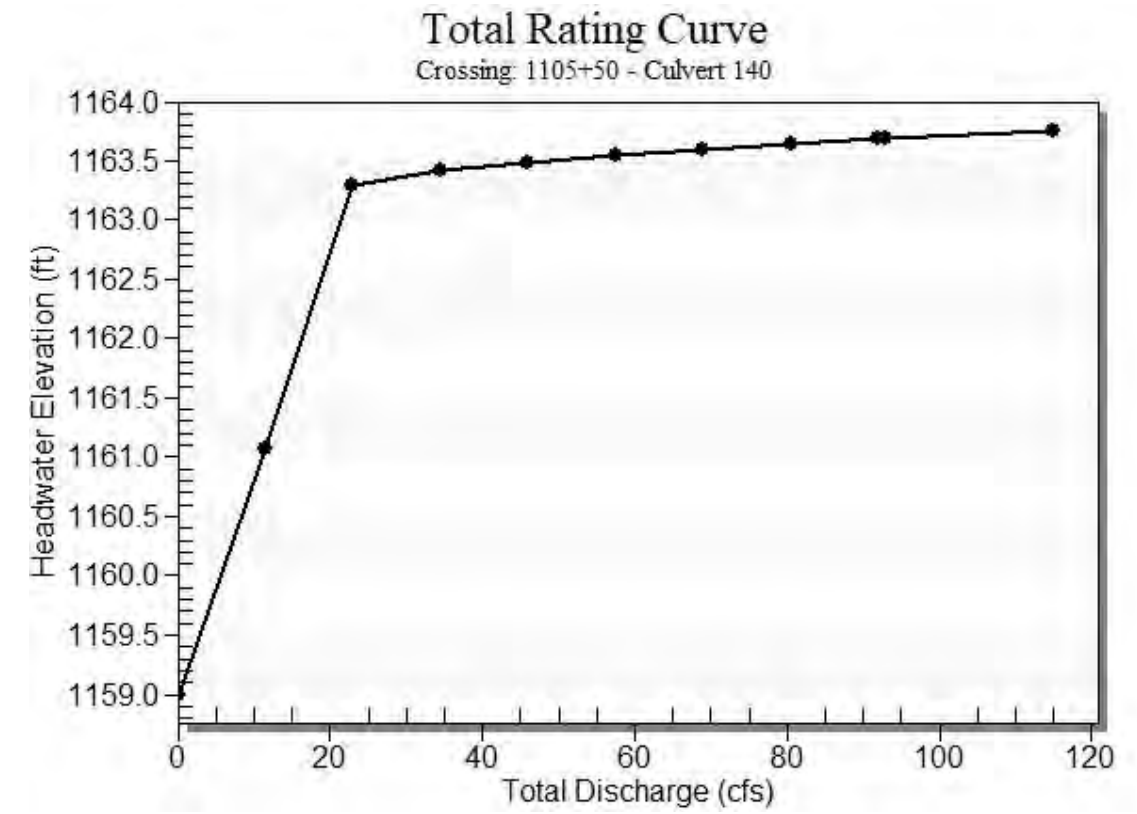
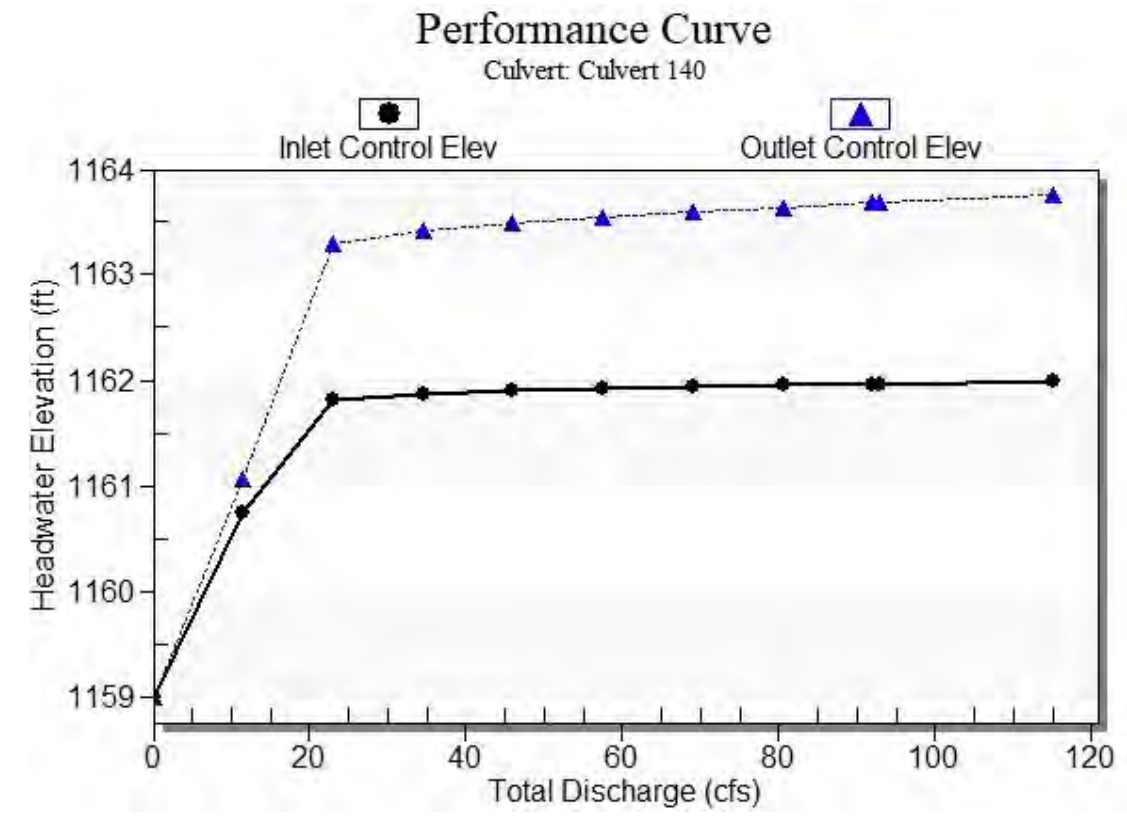


Table 2 - Culvert Summary Table: Culvert 140

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1159.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.50	11.50	1161.07	1.747	2.073	2-M2c	1.886	1.136	1.136	0.281	5.298	2.584
23.00	23.00	1163.29	2.820	4.291	7-M2c	2.500	1.629	1.629	0.423	6.792	3.340
34.50	23.52	1163.42	2.874	4.420	7-M2c	2.500	1.647	1.647	0.537	6.856	3.865
46.00	23.76	1163.49	2.899	4.487	7-M2c	2.500	1.656	1.656	0.636	6.886	4.280
57.50	23.95	1163.54	2.919	4.543	7-M2c	2.500	1.662	1.662	0.724	6.909	4.625
69.00	24.12	1163.59	2.937	4.592	7-M2c	2.500	1.668	1.668	0.805	6.930	4.924
80.50	24.27	1163.64	2.953	4.637	7-M2c	2.500	1.674	1.674	0.880	6.948	5.189
92.00	24.34	1163.68	2.960	4.680	7-M2c	2.500	1.676	1.676	0.950	6.957	5.427
93.00	24.35	1163.68	2.961	4.683	7-M2c	2.500	1.676	1.676	0.956	6.958	5.447
115.00	24.63	1163.76	2.991	4.756	7-M2c	2.500	1.686	1.686	1.079	6.992	5.843

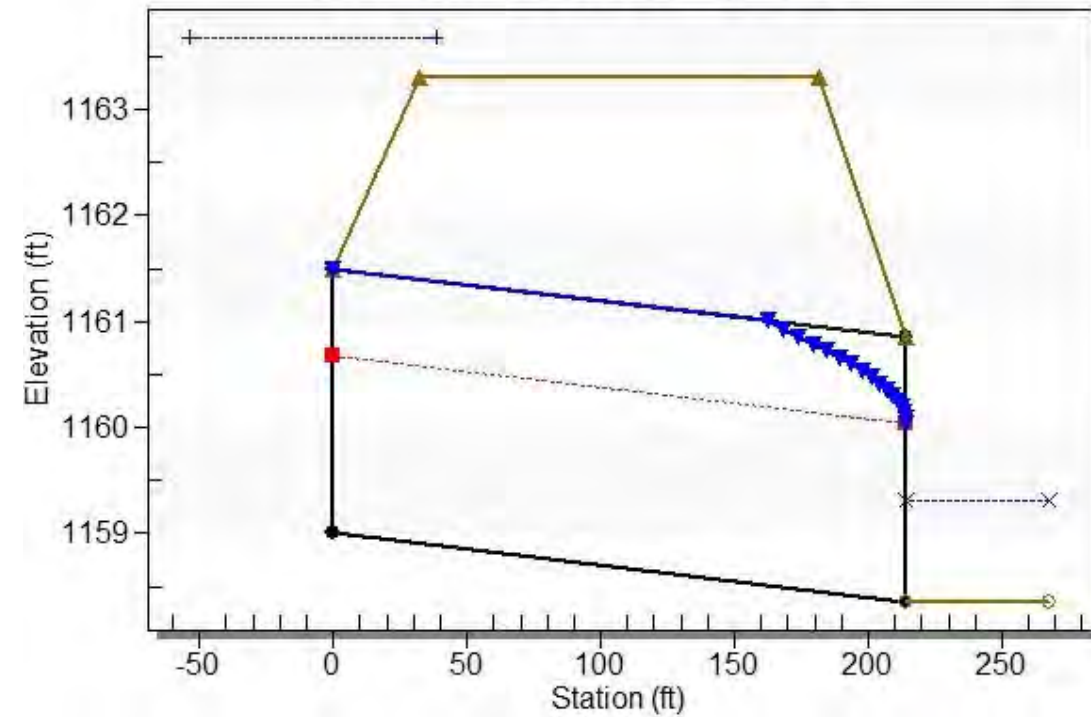
 Straight Culvert
 Inlet Elevation (invert): 1159.00 ft, Outlet Elevation (invert): 1158.36 ft
 Culvert Length: 214.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 140



Water Surface Profile Plot for Culvert: Culvert 140

Crossing - 1105+50 - Culvert 140, Design Discharge - 93.0 cfs
 Culvert - Culvert 140, Culvert Discharge - 24.3 cfs



Site Data - Culvert 140

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1159.00 ft
 Outlet Station: 214.00 ft
 Outlet Elevation: 1158.36 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 140

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1105+50 - Culvert 140)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1158.36	0.00	0.00	0.00	0.00
11.50	1158.64	0.28	2.58	0.05	0.88
23.00	1158.78	0.42	3.34	0.08	0.94
34.50	1158.90	0.54	3.87	0.10	0.97
46.00	1159.00	0.64	4.28	0.12	1.00
57.50	1159.08	0.72	4.63	0.14	1.02
69.00	1159.16	0.80	4.92	0.15	1.03
80.50	1159.24	0.88	5.19	0.16	1.05
92.00	1159.31	0.95	5.43	0.18	1.06
93.00	1159.32	0.96	5.45	0.18	1.06
115.00	1159.44	1.08	5.84	0.20	1.08

Tailwater Channel Data - 1105+50 - Culvert 140

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1158.36 ft

Roadway Data for Crossing: 1105+50 - Culvert 140

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1163.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 145

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 93 cfs

Maximum Flow: 115 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1109+00 - Culvert 145

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 145 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1159.00	0.00	0.00	0.00	1
1160.79	11.50	11.50	0.00	1
1163.83	23.00	21.91	0.92	15
1163.93	34.50	22.12	12.18	6
1164.00	46.00	22.30	23.61	5
1164.05	57.50	22.45	34.93	4
1164.10	69.00	22.58	46.37	4
1164.14	80.50	22.70	57.63	3
1164.19	92.00	22.80	69.10	3
1164.19	93.00	22.81	70.01	2
1164.26	115.00	22.99	91.97	3
1163.81	21.85	21.85	0.00	Overtopping

Rating Curve Plot for Crossing: 1109+00 - Culvert 145

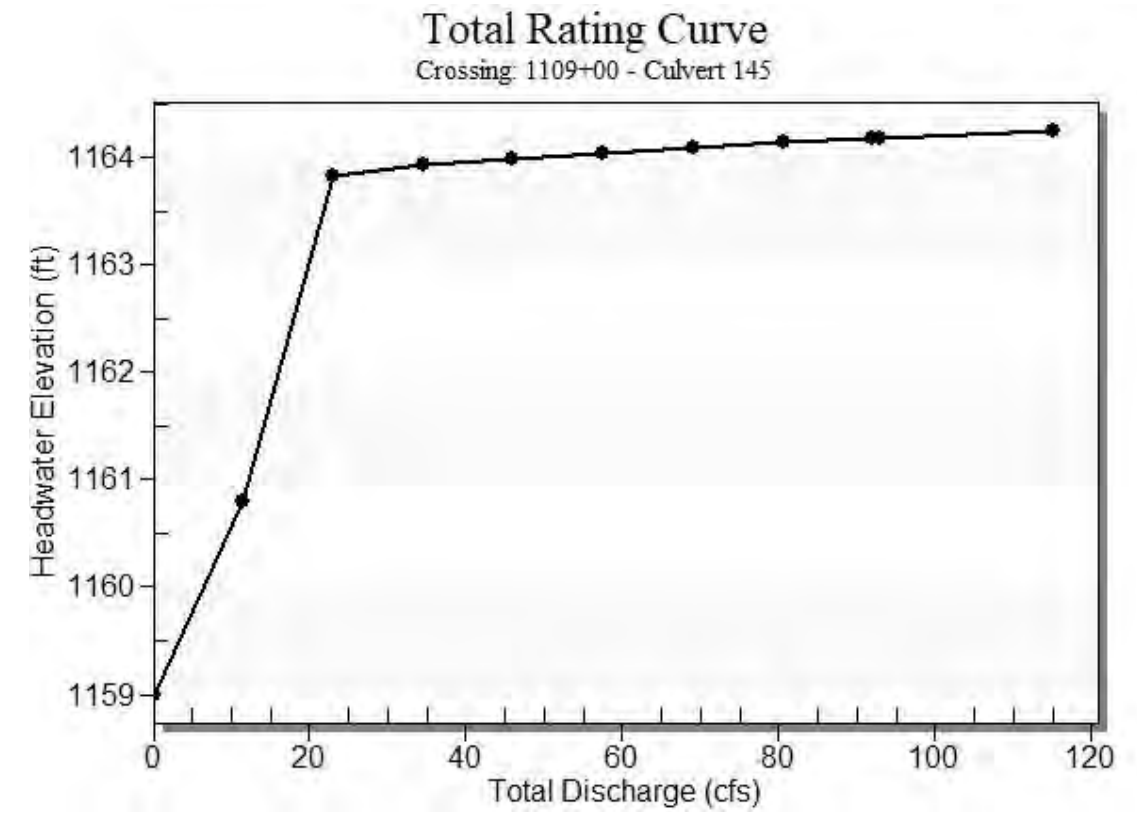
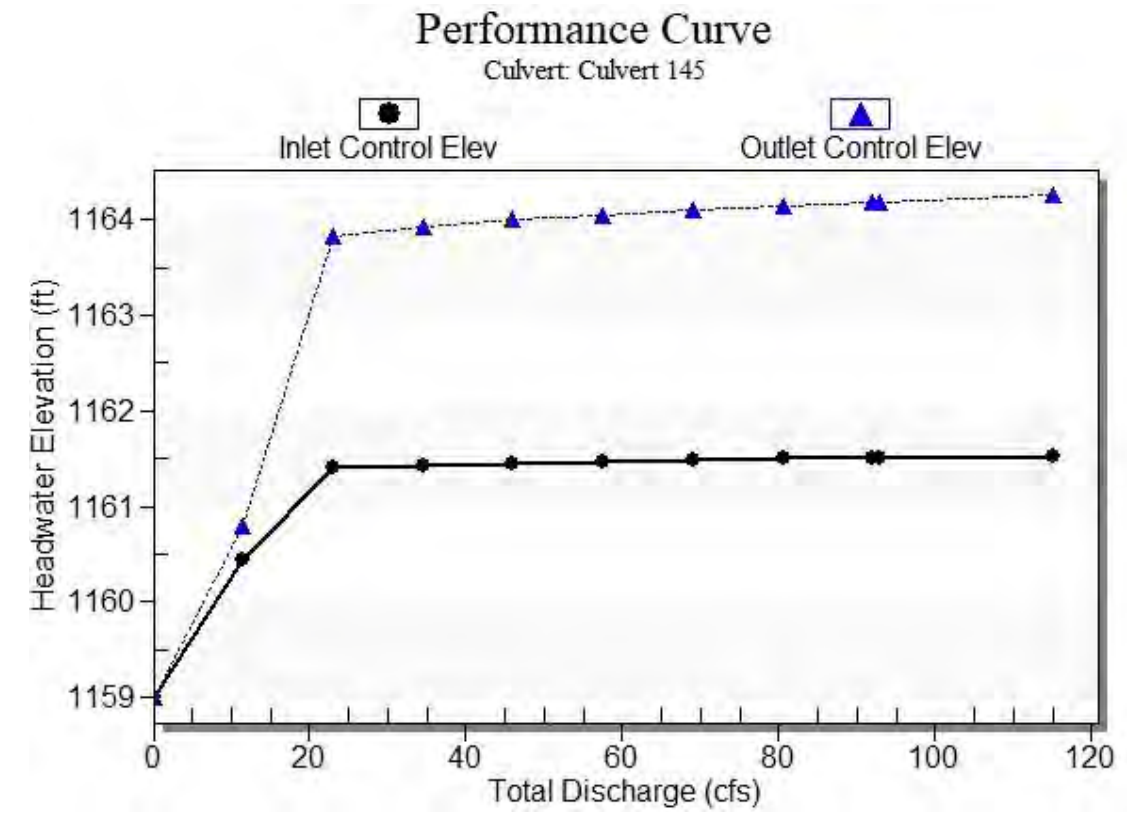


Table 2 - Culvert Summary Table: Culvert 145

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1159.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.50	11.50	1160.79	1.448	1.790	2-M2c	1.850	0.843	0.843	0.281	5.028	2.584
23.00	21.91	1163.83	2.407	4.832	7-M2c	1.850	1.220	1.220	0.423	6.637	3.340
34.50	22.12	1163.93	2.430	4.931	7-M2c	1.850	1.231	1.231	0.537	6.646	3.865
46.00	22.30	1164.00	2.451	4.995	7-M2c	1.850	1.237	1.237	0.636	6.672	4.280
57.50	22.45	1164.05	2.468	5.050	7-M2c	1.850	1.242	1.242	0.724	6.693	4.625
69.00	22.58	1164.10	2.484	5.099	7-M2c	1.850	1.246	1.246	0.805	6.713	4.924
80.50	22.70	1164.14	2.497	5.143	7-M2c	1.850	1.250	1.250	0.880	6.730	5.189
92.00	22.80	1164.19	2.510	5.185	7-M2c	1.850	1.253	1.253	0.950	6.745	5.427
93.00	22.81	1164.19	2.511	5.188	7-M2c	1.850	1.253	1.253	0.956	6.746	5.447
115.00	22.99	1164.26	2.532	5.262	7-M2c	1.850	1.259	1.259	1.079	6.773	5.843

 Straight Culvert
 Inlet Elevation (invert): 1159.00 ft, Outlet Elevation (invert): 1158.36 ft
 Culvert Length: 212.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 145



Water Surface Profile Plot for Culvert: Culvert 145

Site Data - Culvert 145

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 1159.00 ft
Outlet Station: 212.00 ft
Outlet Elevation: 1158.36 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 145

Barrel Shape: Pipe Arch
Barrel Span: 36.10 in
Barrel Rise: 22.20 in
Barrel Material: Steel or Aluminum
Embedment: 0.00 in
Barrel Manning's n: 0.0250
Culvert Type: Straight
Inlet Configuration: Projecting
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1109+00 - Culvert 145)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1158.36	0.00	0.00	0.00	0.00
11.50	1158.64	0.28	2.58	0.05	0.88
23.00	1158.78	0.42	3.34	0.08	0.94
34.50	1158.90	0.54	3.87	0.10	0.97
46.00	1159.00	0.64	4.28	0.12	1.00
57.50	1159.08	0.72	4.63	0.14	1.02
69.00	1159.16	0.80	4.92	0.15	1.03
80.50	1159.24	0.88	5.19	0.16	1.05
92.00	1159.31	0.95	5.43	0.18	1.06
93.00	1159.32	0.96	5.45	0.18	1.06
115.00	1159.44	1.08	5.84	0.20	1.08

Tailwater Channel Data - 1109+00 - Culvert 145

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 15.00 ft
Side Slope (H:V): 3.00 (1:1)
Channel Slope: 0.0030
Channel Manning's n: 0.0130
Channel Invert Elevation: 1158.36 ft

Roadway Data for Crossing: 1109+00 - Culvert 145

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 1163.81 ft
Roadway Surface: Paved
Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 150

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 49.5 cfs

Maximum Flow: 61.875 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1117+00 - Culvert 150

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 150 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1160.30	0.00	0.00	0.00	1
1161.70	6.19	6.19	0.00	1
1164.32	12.38	11.91	0.35	86
1164.39	18.56	12.01	6.43	6
1164.43	24.75	12.06	12.51	4
1164.47	30.94	12.12	18.74	4
1164.50	37.13	12.18	24.75	3
1164.53	43.31	12.23	30.96	3
1164.56	49.50	12.28	37.16	3
1164.59	55.69	12.32	43.34	3
1164.61	61.88	12.36	49.50	3
1164.31	11.90	11.90	0.00	Overtopping

Rating Curve Plot for Crossing: 1117+00 - Culvert 150

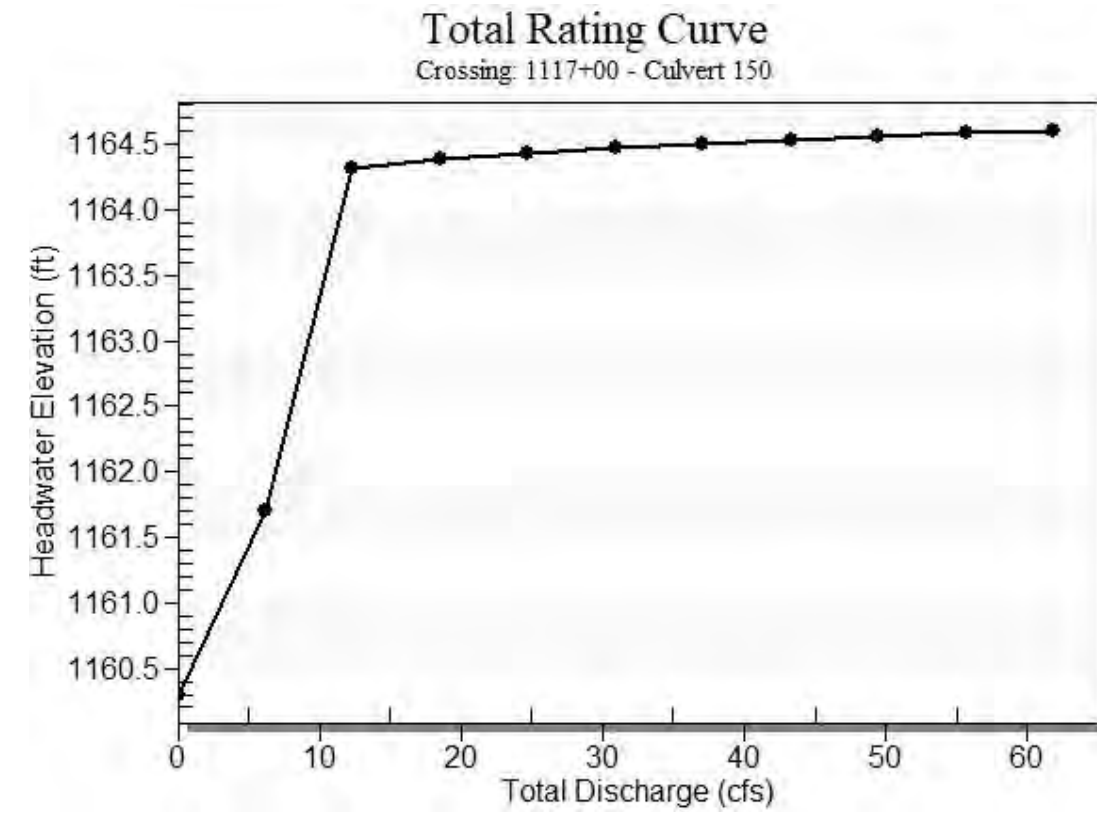
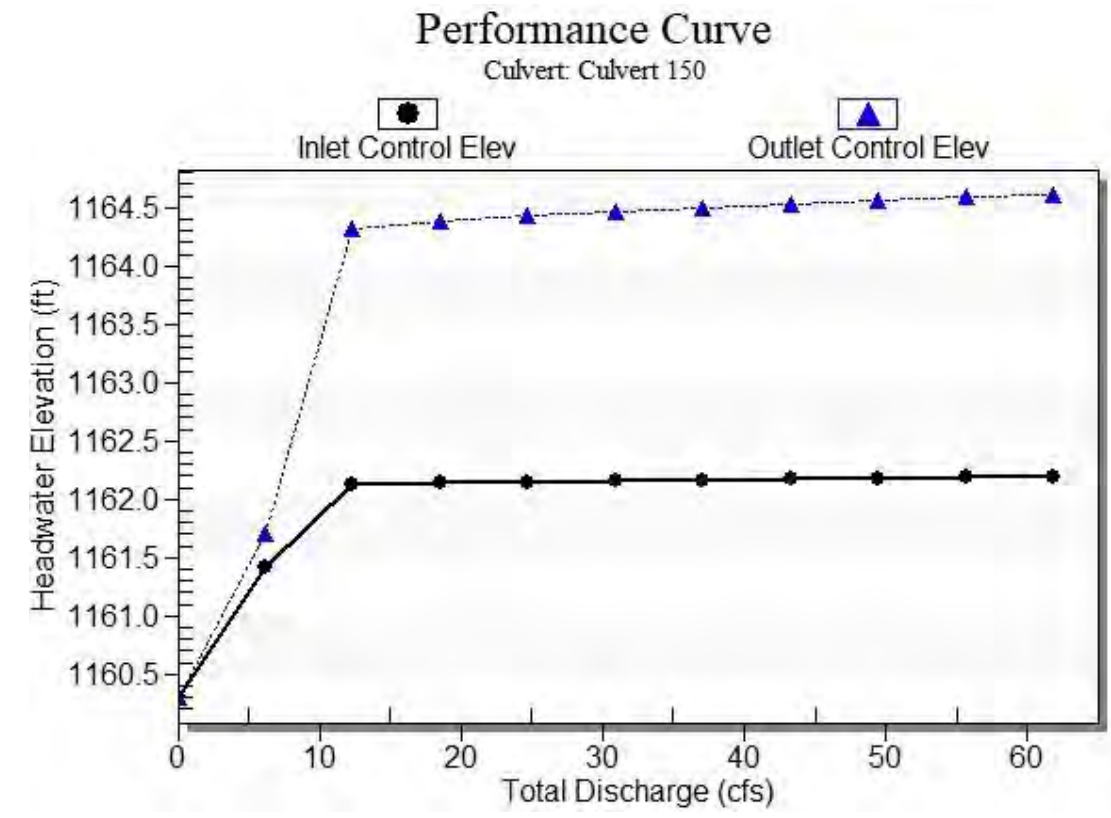


Table 2 - Culvert Summary Table: Culvert 150

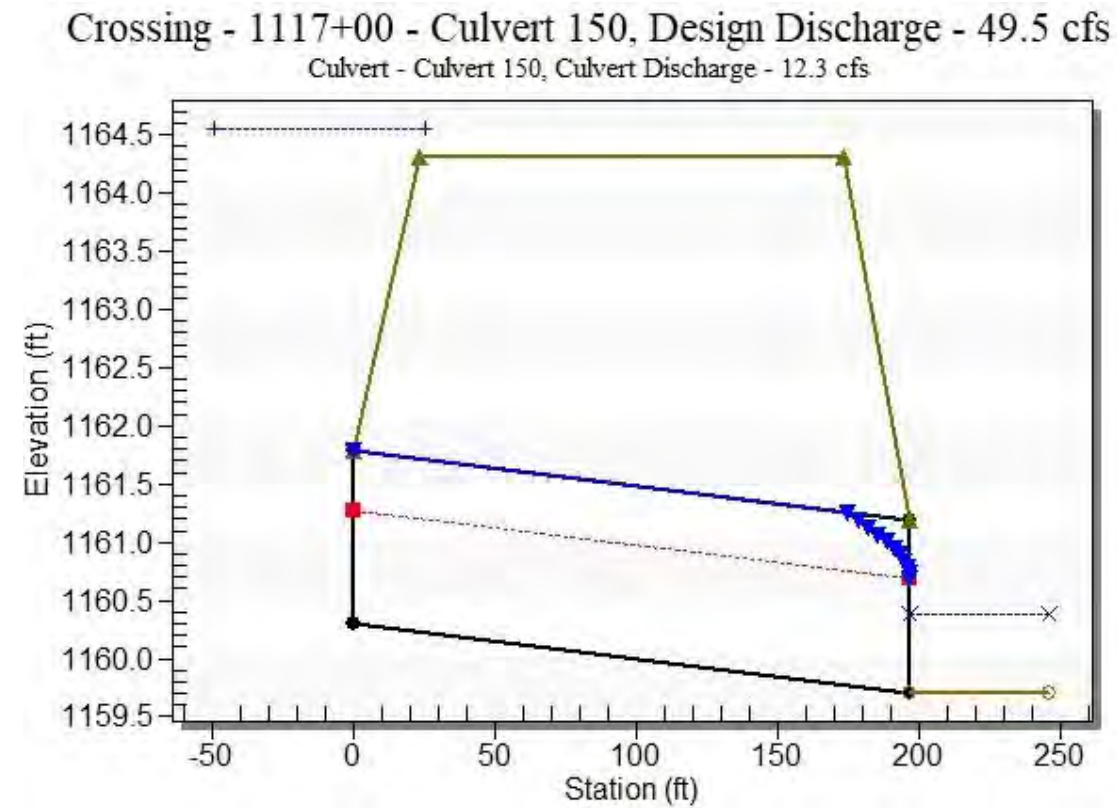
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1160.30	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	1161.70	1.112	1.405	2-M2c	1.483	0.657	0.657	0.194	4.384	2.044
12.38	11.91	1164.32	1.825	4.021	7-M2c	1.483	0.954	0.954	0.293	5.781	2.656
18.56	12.01	1164.39	1.840	4.082	7-M2c	1.483	0.958	0.958	0.373	5.803	3.088
24.75	12.06	1164.43	1.847	4.133	7-M2c	1.483	0.960	0.960	0.442	5.814	3.429
30.94	12.12	1164.47	1.856	4.169	7-M2c	1.483	0.963	0.963	0.504	5.828	3.717
37.13	12.18	1164.50	1.865	4.201	7-M2c	1.483	0.966	0.966	0.561	5.841	3.968
43.31	12.23	1164.53	1.873	4.231	7-M2c	1.483	0.968	0.968	0.614	5.853	4.191
49.50	12.28	1164.56	1.880	4.260	7-M2c	1.483	0.970	0.970	0.664	5.864	4.391
55.69	12.32	1164.59	1.887	4.286	7-M2c	1.483	0.972	0.972	0.711	5.874	4.574
61.88	12.36	1164.61	1.894	4.312	7-M2c	1.483	0.974	0.974	0.755	5.884	4.744

 Straight Culvert
 Inlet Elevation (invert): 1160.30 ft, Outlet Elevation (invert): 1159.71 ft
 Culvert Length: 197.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 150



Water Surface Profile Plot for Culvert: Culvert 150



Site Data - Culvert 150

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1160.30 ft
 Outlet Station: 197.00 ft
 Outlet Elevation: 1159.71 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 150

Barrel Shape: Pipe Arch
 Barrel Span: 28.90 in
 Barrel Rise: 17.80 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1117+00 - Culvert 150)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1159.71	0.00	0.00	0.00	0.00
6.19	1159.90	0.19	2.04	0.04	0.83
12.38	1160.00	0.29	2.66	0.05	0.89
18.56	1160.08	0.37	3.09	0.07	0.92
24.75	1160.15	0.44	3.43	0.08	0.95
30.94	1160.21	0.50	3.72	0.09	0.96
37.13	1160.27	0.56	3.97	0.10	0.98
43.31	1160.32	0.61	4.19	0.11	0.99
49.50	1160.37	0.66	4.39	0.12	1.00
55.69	1160.42	0.71	4.57	0.13	1.01
61.88	1160.47	0.76	4.74	0.14	1.02

Tailwater Channel Data - 1117+00 - Culvert 150

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1159.71 ft

Roadway Data for Crossing: 1117+00 - Culvert 150

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1164.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 155

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 49.5 cfs

Maximum Flow: 61.875 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1124+50 - Culvert 155

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 155 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1161.20	0.00	0.00	0.00	1
1162.61	6.19	6.19	0.00	1
1165.32	12.38	12.01	0.25	91
1165.39	18.56	12.09	6.34	6
1165.43	24.75	12.17	12.40	4
1165.47	30.94	12.23	18.63	4
1165.50	37.13	12.28	24.65	3
1165.53	43.31	12.33	30.85	3
1165.56	49.50	12.38	37.05	3
1165.59	55.69	12.43	43.23	3
1165.61	61.88	12.47	49.40	3
1165.31	12.00	12.00	0.00	Overtopping

Rating Curve Plot for Crossing: 1124+50 - Culvert 155

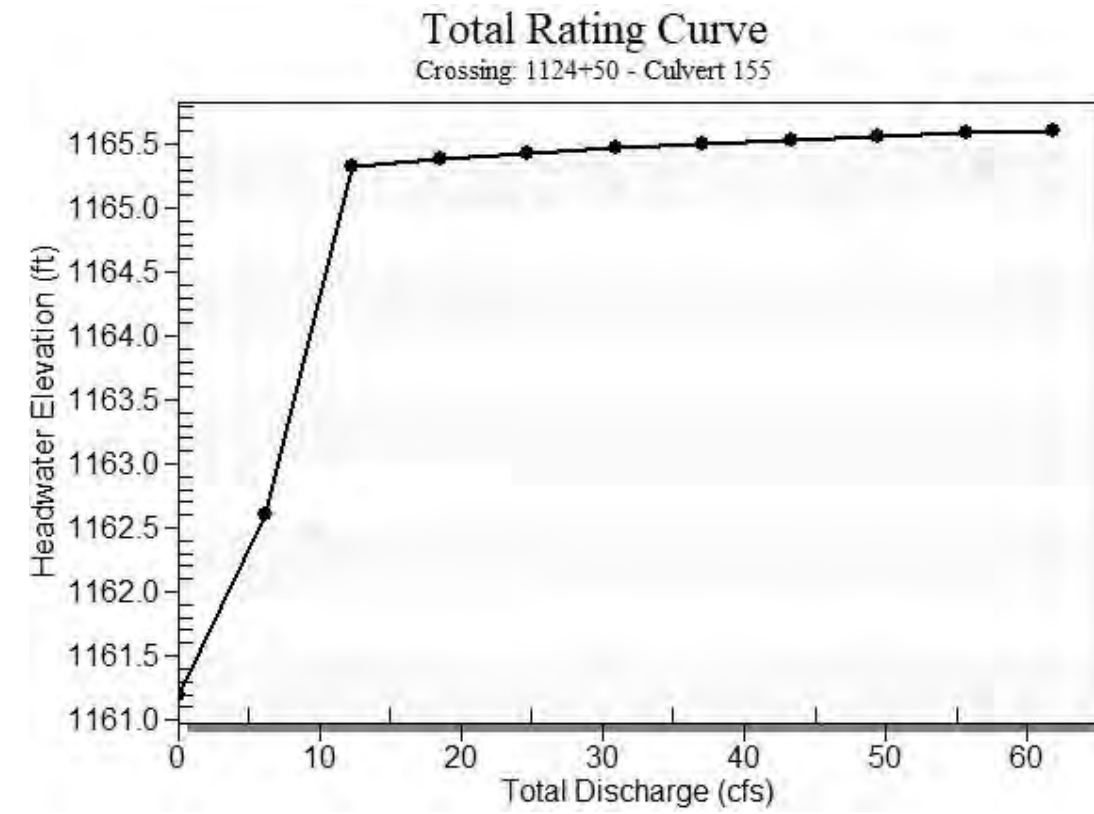
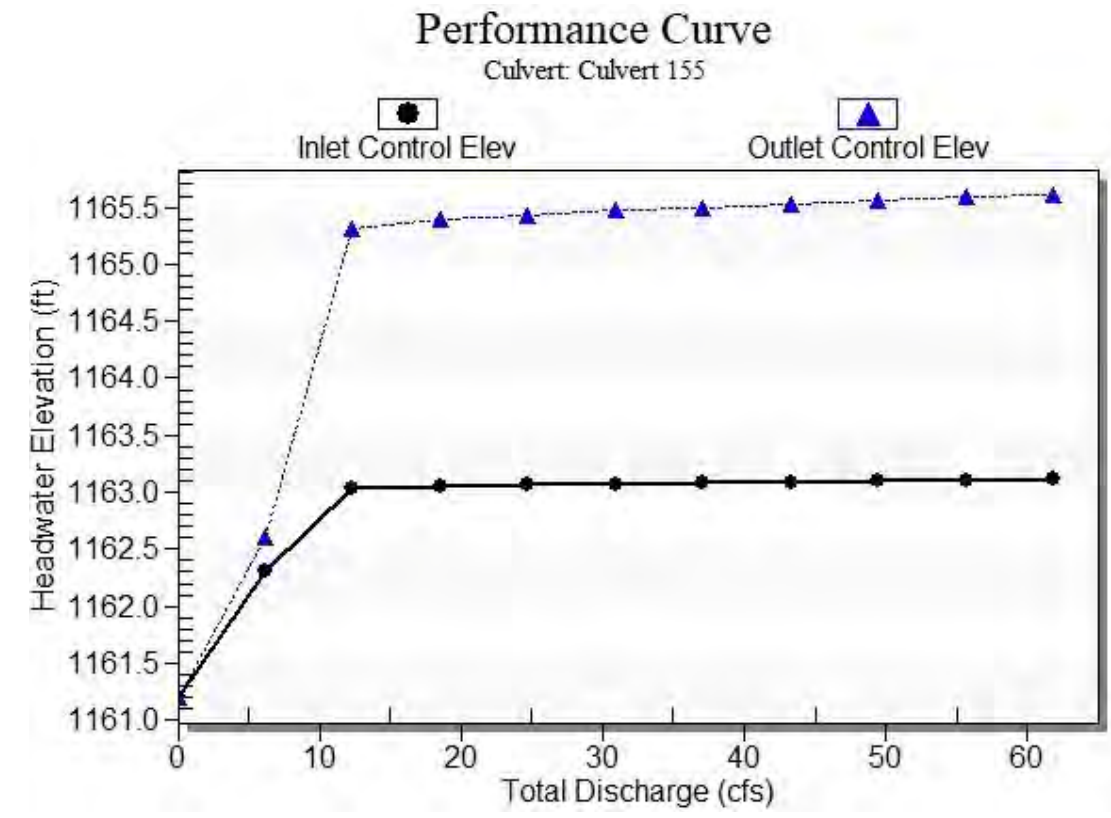


Table 2 - Culvert Summary Table: Culvert 155

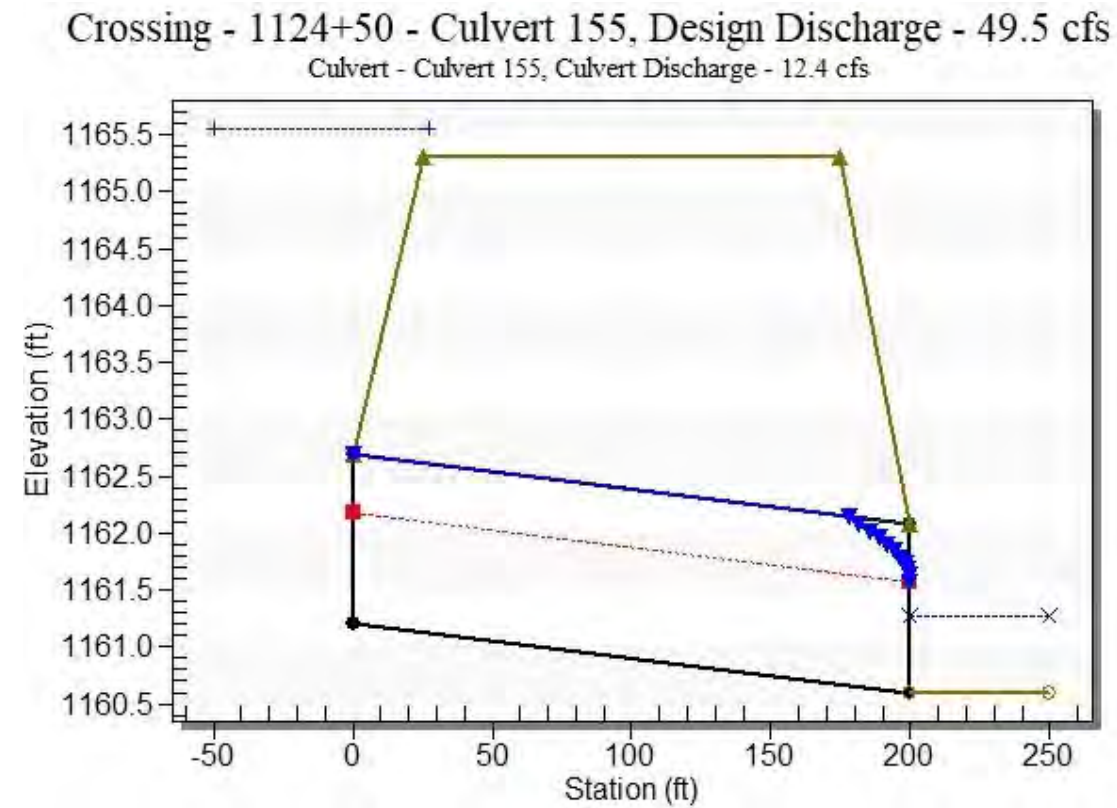
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1161.20	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	1162.61	1.112	1.406	2-M2c	1.483	0.657	0.657	0.194	4.384	2.044
12.38	12.01	1165.32	1.840	4.117	7-M2c	1.483	0.958	0.958	0.293	5.803	2.656
18.56	12.09	1165.39	1.852	4.187	7-M2c	1.483	0.962	0.962	0.373	5.821	3.088
24.75	12.17	1165.43	1.863	4.231	7-M2c	1.483	0.965	0.965	0.442	5.838	3.429
30.94	12.23	1165.47	1.873	4.268	7-M2c	1.483	0.968	0.968	0.504	5.853	3.717
37.13	12.28	1165.50	1.881	4.301	7-M2c	1.483	0.970	0.970	0.561	5.865	3.968
43.31	12.33	1165.53	1.889	4.331	7-M2c	1.483	0.973	0.973	0.614	5.877	4.191
49.50	12.38	1165.56	1.896	4.358	7-M2c	1.483	0.975	0.975	0.664	5.888	4.391
55.69	12.43	1165.59	1.903	4.386	7-M2c	1.483	0.977	0.977	0.711	5.898	4.574
61.88	12.47	1165.61	1.910	4.411	7-M2c	1.483	0.978	0.978	0.755	5.907	4.744

 Straight Culvert
 Inlet Elevation (invert): 1161.20 ft, Outlet Elevation (invert): 1160.60 ft
 Culvert Length: 200.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 155



Water Surface Profile Plot for Culvert: Culvert 155



Site Data - Culvert 155

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1161.20 ft
 Outlet Station: 200.00 ft
 Outlet Elevation: 1160.60 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 155

Barrel Shape: Pipe Arch
 Barrel Span: 28.90 in
 Barrel Rise: 17.80 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1124+50 - Culvert 155)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1160.60	0.00	0.00	0.00	0.00
6.19	1160.79	0.19	2.04	0.04	0.83
12.38	1160.89	0.29	2.66	0.05	0.89
18.56	1160.97	0.37	3.09	0.07	0.92
24.75	1161.04	0.44	3.43	0.08	0.95
30.94	1161.10	0.50	3.72	0.09	0.96
37.13	1161.16	0.56	3.97	0.10	0.98
43.31	1161.21	0.61	4.19	0.11	0.99
49.50	1161.26	0.66	4.39	0.12	1.00
55.69	1161.31	0.71	4.57	0.13	1.01
61.88	1161.36	0.76	4.74	0.14	1.02

Tailwater Channel Data - 1124+50 - Culvert 155

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1160.60 ft

Roadway Data for Crossing: 1124+50 - Culvert 155

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1165.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 160

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 49.5 cfs

Maximum Flow: 61.875 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1127+30 - Culvert 160

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 160 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1160.80	0.00	0.00	0.00	1
1161.00	6.19	6.19	0.00	1
1161.12	12.38	12.38	0.00	1
1161.21	18.56	18.56	0.00	1
1161.30	24.75	24.75	0.00	1
1161.38	30.94	30.94	0.00	1
1161.45	37.13	37.13	0.00	1
1161.51	43.31	43.31	0.00	1
1161.58	49.50	49.50	0.00	1
1161.64	55.69	55.69	0.00	1
1161.70	61.88	61.88	0.00	1
1165.81	756.07	756.07	0.00	Overtopping

Rating Curve Plot for Crossing: 1127+30 - Culvert 160

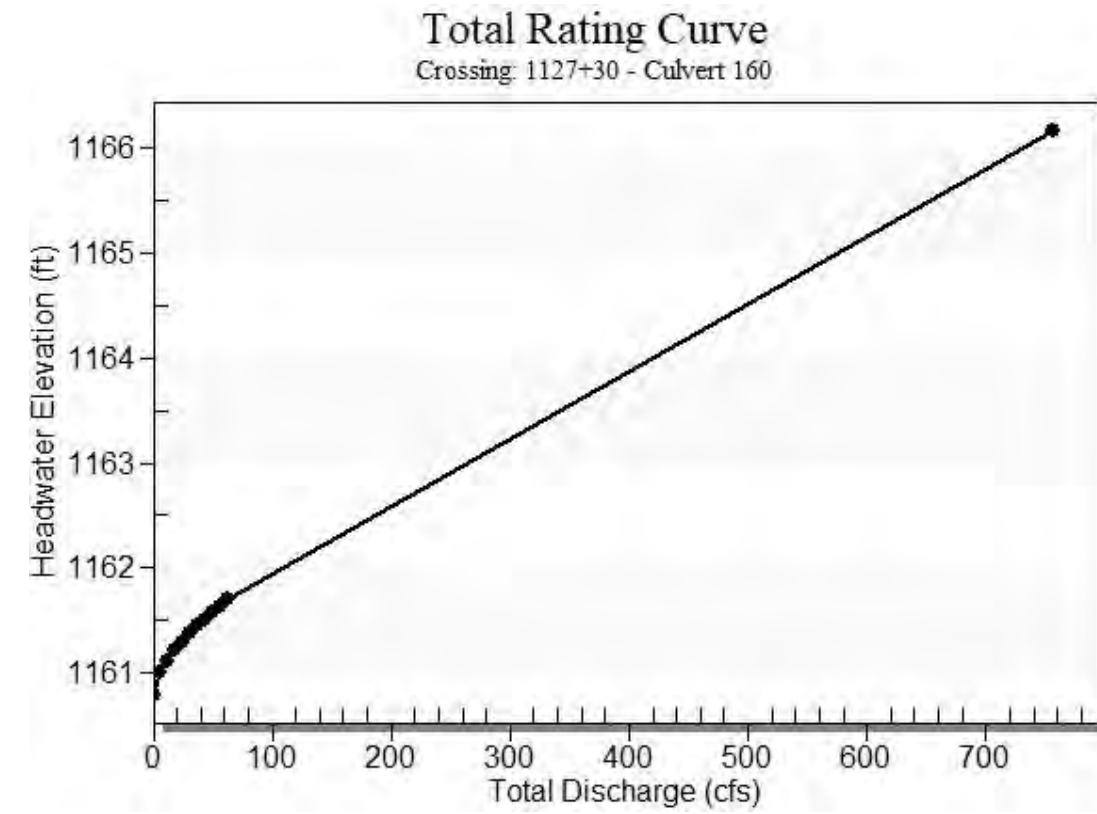
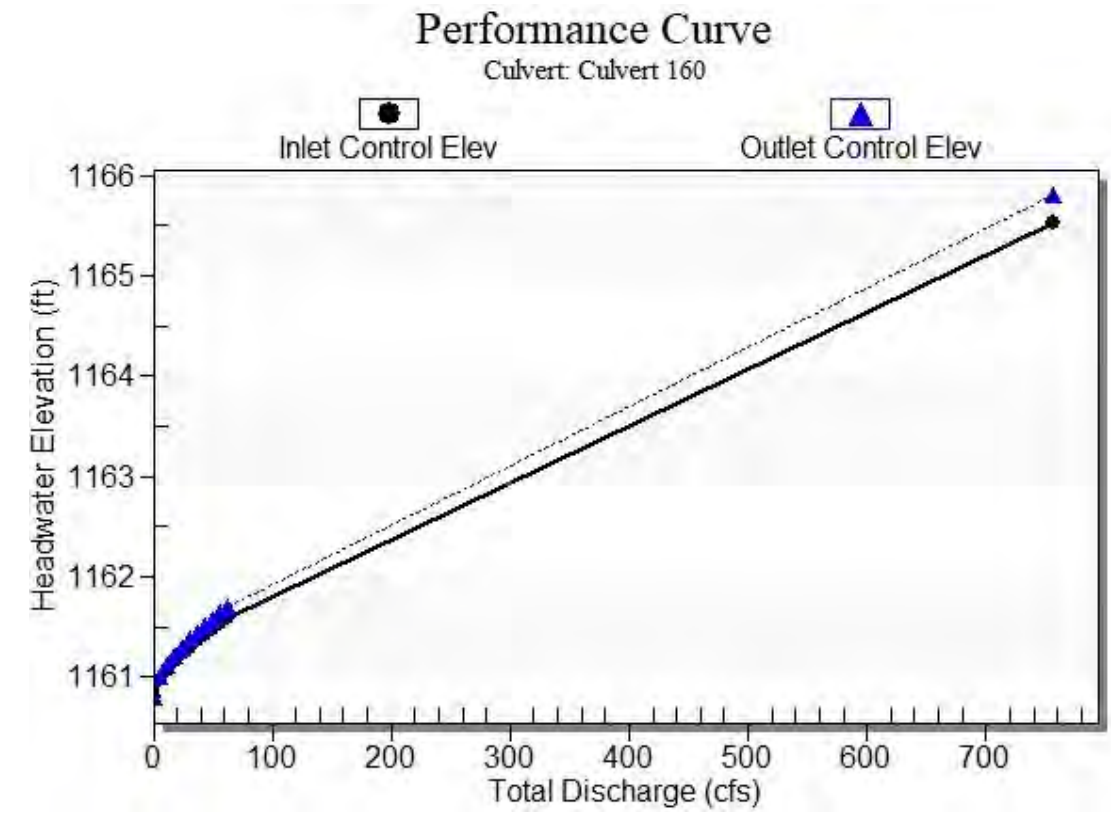


Table 2 - Culvert Summary Table: Culvert 160

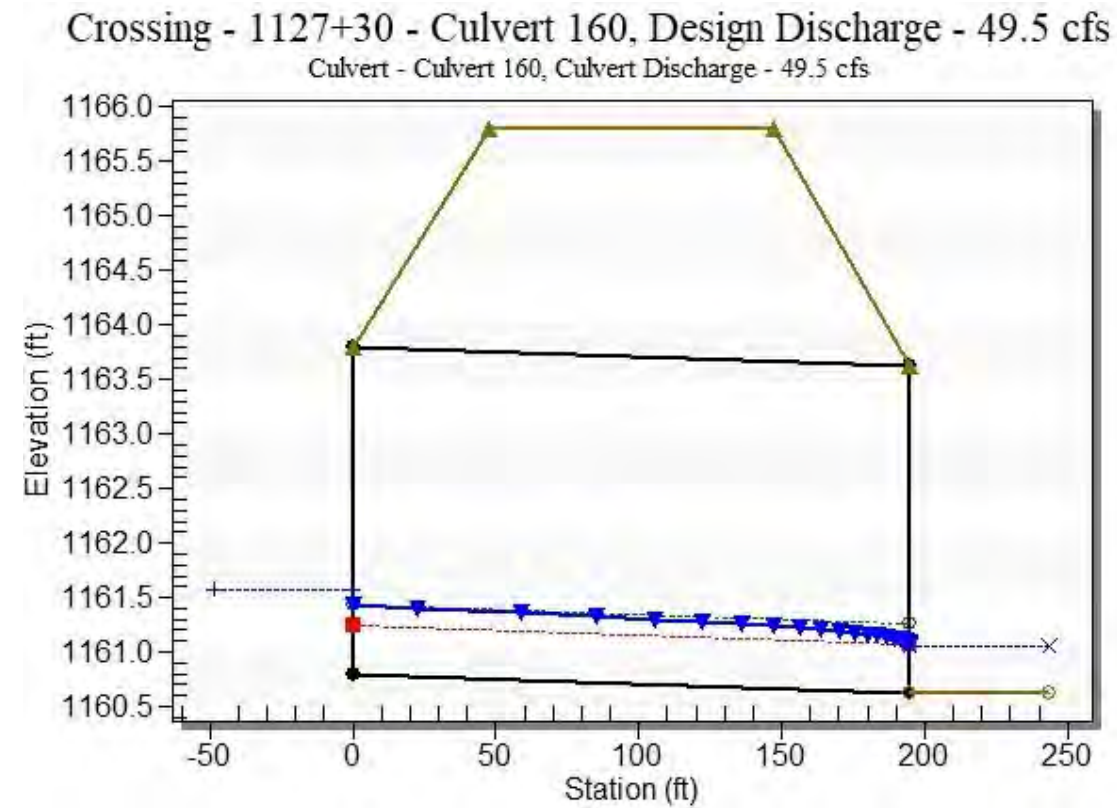
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1160.80	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	1161.00	0.169	0.204	3-M2t	0.174	0.110	0.122	0.122	1.696	1.525
12.38	12.38	1161.12	0.268	0.319	3-M2t	0.267	0.174	0.184	0.184	2.241	2.003
18.56	18.56	1161.21	0.351	0.414	3-M2t	0.343	0.228	0.235	0.235	2.636	2.347
24.75	24.75	1161.30	0.425	0.498	3-M2t	0.411	0.276	0.279	0.279	2.959	2.624
30.94	30.94	1161.38	0.493	0.576	2-M2c	0.472	0.321	0.321	0.319	3.214	2.861
37.13	37.13	1161.45	0.556	0.647	2-M2c	0.529	0.362	0.362	0.355	3.416	3.069
43.31	43.31	1161.51	0.617	0.714	2-M2c	0.582	0.402	0.402	0.389	3.596	3.256
49.50	49.50	1161.58	0.674	0.777	2-M2c	0.634	0.439	0.439	0.421	3.759	3.427
55.69	55.69	1161.64	0.729	0.838	2-M2c	0.683	0.475	0.475	0.452	3.910	3.585
61.88	61.88	1161.70	0.782	0.896	2-M2c	0.729	0.509	0.509	0.481	4.050	3.731

 Straight Culvert
 Inlet Elevation (invert): 1160.80 ft, Outlet Elevation (invert): 1160.63 ft
 Culvert Length: 195.00 ft, Culvert Slope: 0.0009

Culvert Performance Curve Plot: Culvert 160



Water Surface Profile Plot for Culvert: Culvert 160



Site Data - Culvert 160

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1160.80 ft
 Outlet Station: 195.00 ft
 Outlet Elevation: 1160.63 ft
 Number of Barrels: 3

Culvert Data Summary - Culvert 160

Barrel Shape: Concrete Box
 Barrel Span: 10.00 ft
 Barrel Rise: 3.00 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge (30-75° flare) Wingwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1127+30 - Culvert 160)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1160.63	0.00	0.00	0.00	0.00
6.19	1160.75	0.12	1.52	0.02	0.77
12.38	1160.81	0.18	2.00	0.03	0.83
18.56	1160.86	0.23	2.35	0.04	0.86
24.75	1160.91	0.28	2.62	0.05	0.89
30.94	1160.95	0.32	2.86	0.06	0.91
37.13	1160.99	0.36	3.07	0.07	0.92
43.31	1161.02	0.39	3.26	0.07	0.94
49.50	1161.05	0.42	3.43	0.08	0.95
55.69	1161.08	0.45	3.58	0.08	0.96
61.88	1161.11	0.48	3.73	0.09	0.97

Tailwater Channel Data - 1127+30 - Culvert 160

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 33.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1160.63 ft

Roadway Data for Crossing: 1127+30 - Culvert 160

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1165.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 100.00 ft

HY-8 Culvert Analysis Report

Structure 165

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 49.5 cfs

Maximum Flow: 61.875 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1130+00 - Culvert 165

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 165 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1161.50	0.00	0.00	0.00	1
1162.90	6.19	6.19	0.00	1
1165.80	12.38	12.38	0.00	1
1166.38	18.56	13.24	5.22	16
1166.42	24.75	13.31	11.37	5
1166.46	30.94	13.37	17.48	4
1166.49	37.13	13.42	23.48	3
1166.53	43.31	13.47	29.70	3
1166.55	49.50	13.51	35.91	3
1166.58	55.69	13.56	42.10	3
1166.61	61.88	13.60	48.27	3
1166.31	13.16	13.16	0.00	Overtopping

Rating Curve Plot for Crossing: 1130+00 - Culvert 165

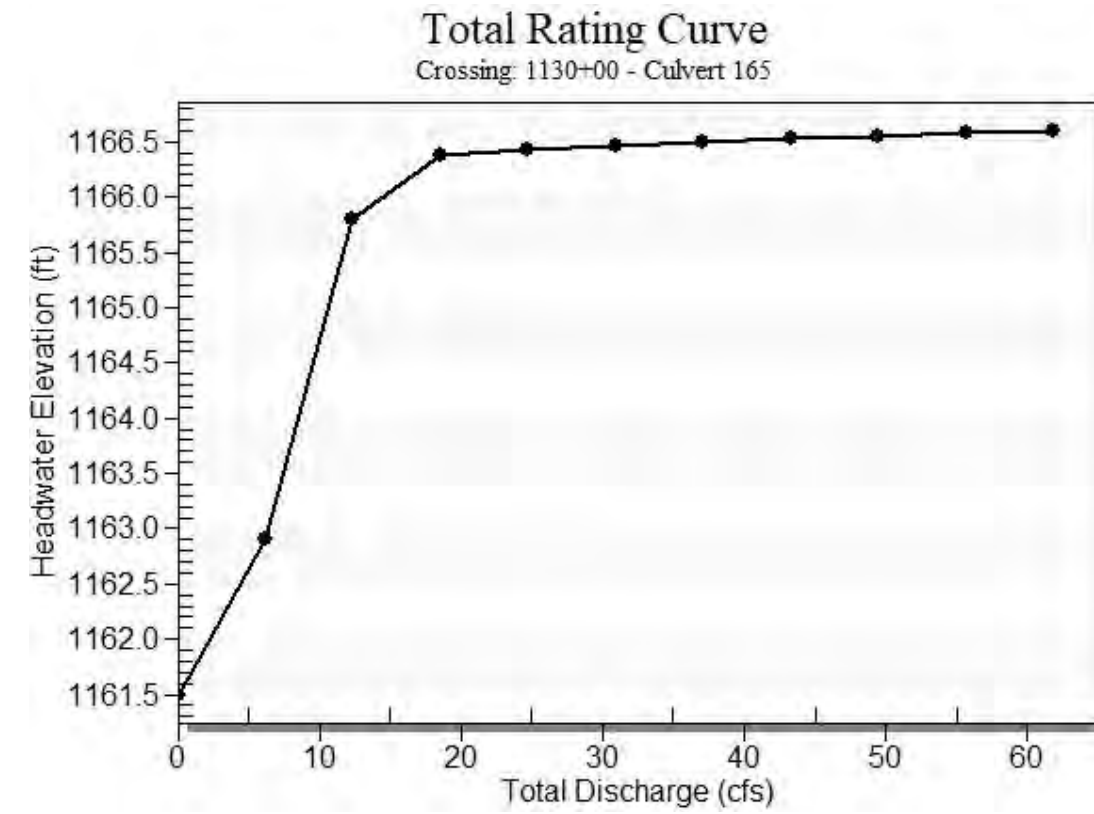
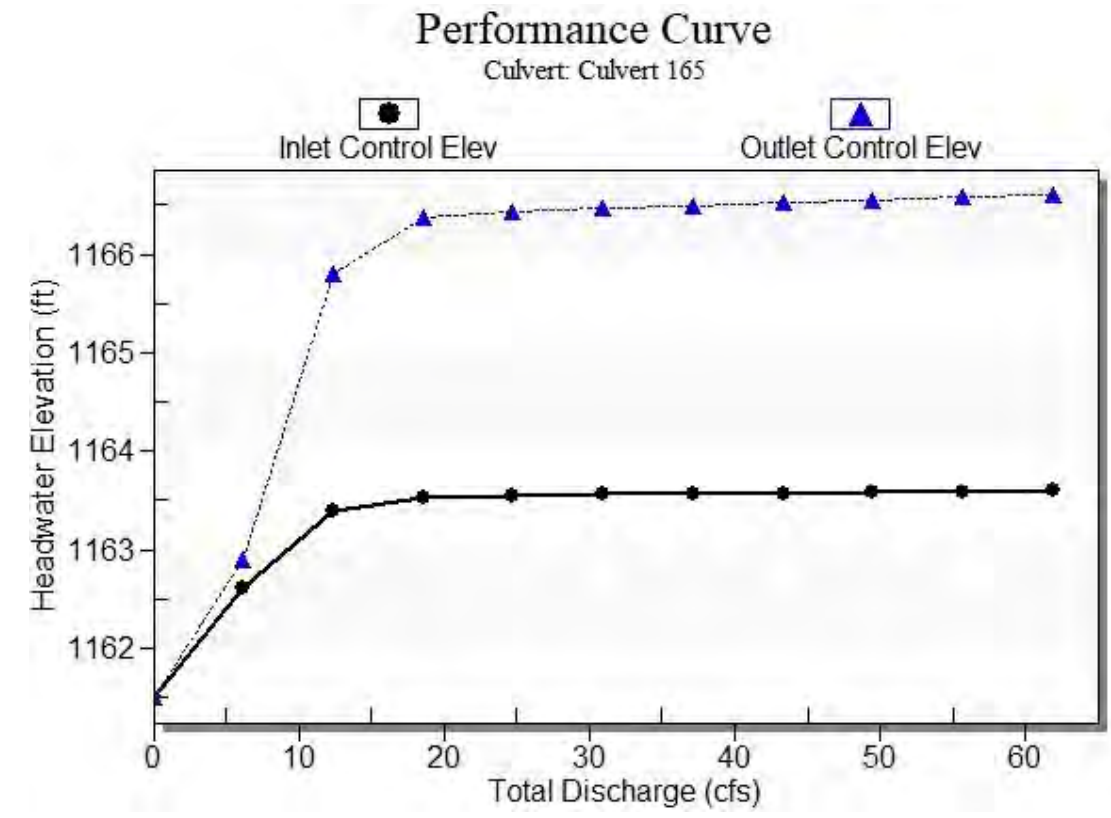


Table 2 - Culvert Summary Table: Culvert 165

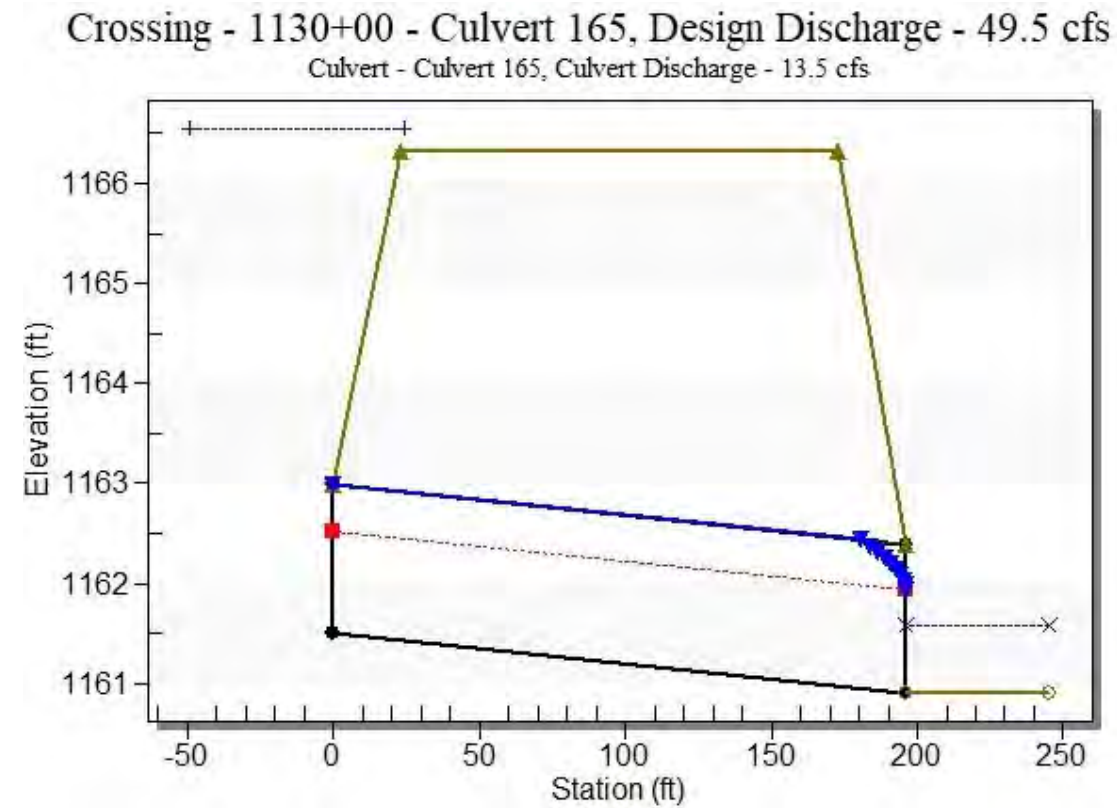
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1161.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	1162.90	1.112	1.403	2-M2c	1.483	0.657	0.657	0.194	4.384	2.044
12.38	12.38	1165.80	1.895	4.302	7-M2c	1.483	0.974	0.974	0.293	5.886	2.656
18.56	13.24	1166.38	2.035	4.879	7-M2c	1.483	1.012	1.012	0.373	6.086	3.088
24.75	13.31	1166.42	2.047	4.924	7-M2c	1.483	1.015	1.015	0.442	6.102	3.429
30.94	13.37	1166.46	2.057	4.961	7-M2c	1.483	1.017	1.017	0.504	6.116	3.717
37.13	13.42	1166.49	2.065	4.994	7-M2c	1.483	1.019	1.019	0.561	6.127	3.968
43.31	13.47	1166.53	2.074	5.025	7-M2c	1.483	1.022	1.022	0.614	6.139	4.191
49.50	13.51	1166.55	2.081	5.054	7-M2c	1.483	1.023	1.023	0.664	6.149	4.391
55.69	13.56	1166.58	2.088	5.080	7-M2c	1.483	1.025	1.025	0.711	6.158	4.574
61.88	13.60	1166.61	2.095	5.106	7-M2c	1.483	1.027	1.027	0.755	6.168	4.744

 Straight Culvert
 Inlet Elevation (invert): 1161.50 ft, Outlet Elevation (invert): 1160.91 ft
 Culvert Length: 196.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 165



Water Surface Profile Plot for Culvert: Culvert 165



Site Data - Culvert 165

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1161.50 ft
 Outlet Station: 196.00 ft
 Outlet Elevation: 1160.91 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 165

Barrel Shape: Pipe Arch
 Barrel Span: 28.90 in
 Barrel Rise: 17.80 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1130+00 - Culvert 165)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1160.91	0.00	0.00	0.00	0.00
6.19	1161.10	0.19	2.04	0.04	0.83
12.38	1161.20	0.29	2.66	0.05	0.89
18.56	1161.28	0.37	3.09	0.07	0.92
24.75	1161.35	0.44	3.43	0.08	0.95
30.94	1161.41	0.50	3.72	0.09	0.96
37.13	1161.47	0.56	3.97	0.10	0.98
43.31	1161.52	0.61	4.19	0.11	0.99
49.50	1161.57	0.66	4.39	0.12	1.00
55.69	1161.62	0.71	4.57	0.13	1.01
61.88	1161.67	0.76	4.74	0.14	1.02

Tailwater Channel Data - 1130+00 - Culvert 165

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1160.91 ft

Roadway Data for Crossing: 1130+00 - Culvert 165

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1166.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 170

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 49.5 cfs

Maximum Flow: 61.875 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1133+50 - Culvert 170

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 170 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1161.30	0.00	0.00	0.00	1
1162.71	6.19	6.19	0.00	1
1165.68	12.38	12.38	0.00	1
1166.38	18.56	13.41	4.98	17
1166.42	24.75	13.48	11.20	5
1166.46	30.94	13.53	17.32	4
1166.49	37.13	13.58	23.32	3
1166.52	43.31	13.63	29.54	3
1166.55	49.50	13.68	35.75	3
1166.58	55.69	13.71	41.94	3
1166.61	61.88	13.75	48.11	3
1166.31	13.30	13.30	0.00	Overtopping

Rating Curve Plot for Crossing: 1133+50 - Culvert 170

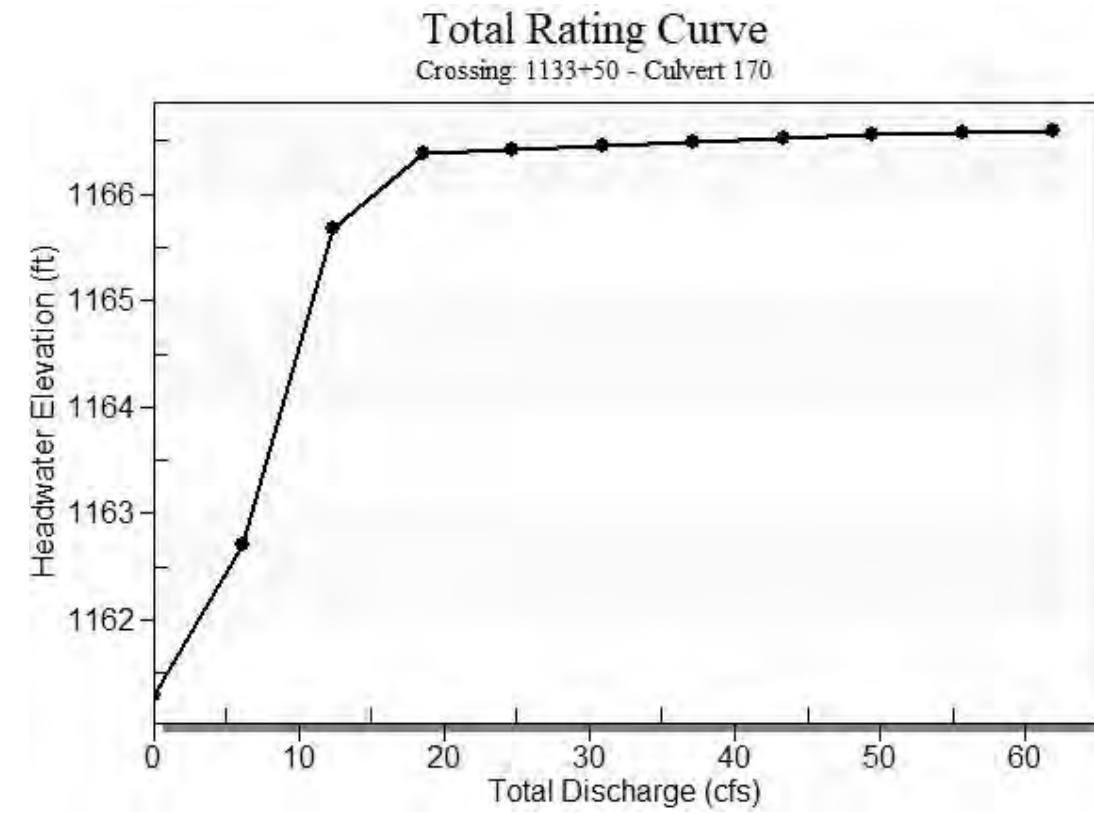
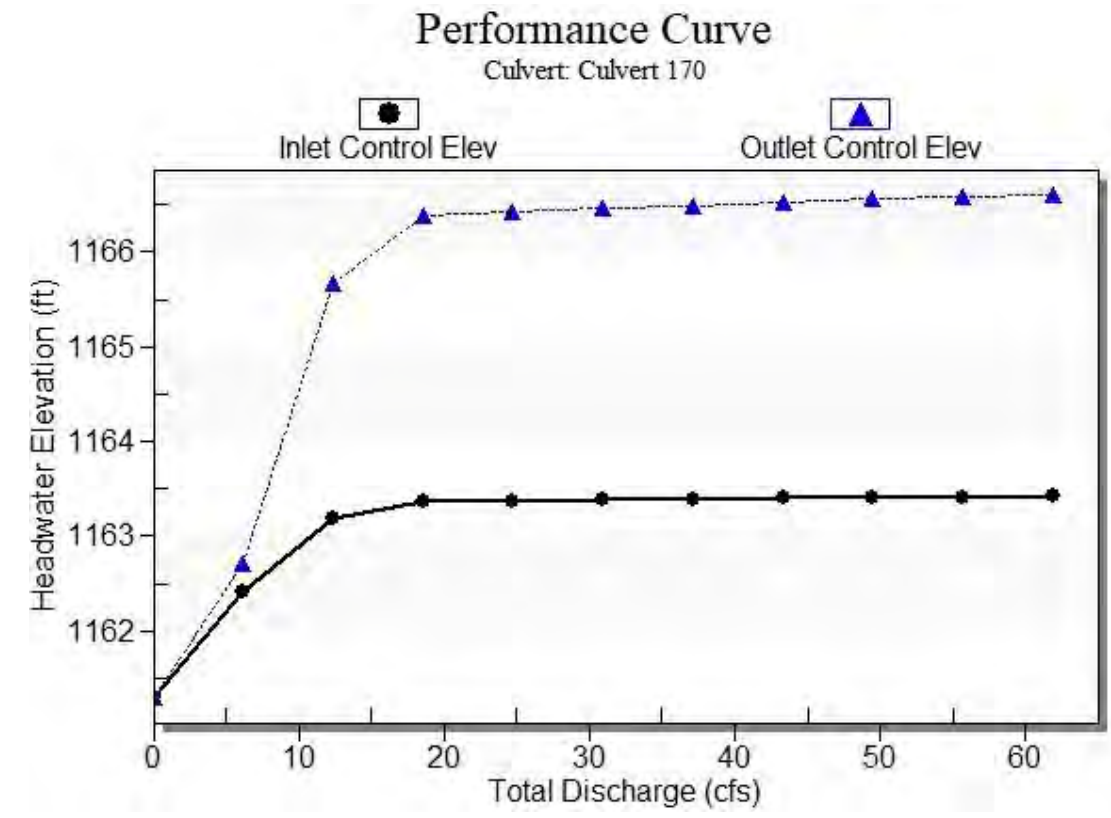


Table 2 - Culvert Summary Table: Culvert 170

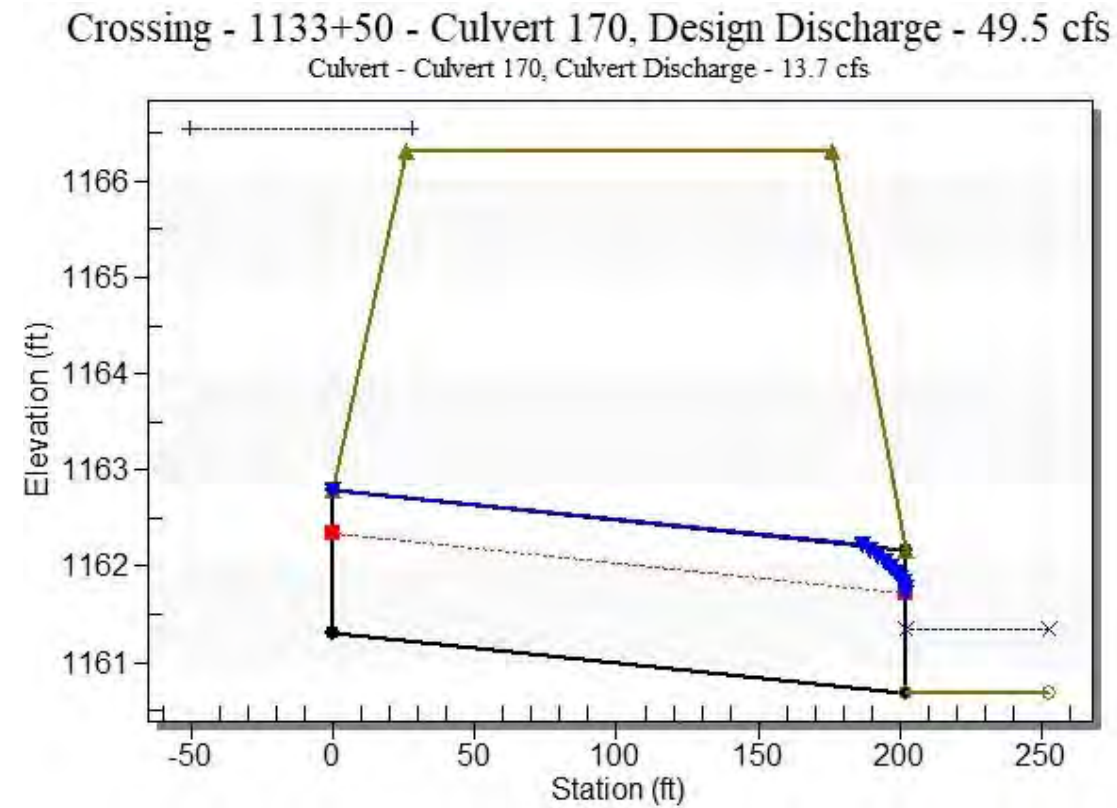
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1161.30	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	1162.71	1.112	1.406	2-M2c	1.483	0.657	0.657	0.194	4.384	2.044
12.38	12.38	1165.68	1.895	4.377	7-M2c	1.483	0.974	0.974	0.293	5.886	2.656
18.56	13.41	1166.38	2.063	5.076	7-M2c	1.483	1.019	1.019	0.373	6.124	3.088
24.75	13.48	1166.42	2.075	5.123	7-M2c	1.483	1.022	1.022	0.442	6.140	3.429
30.94	13.53	1166.46	2.084	5.160	7-M2c	1.483	1.024	1.024	0.504	6.153	3.717
37.13	13.58	1166.49	2.093	5.193	7-M2c	1.483	1.026	1.026	0.561	6.165	3.968
43.31	13.63	1166.52	2.101	5.224	7-M2c	1.483	1.028	1.028	0.614	6.175	4.191
49.50	13.68	1166.55	2.109	5.253	7-M2c	1.483	1.034	1.034	0.664	6.164	4.391
55.69	13.71	1166.58	2.116	5.280	7-M2c	1.483	1.036	1.036	0.711	6.173	4.574
61.88	13.75	1166.61	2.122	5.306	7-M2c	1.483	1.037	1.037	0.755	6.181	4.744

 Straight Culvert
 Inlet Elevation (invert): 1161.30 ft, Outlet Elevation (invert): 1160.69 ft
 Culvert Length: 202.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 170



Water Surface Profile Plot for Culvert: Culvert 170



Site Data - Culvert 170

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1161.30 ft
 Outlet Station: 202.00 ft
 Outlet Elevation: 1160.69 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 170

Barrel Shape: Pipe Arch
 Barrel Span: 28.90 in
 Barrel Rise: 17.80 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1133+50 - Culvert 170)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1160.69	0.00	0.00	0.00	0.00
6.19	1160.88	0.19	2.04	0.04	0.83
12.38	1160.98	0.29	2.66	0.05	0.89
18.56	1161.06	0.37	3.09	0.07	0.92
24.75	1161.13	0.44	3.43	0.08	0.95
30.94	1161.19	0.50	3.72	0.09	0.96
37.13	1161.25	0.56	3.97	0.10	0.98
43.31	1161.30	0.61	4.19	0.11	0.99
49.50	1161.35	0.66	4.39	0.12	1.00
55.69	1161.40	0.71	4.57	0.13	1.01
61.88	1161.45	0.76	4.74	0.14	1.02

Tailwater Channel Data - 1133+50 - Culvert 170

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1160.69 ft

Roadway Data for Crossing: 1133+50 - Culvert 170

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1166.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 175

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 49.5 cfs

Maximum Flow: 61.875 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1136+50 - Culvert 175

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 175 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1161.50	0.00	0.00	0.00	1
1162.62	6.19	6.19	0.00	1
1163.42	12.38	12.38	0.00	1
1165.07	18.56	18.56	0.00	1
1166.84	24.75	23.40	1.20	33
1166.90	30.94	23.51	7.34	6
1166.94	37.13	23.60	13.37	4
1166.97	43.31	23.69	19.55	4
1167.01	49.50	23.78	25.54	3
1167.04	55.69	23.86	31.72	3
1167.06	61.88	23.93	37.89	3
1166.81	23.33	23.33	0.00	Overtopping

Rating Curve Plot for Crossing: 1136+50 - Culvert 175

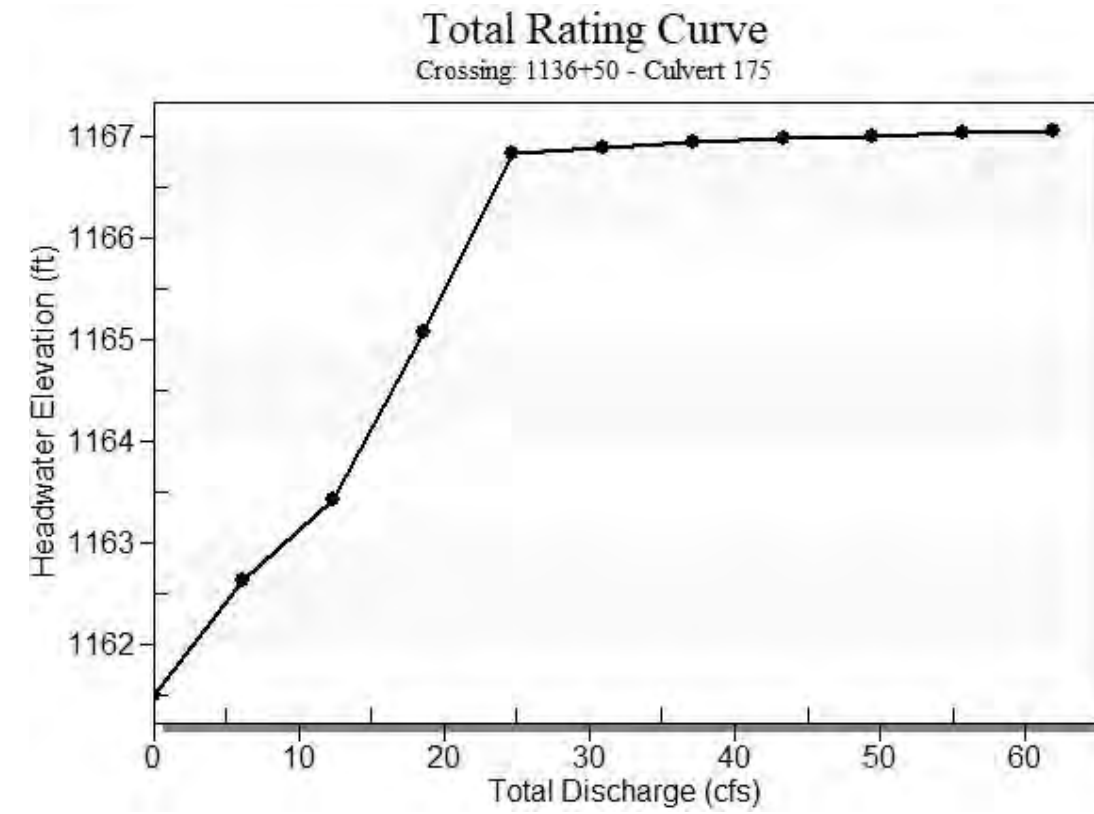
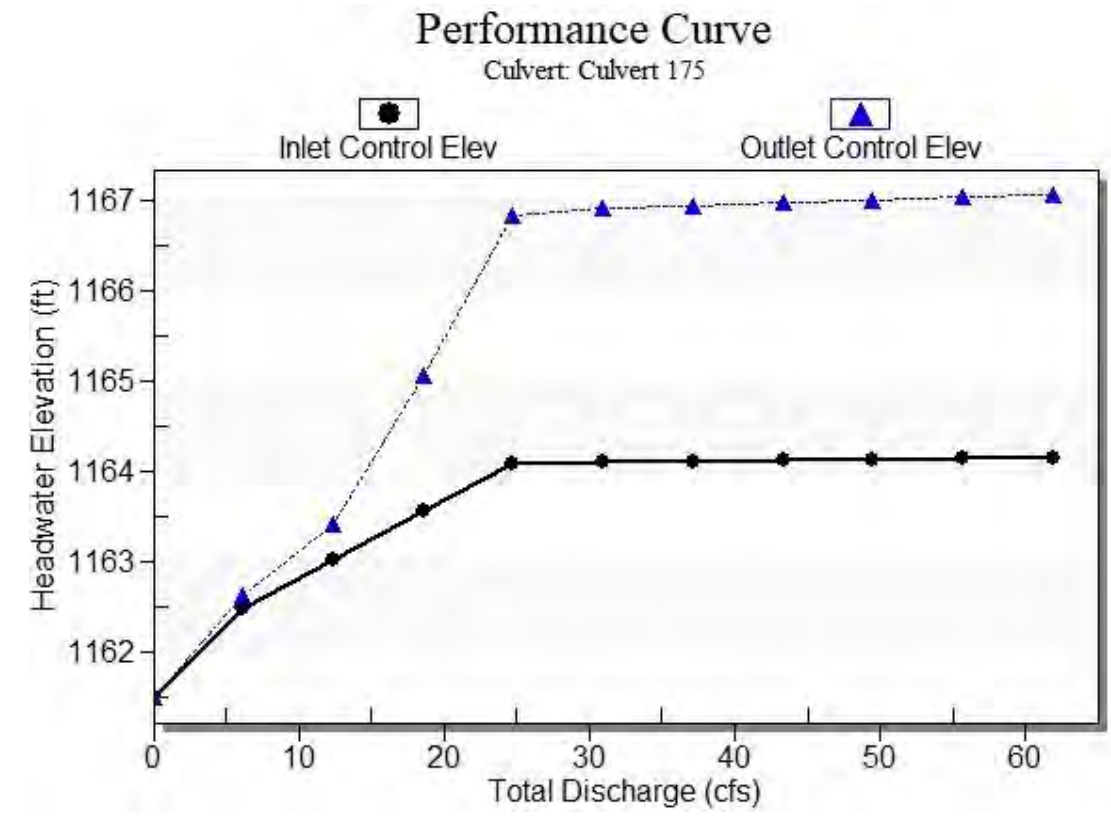


Table 2 - Culvert Summary Table: Culvert 175

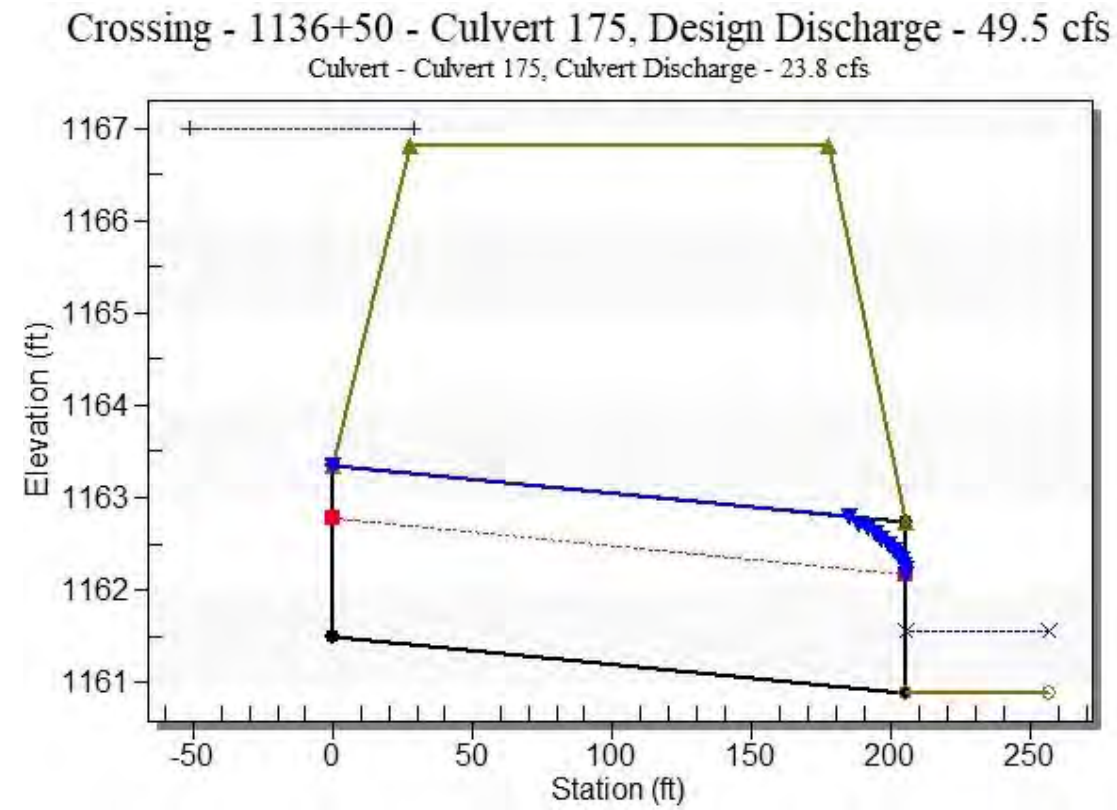
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1161.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	1162.62	0.978	1.123	2-M2c	0.957	0.582	0.582	0.194	4.067	2.044
12.38	12.38	1163.42	1.519	1.915	7-M2c	1.850	0.879	0.879	0.293	5.179	2.656
18.56	18.56	1165.07	2.056	3.571	7-M2c	1.850	1.110	1.110	0.373	6.143	3.088
24.75	23.40	1166.84	2.582	5.336	7-M2c	1.850	1.271	1.271	0.442	6.832	3.429
30.94	23.51	1166.90	2.596	5.406	7-M2c	1.850	1.275	1.275	0.504	6.849	3.717
37.13	23.60	1166.94	2.606	5.437	7-M2c	1.850	1.278	1.278	0.561	6.861	3.968
43.31	23.69	1166.97	2.618	5.474	7-M2c	1.850	1.281	1.281	0.614	6.875	4.191
49.50	23.78	1167.01	2.628	5.505	7-M2c	1.850	1.283	1.283	0.664	6.887	4.391
55.69	23.86	1167.04	2.638	5.535	7-M2c	1.850	1.285	1.285	0.711	6.899	4.574
61.88	23.93	1167.06	2.647	5.563	7-M2c	1.850	1.288	1.288	0.755	6.909	4.744

 Straight Culvert
 Inlet Elevation (invert): 1161.50 ft, Outlet Elevation (invert): 1160.89 ft
 Culvert Length: 205.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 175



Water Surface Profile Plot for Culvert: Culvert 175



Site Data - Culvert 175

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1161.50 ft
 Outlet Station: 205.00 ft
 Outlet Elevation: 1160.89 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 175

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1136+50 - Culvert 175)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1160.89	0.00	0.00	0.00	0.00
6.19	1161.08	0.19	2.04	0.04	0.83
12.38	1161.18	0.29	2.66	0.05	0.89
18.56	1161.26	0.37	3.09	0.07	0.92
24.75	1161.33	0.44	3.43	0.08	0.95
30.94	1161.39	0.50	3.72	0.09	0.96
37.13	1161.45	0.56	3.97	0.10	0.98
43.31	1161.50	0.61	4.19	0.11	0.99
49.50	1161.55	0.66	4.39	0.12	1.00
55.69	1161.60	0.71	4.57	0.13	1.01
61.88	1161.65	0.76	4.74	0.14	1.02

Tailwater Channel Data - 1136+50 - Culvert 175

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1160.89 ft

Roadway Data for Crossing: 1136+50 - Culvert 175

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1166.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 180

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 49.5 cfs

Maximum Flow: 61.875 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1143+50 - Culvert 180

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 180 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1162.00	0.00	0.00	0.00	1
1163.12	6.19	6.19	0.00	1
1163.92	12.38	12.38	0.00	1
1165.57	18.56	18.56	0.00	1
1167.34	24.75	23.40	1.20	33
1167.40	30.94	23.51	7.34	6
1167.44	37.13	23.60	13.37	4
1167.47	43.31	23.69	19.55	4
1167.51	49.50	23.78	25.54	3
1167.54	55.69	23.86	31.72	3
1167.56	61.88	23.93	37.89	3
1167.31	23.33	23.33	0.00	Overtopping

Rating Curve Plot for Crossing: 1143+50 - Culvert 180

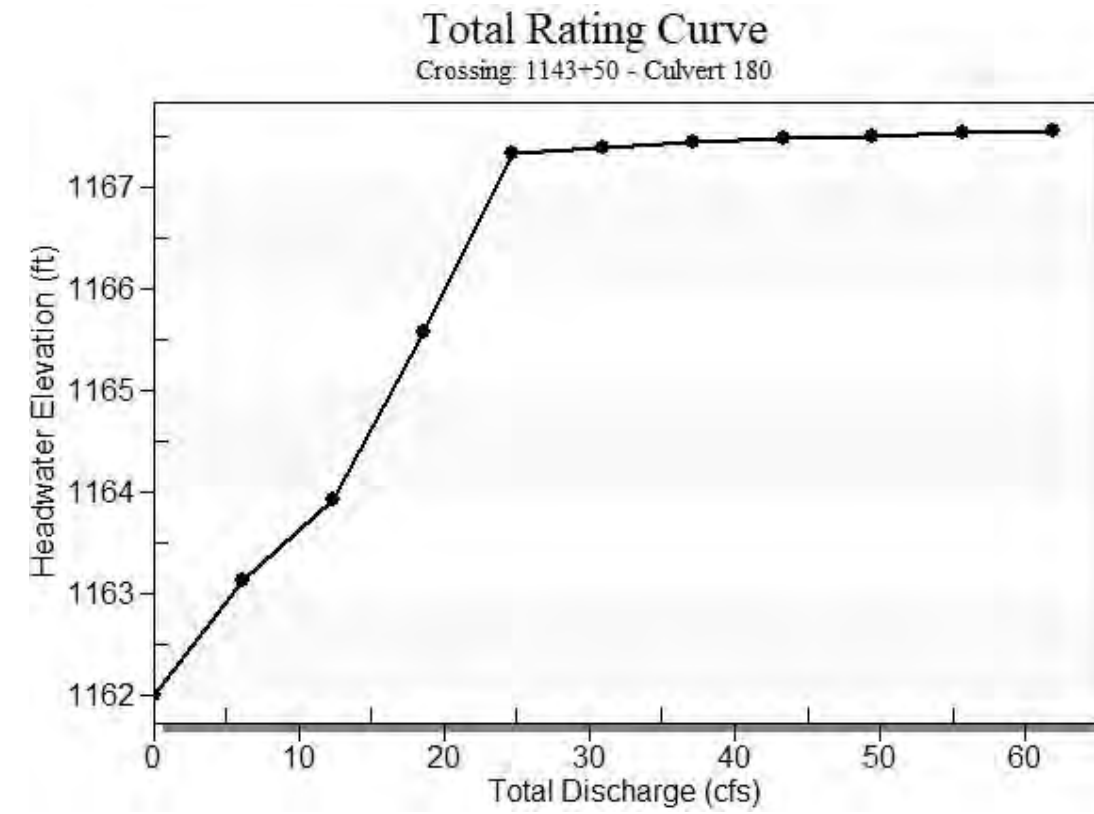
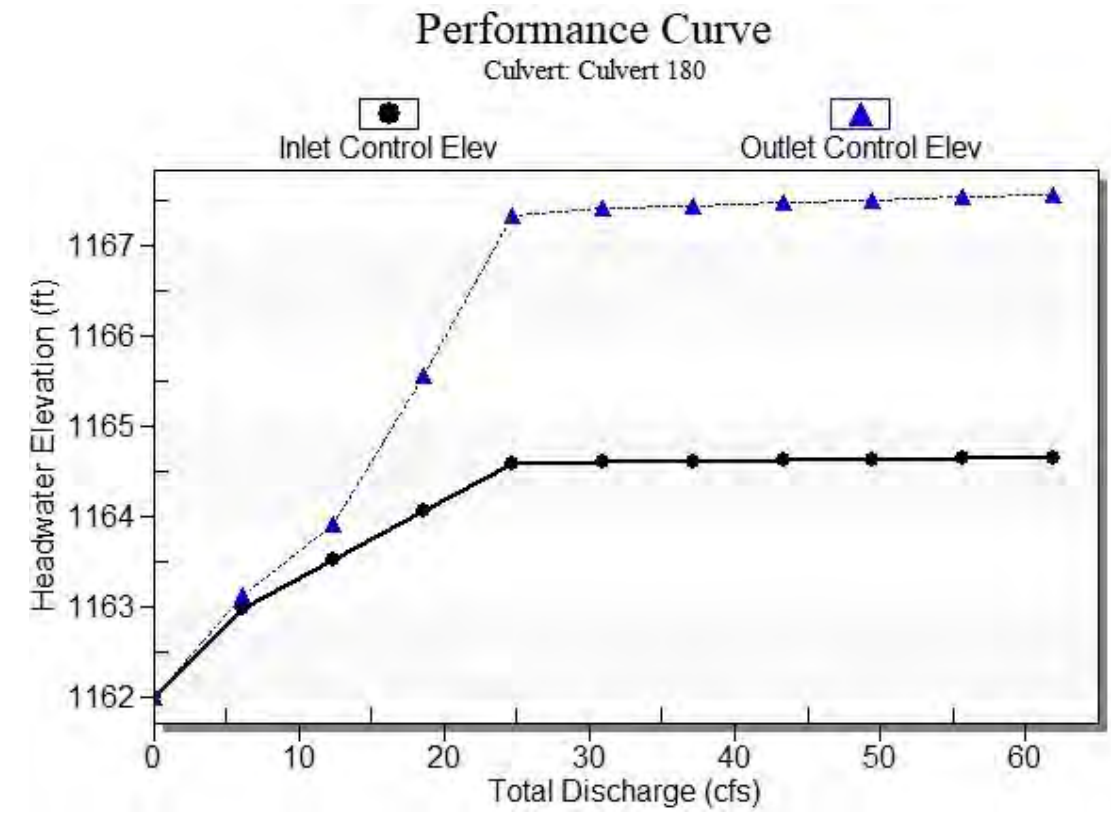


Table 2 - Culvert Summary Table: Culvert 180

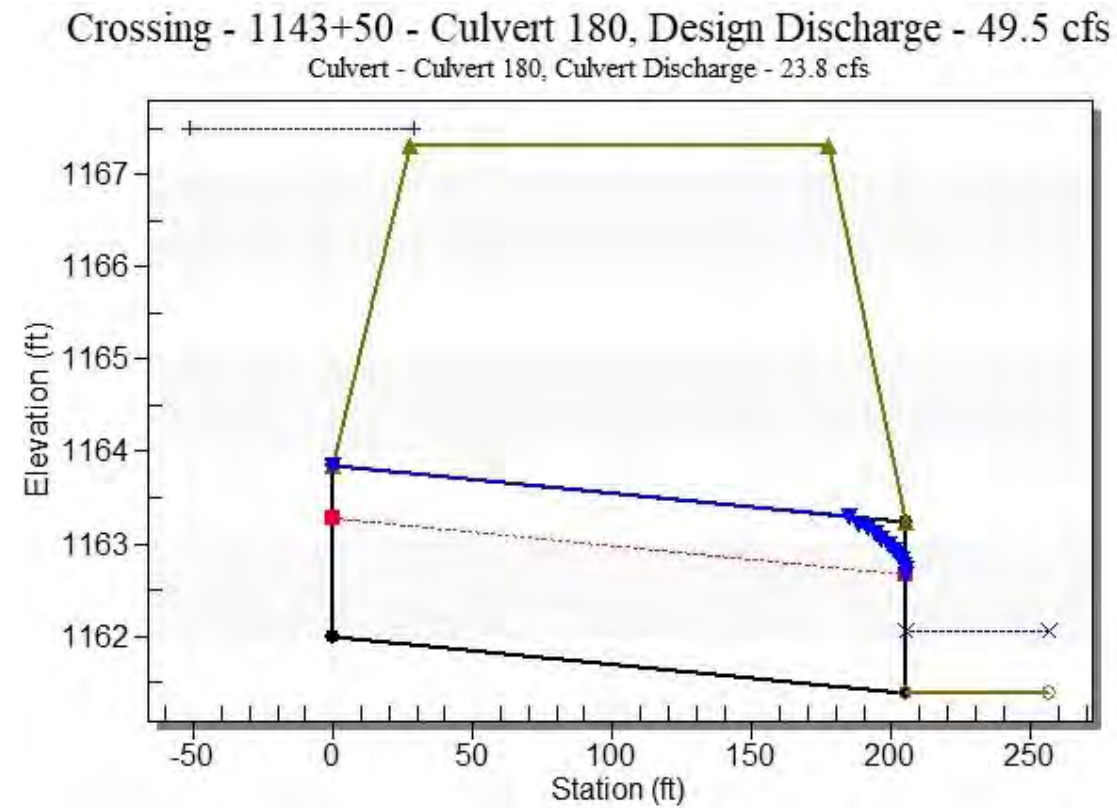
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1162.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	1163.12	0.978	1.123	2-M2c	0.957	0.582	0.582	0.194	4.067	2.044
12.38	12.38	1163.92	1.519	1.915	7-M2c	1.850	0.879	0.879	0.293	5.179	2.656
18.56	18.56	1165.57	2.056	3.571	7-M2c	1.850	1.110	1.110	0.373	6.143	3.088
24.75	23.40	1167.34	2.582	5.336	7-M2c	1.850	1.271	1.271	0.442	6.832	3.429
30.94	23.51	1167.40	2.596	5.406	7-M2c	1.850	1.275	1.275	0.504	6.849	3.717
37.13	23.60	1167.44	2.606	5.437	7-M2c	1.850	1.278	1.278	0.561	6.861	3.968
43.31	23.69	1167.47	2.618	5.474	7-M2c	1.850	1.281	1.281	0.614	6.875	4.191
49.50	23.78	1167.51	2.628	5.505	7-M2c	1.850	1.283	1.283	0.664	6.887	4.391
55.69	23.86	1167.54	2.638	5.535	7-M2c	1.850	1.285	1.285	0.711	6.899	4.574
61.88	23.93	1167.56	2.647	5.563	7-M2c	1.850	1.288	1.288	0.755	6.909	4.744

 Straight Culvert
 Inlet Elevation (invert): 1162.00 ft, Outlet Elevation (invert): 1161.39 ft
 Culvert Length: 205.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 180



Water Surface Profile Plot for Culvert: Culvert 180



Site Data - Culvert 180

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1162.00 ft
 Outlet Station: 205.00 ft
 Outlet Elevation: 1161.39 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 180

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1143+50 - Culvert 180)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1161.39	0.00	0.00	0.00	0.00
6.19	1161.58	0.19	2.04	0.04	0.83
12.38	1161.68	0.29	2.66	0.05	0.89
18.56	1161.76	0.37	3.09	0.07	0.92
24.75	1161.83	0.44	3.43	0.08	0.95
30.94	1161.89	0.50	3.72	0.09	0.96
37.13	1161.95	0.56	3.97	0.10	0.98
43.31	1162.00	0.61	4.19	0.11	0.99
49.50	1162.05	0.66	4.39	0.12	1.00
55.69	1162.10	0.71	4.57	0.13	1.01
61.88	1162.15	0.76	4.74	0.14	1.02

Tailwater Channel Data - 1143+50 - Culvert 180

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1161.39 ft

Roadway Data for Crossing: 1143+50 - Culvert 180

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1167.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 185

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 49.5 cfs

Maximum Flow: 61.875 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1151+00 - Culvert 185

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 185 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1162.50	0.00	0.00	0.00	1
1163.62	6.19	6.19	0.00	1
1164.42	12.38	12.38	0.00	1
1166.07	18.56	18.56	0.00	1
1168.31	24.75	24.56	0.03	86
1168.39	30.94	24.73	6.05	6
1168.43	37.13	24.84	12.09	4
1168.47	43.31	24.92	18.31	4
1168.50	49.50	25.00	24.30	3
1168.53	55.69	25.07	30.49	3
1168.56	61.88	25.14	36.67	3
1168.31	24.55	24.55	0.00	Overtopping

Rating Curve Plot for Crossing: 1151+00 - Culvert 185

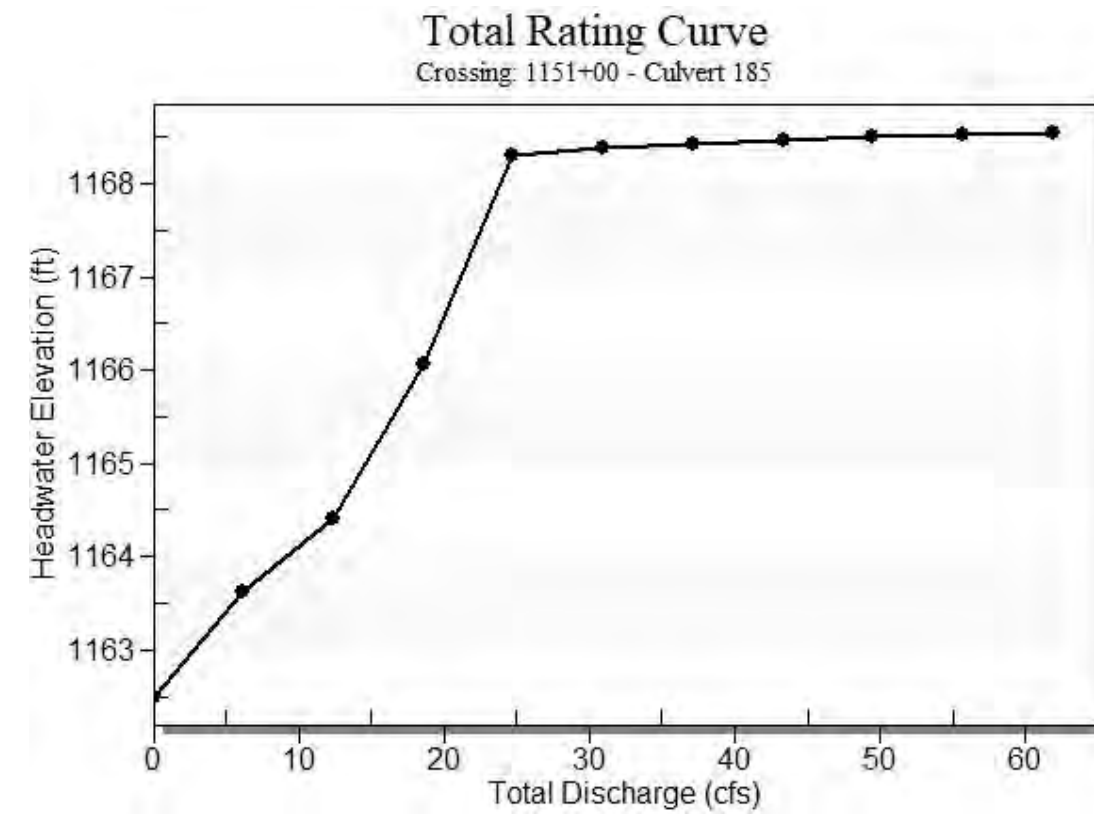
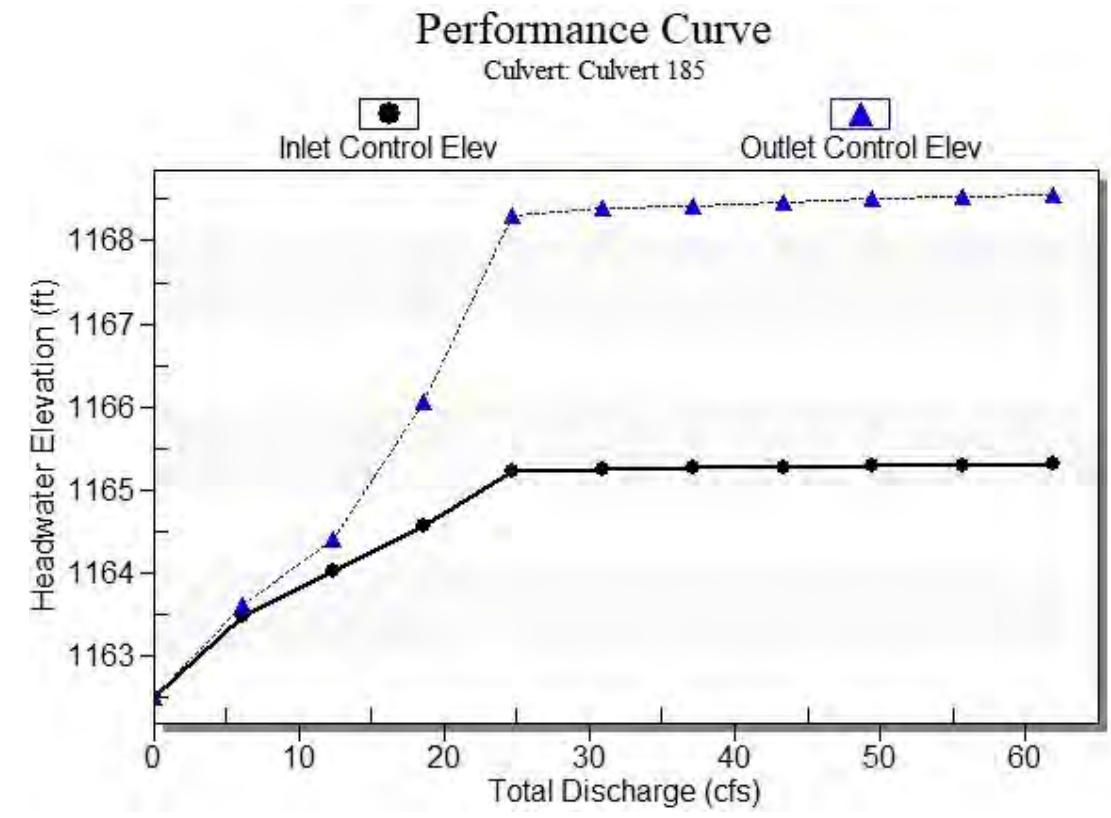


Table 2 - Culvert Summary Table: Culvert 185

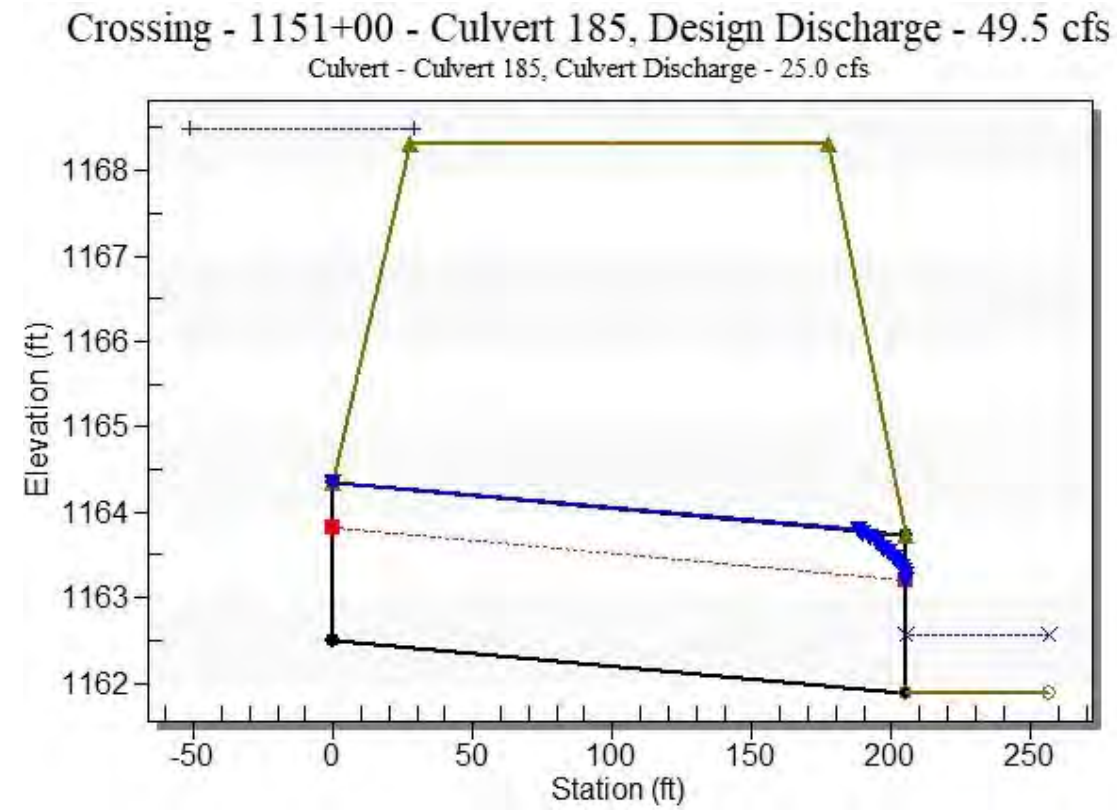
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1162.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	1163.62	0.978	1.123	2-M2c	0.957	0.582	0.582	0.194	4.067	2.044
12.38	12.38	1164.42	1.519	1.915	7-M2c	1.850	0.879	0.879	0.293	5.179	2.656
18.56	18.56	1166.07	2.056	3.571	7-M2c	1.850	1.110	1.110	0.373	6.143	3.088
24.75	24.56	1168.31	2.727	5.812	7-M2c	1.850	1.307	1.307	0.442	7.001	3.429
30.94	24.73	1168.39	2.749	5.885	7-M2c	1.850	1.312	1.312	0.504	7.027	3.717
37.13	24.84	1168.43	2.763	5.929	7-M2c	1.850	1.315	1.315	0.561	7.042	3.968
43.31	24.92	1168.47	2.775	5.966	7-M2c	1.850	1.317	1.317	0.614	7.055	4.191
49.50	25.00	1168.50	2.784	5.998	7-M2c	1.850	1.320	1.320	0.664	7.066	4.391
55.69	25.07	1168.53	2.794	6.029	7-M2c	1.850	1.322	1.322	0.711	7.077	4.574
61.88	25.14	1168.56	2.803	6.058	7-M2c	1.850	1.324	1.324	0.755	7.086	4.744

 Straight Culvert
 Inlet Elevation (invert): 1162.50 ft, Outlet Elevation (invert): 1161.89 ft
 Culvert Length: 205.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 185



Water Surface Profile Plot for Culvert: Culvert 185



Site Data - Culvert 185

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1162.50 ft
 Outlet Station: 205.00 ft
 Outlet Elevation: 1161.89 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 185

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1151+00 - Culvert 185)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1161.89	0.00	0.00	0.00	0.00
6.19	1162.08	0.19	2.04	0.04	0.83
12.38	1162.18	0.29	2.66	0.05	0.89
18.56	1162.26	0.37	3.09	0.07	0.92
24.75	1162.33	0.44	3.43	0.08	0.95
30.94	1162.39	0.50	3.72	0.09	0.96
37.13	1162.45	0.56	3.97	0.10	0.98
43.31	1162.50	0.61	4.19	0.11	0.99
49.50	1162.55	0.66	4.39	0.12	1.00
55.69	1162.60	0.71	4.57	0.13	1.01
61.88	1162.65	0.76	4.74	0.14	1.02

Tailwater Channel Data - 1151+00 - Culvert 185

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1161.89 ft

Roadway Data for Crossing: 1151+00 - Culvert 185

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1168.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 190

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 298 cfs

Maximum Flow: 375 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1156+56 - Culvert 190

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 190 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1163.00	0.00	0.00	0.00	1
1168.91	37.50	28.72	8.73	13
1169.10	75.00	29.28	45.41	6
1169.23	112.50	29.71	82.60	5
1169.35	150.00	30.05	119.63	4
1169.46	187.50	30.34	157.02	4
1169.55	225.00	30.60	194.34	4
1169.65	262.50	30.89	231.34	3
1169.73	298.00	31.14	266.72	3
1169.82	337.50	31.39	306.05	3
1169.90	375.00	31.62	343.37	3
1168.81	28.44	28.44	0.00	Overtopping

Rating Curve Plot for Crossing: 1156+56 - Culvert 190

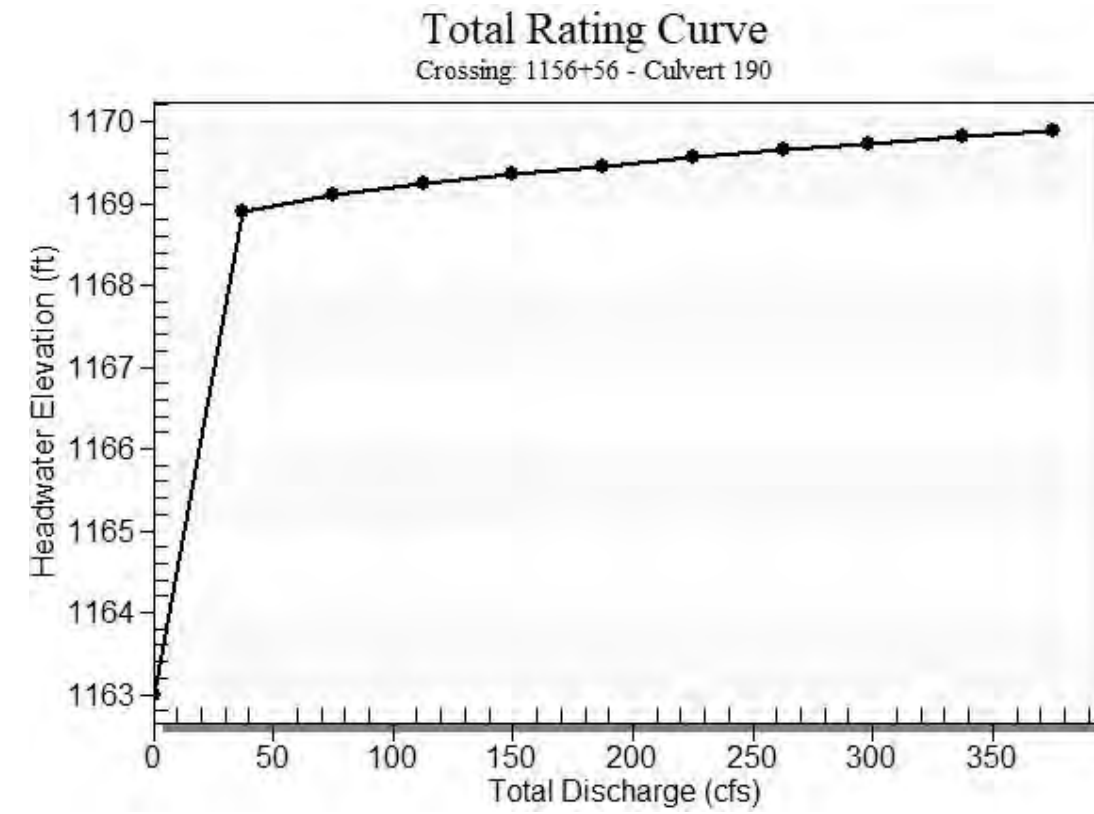
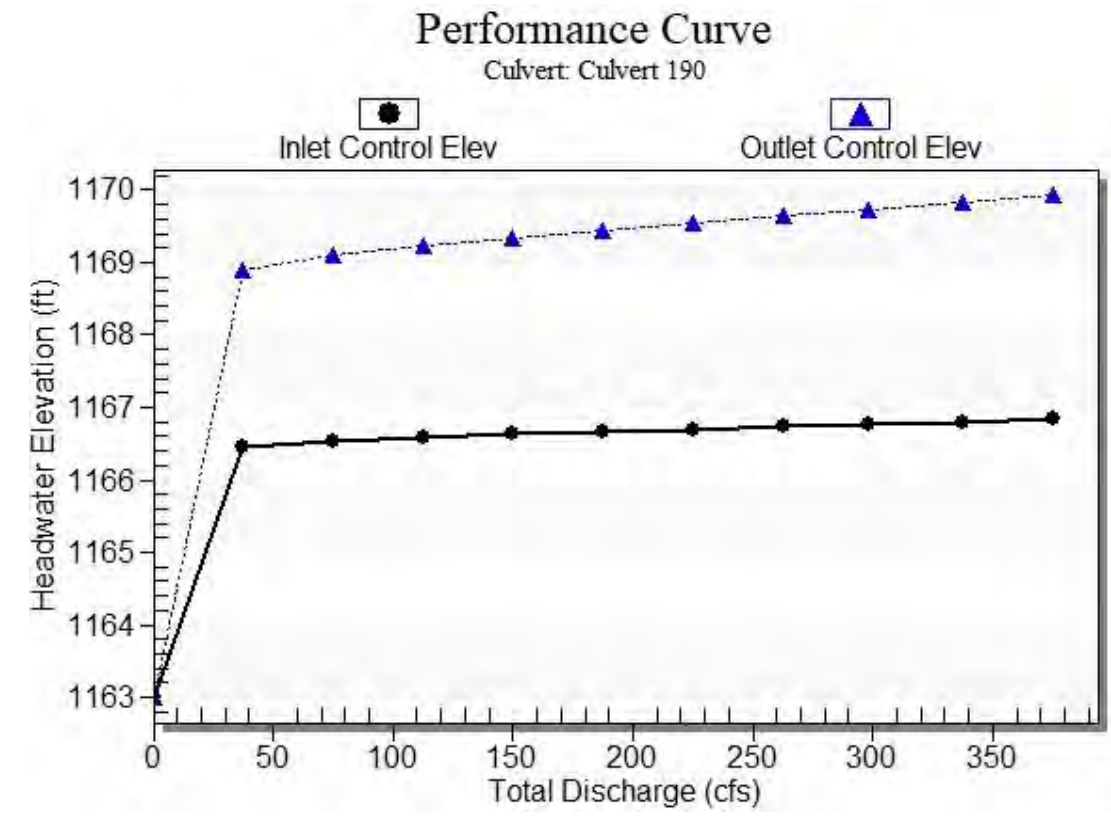


Table 2 - Culvert Summary Table: Culvert 190

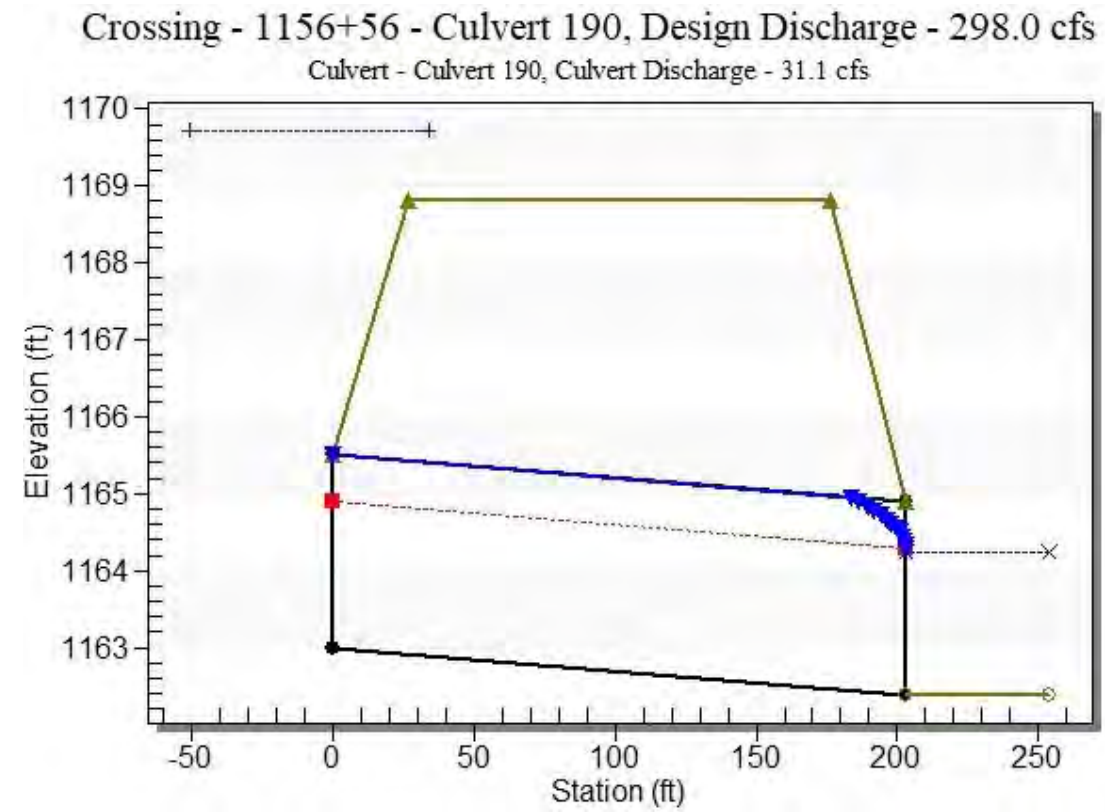
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1163.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
37.50	28.72	1168.91	3.461	5.901	7-M2c	2.500	1.825	1.825	0.564	7.480	3.982
75.00	29.28	1169.10	3.530	6.094	7-M2c	2.500	1.843	1.843	0.844	7.550	5.066
112.50	29.71	1169.23	3.584	6.232	7-M2c	2.500	1.856	1.856	1.066	7.603	5.801
150.00	30.05	1169.35	3.628	6.349	7-M2c	2.500	1.866	1.866	1.255	7.646	6.371
187.50	30.34	1169.46	3.665	6.446	7-M2c	2.500	1.875	1.875	1.423	7.682	6.841
225.00	30.60	1169.55	3.700	6.554	7-M2c	2.500	1.883	1.883	1.575	7.716	7.244
262.50	30.89	1169.65	3.737	6.645	7-M2c	2.500	1.891	1.891	1.715	7.752	7.598
298.00	31.14	1169.73	3.771	6.728	7-M2c	2.500	1.899	1.899	1.839	7.784	7.898
337.50	31.39	1169.82	3.805	6.819	7-M2t	2.500	1.906	1.969	1.969	7.572	8.201
375.00	31.62	1169.90	3.835	6.937	7-M2t	2.500	1.913	2.084	2.084	7.231	8.464

 Straight Culvert
 Inlet Elevation (invert): 1163.00 ft, Outlet Elevation (invert): 1162.39 ft
 Culvert Length: 203.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 190



Water Surface Profile Plot for Culvert: Culvert 190



Site Data - Culvert 190

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1163.00 ft
 Outlet Station: 203.00 ft
 Outlet Elevation: 1162.39 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 190

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1156+56 - Culvert 190)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1162.39	0.00	0.00	0.00	0.00
37.50	1162.95	0.56	3.98	0.11	0.98
75.00	1163.23	0.84	5.07	0.16	1.04
112.50	1163.46	1.07	5.80	0.20	1.07
150.00	1163.64	1.25	6.37	0.23	1.10
187.50	1163.81	1.42	6.84	0.27	1.12
225.00	1163.96	1.57	7.24	0.29	1.13
262.50	1164.11	1.72	7.60	0.32	1.15
298.00	1164.23	1.84	7.90	0.34	1.16
337.50	1164.36	1.97	8.20	0.37	1.17
375.00	1164.47	2.08	8.46	0.39	1.18

Tailwater Channel Data - 1156+56 - Culvert 190

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1162.39 ft

Roadway Data for Crossing: 1156+56 - Culvert 190

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1168.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 200

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 31 cfs

Maximum Flow: 37 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1180+00 - Culvert 200

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 200 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1165.00	0.00	0.00	0.00	1
1166.07	3.70	3.70	0.00	1
1166.59	7.40	7.40	0.00	1
1167.01	11.10	11.10	0.00	1
1167.44	14.80	14.80	0.00	1
1168.00	18.50	18.50	0.00	1
1168.85	22.20	22.20	0.00	1
1169.34	25.90	24.12	1.66	21
1169.38	29.60	24.26	5.27	5
1169.39	31.00	24.30	6.55	3
1169.43	37.00	24.37	12.57	4
1169.31	24.00	24.00	0.00	Overtopping

Rating Curve Plot for Crossing: 1180+00 - Culvert 200

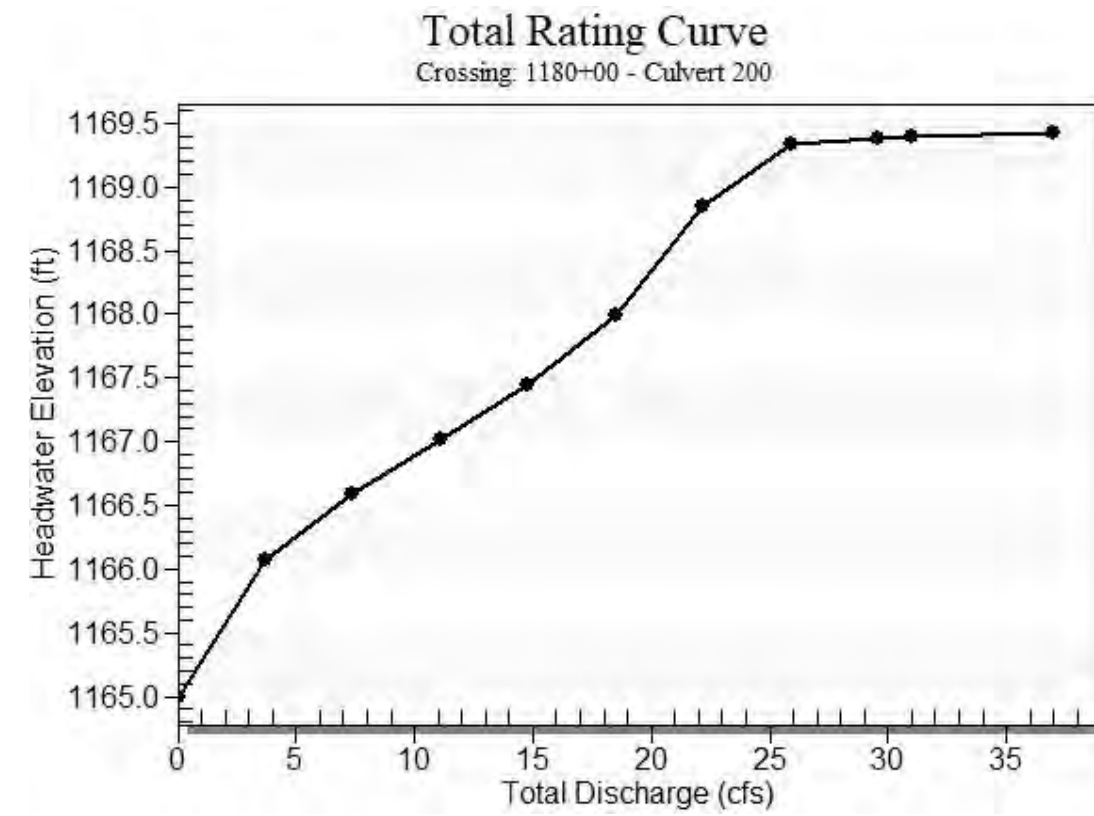
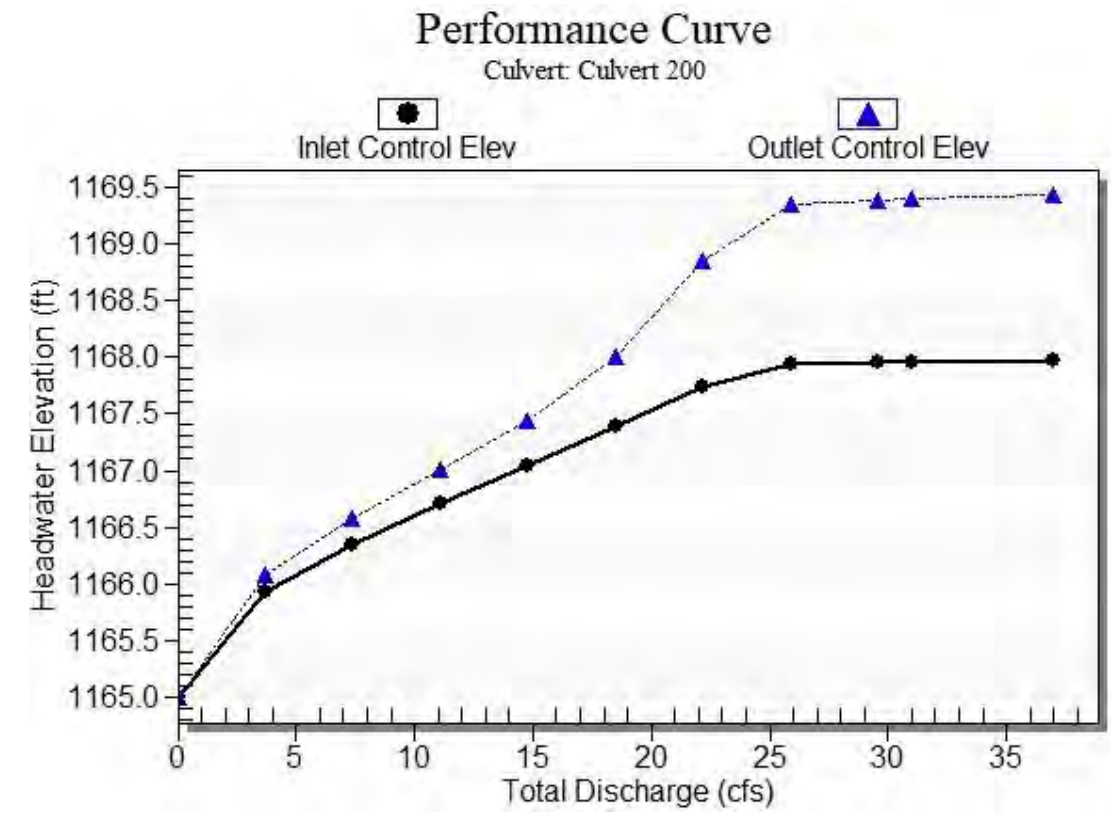


Table 2 - Culvert Summary Table: Culvert 200

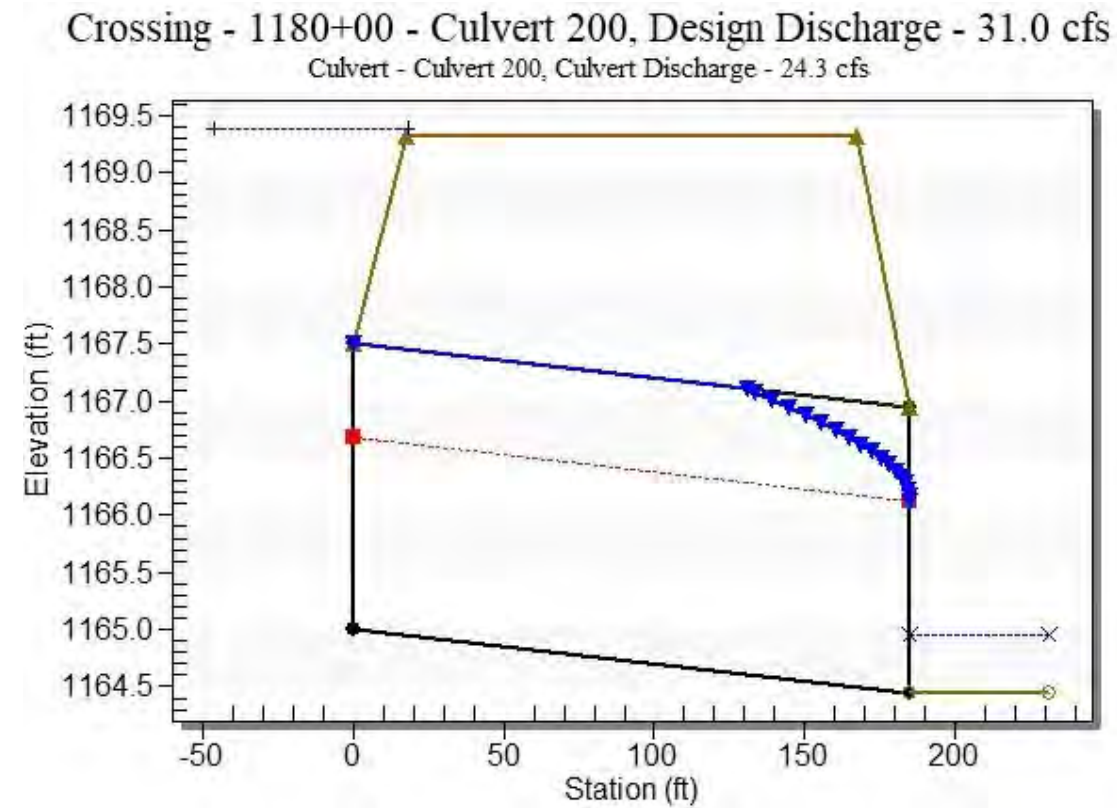
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1165.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.70	3.70	1166.07	0.932	1.072	2-M2c	0.922	0.629	0.629	0.143	3.819	1.677
7.40	7.40	1166.59	1.352	1.585	2-M2c	1.374	0.899	0.899	0.216	4.658	2.188
11.10	11.10	1167.01	1.710	2.014	2-M2c	1.832	1.115	1.115	0.275	5.241	2.550
14.80	14.80	1167.44	2.046	2.443	2-M2c	2.500	1.296	1.296	0.326	5.763	2.839
18.50	18.50	1168.00	2.383	2.998	7-M2c	2.500	1.454	1.454	0.372	6.246	3.084
22.20	22.20	1168.85	2.739	3.850	7-M2c	2.500	1.599	1.599	0.415	6.694	3.296
25.90	24.12	1169.34	2.937	4.342	7-M2c	2.500	1.668	1.668	0.454	6.930	3.486
29.60	24.26	1169.38	2.951	4.379	7-M2c	2.500	1.673	1.673	0.491	6.947	3.660
31.00	24.30	1169.39	2.956	4.389	7-M2c	2.500	1.675	1.675	0.505	6.952	3.720
37.00	24.37	1169.43	2.963	4.432	7-M2c	2.500	1.677	1.677	0.560	6.961	3.963

 Straight Culvert
 Inlet Elevation (invert): 1165.00 ft, Outlet Elevation (invert): 1164.45 ft
 Culvert Length: 185.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 200



Water Surface Profile Plot for Culvert: Culvert 200



Site Data - Culvert 200

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1165.00 ft
 Outlet Station: 185.00 ft
 Outlet Elevation: 1164.45 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 200

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1180+00 - Culvert 200)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1164.45	0.00	0.00	0.00	0.00
3.70	1164.59	0.14	1.68	0.03	0.79
7.40	1164.67	0.22	2.19	0.04	0.85
11.10	1164.73	0.28	2.55	0.05	0.88
14.80	1164.78	0.33	2.84	0.06	0.90
18.50	1164.82	0.37	3.08	0.07	0.92
22.20	1164.86	0.41	3.30	0.08	0.94
25.90	1164.90	0.45	3.49	0.08	0.95
29.60	1164.94	0.49	3.66	0.09	0.96
31.00	1164.95	0.50	3.72	0.09	0.96
37.00	1165.01	0.56	3.96	0.10	0.98

Tailwater Channel Data - 1180+00 - Culvert 200

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1164.45 ft

Roadway Data for Crossing: 1180+00 - Culvert 200

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1169.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 205

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 57.33 cfs

Maximum Flow: 72 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1198+50 - Culvert 205

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 205 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1167.00	0.00	0.00	0.00	1
1168.56	7.20	7.20	0.00	1
1169.39	14.40	14.40	0.00	1
1170.73	21.60	21.60	0.00	1
1172.33	28.80	27.60	1.06	42
1172.40	36.00	27.85	8.05	6
1172.45	43.20	28.01	15.00	4
1172.49	50.40	28.14	22.17	4
1172.52	57.33	28.26	28.86	3
1172.56	64.80	28.37	36.29	3
1172.59	72.00	28.47	43.46	3
1172.31	27.51	27.51	0.00	Overtopping

Rating Curve Plot for Crossing: 1198+50 - Culvert 205

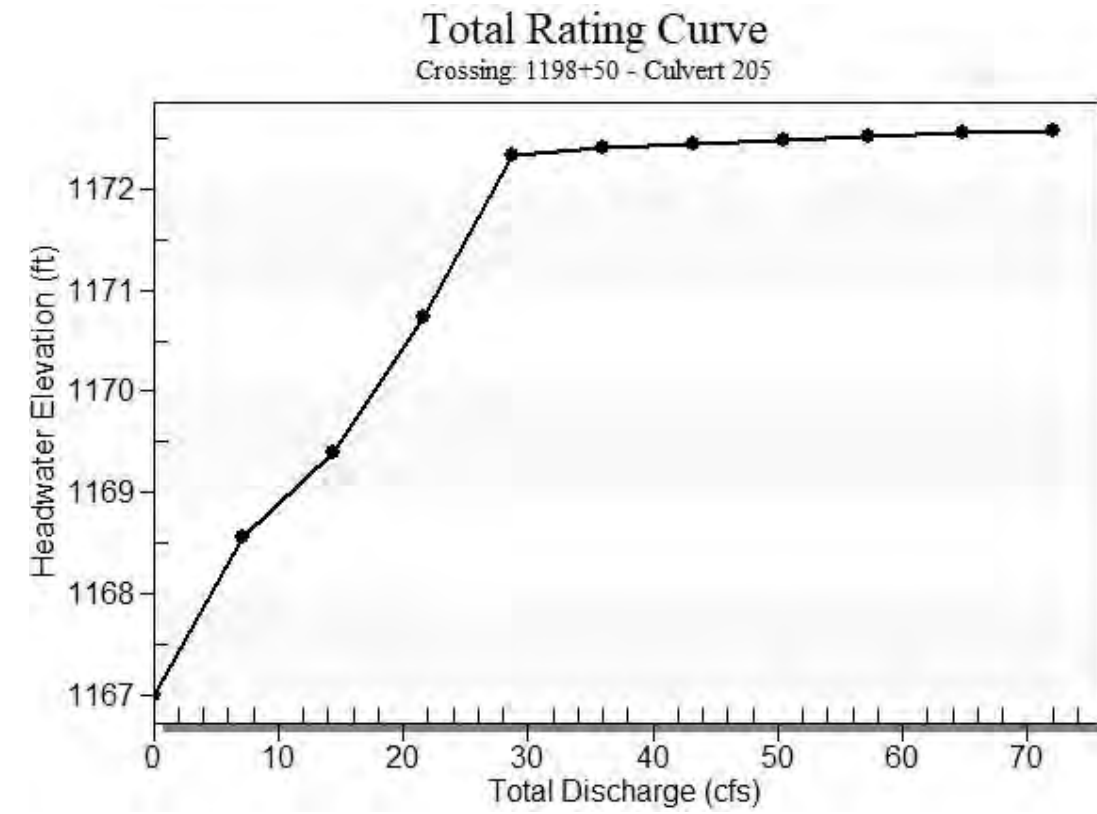
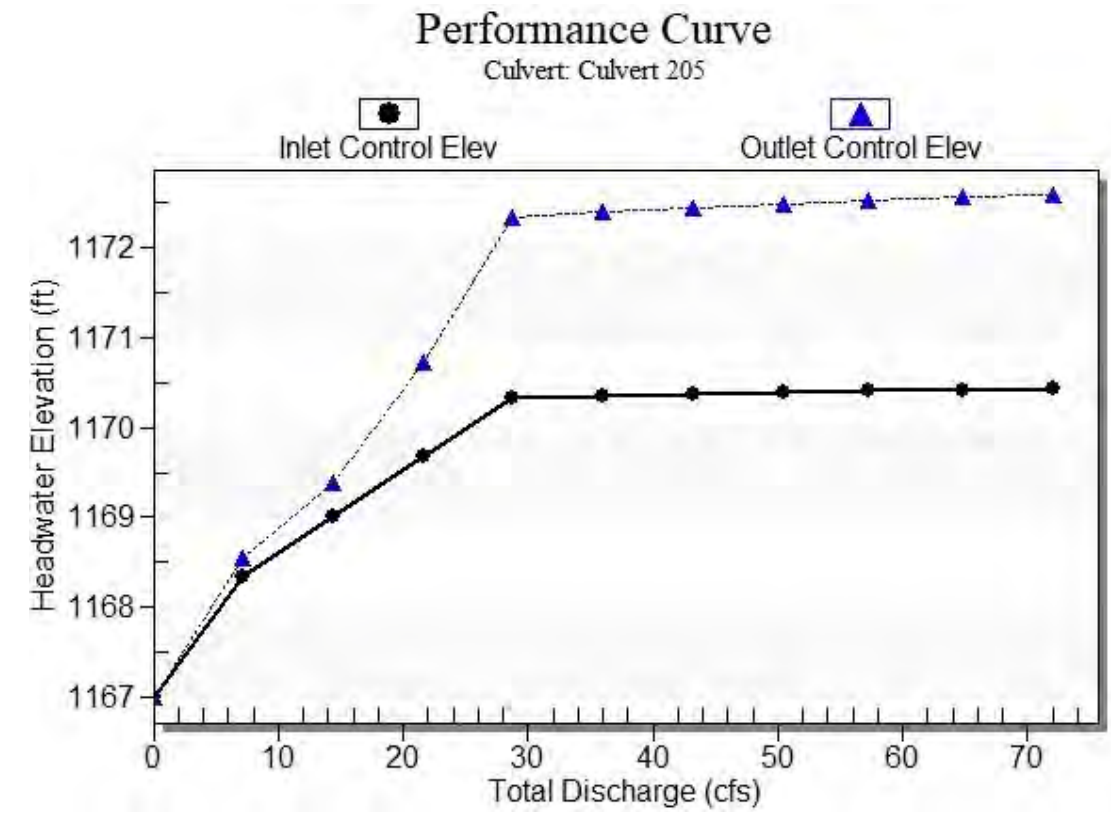


Table 2 - Culvert Summary Table: Culvert 205

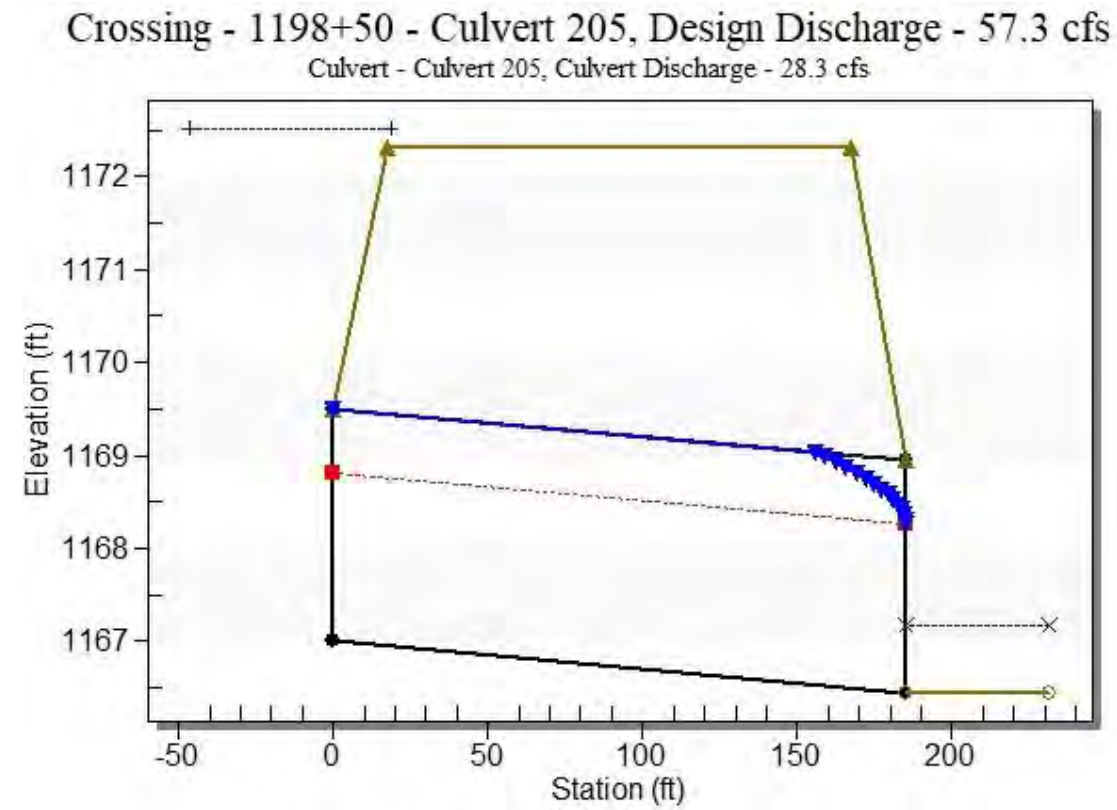
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1167.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.20	7.20	1168.56	1.332	1.559	2-M2c	1.350	0.886	0.886	0.213	4.624	2.165
14.40	14.40	1169.39	2.010	2.395	2-M2c	2.500	1.278	1.278	0.321	5.707	2.812
21.60	21.60	1170.73	2.679	3.725	7-M2c	2.500	1.577	1.577	0.408	6.620	3.264
28.80	27.60	1172.33	3.325	5.333	7-M2c	2.500	1.789	1.789	0.483	7.341	3.624
36.00	27.85	1172.40	3.356	5.401	7-M2c	2.500	1.797	1.797	0.551	7.373	3.925
43.20	28.01	1172.45	3.375	5.447	7-M2c	2.500	1.802	1.802	0.613	7.392	4.187
50.40	28.14	1172.49	3.391	5.487	7-M2c	2.500	1.807	1.807	0.671	7.409	4.418
57.33	28.26	1172.52	3.404	5.521	7-M2c	2.500	1.810	1.810	0.723	7.423	4.620
64.80	28.37	1172.56	3.418	5.555	7-M2c	2.500	1.814	1.814	0.776	7.437	4.819
72.00	28.47	1172.59	3.430	5.586	7-M2c	2.500	1.817	1.817	0.825	7.449	4.996

 Straight Culvert
 Inlet Elevation (invert): 1167.00 ft, Outlet Elevation (invert): 1166.45 ft
 Culvert Length: 185.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 205



Water Surface Profile Plot for Culvert: Culvert 205



Site Data - Culvert 205

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1167.00 ft
 Outlet Station: 185.00 ft
 Outlet Elevation: 1166.45 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 205

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1198+50 - Culvert 205)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1166.45	0.00	0.00	0.00	0.00
7.20	1166.66	0.21	2.16	0.04	0.84
14.40	1166.77	0.32	2.81	0.06	0.90
21.60	1166.86	0.41	3.26	0.08	0.93
28.80	1166.93	0.48	3.62	0.09	0.96
36.00	1167.00	0.55	3.93	0.10	0.98
43.20	1167.06	0.61	4.19	0.11	0.99
50.40	1167.12	0.67	4.42	0.13	1.01
57.33	1167.17	0.72	4.62	0.14	1.02
64.80	1167.23	0.78	4.82	0.15	1.03
72.00	1167.27	0.82	5.00	0.15	1.04

Tailwater Channel Data - 1198+50 - Culvert 205

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1166.45 ft

Roadway Data for Crossing: 1198+50 - Culvert 205

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1172.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 210

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 57.33 cfs

Maximum Flow: 72 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1201+50 - Culvert 210

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 210 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1167.00	0.00	0.00	0.00	1
1168.56	7.20	7.20	0.00	1
1169.42	14.40	14.40	0.00	1
1170.90	21.60	21.60	0.00	1
1173.09	28.80	28.80	0.00	1
1173.39	36.00	29.73	6.12	11
1173.44	43.20	29.87	13.25	5
1173.48	50.40	29.99	20.32	4
1173.51	57.33	30.09	27.00	3
1173.55	64.80	30.19	34.45	3
1173.58	72.00	30.27	41.64	3
1173.31	29.51	29.51	0.00	Overtopping

Rating Curve Plot for Crossing: 1201+50 - Culvert 210

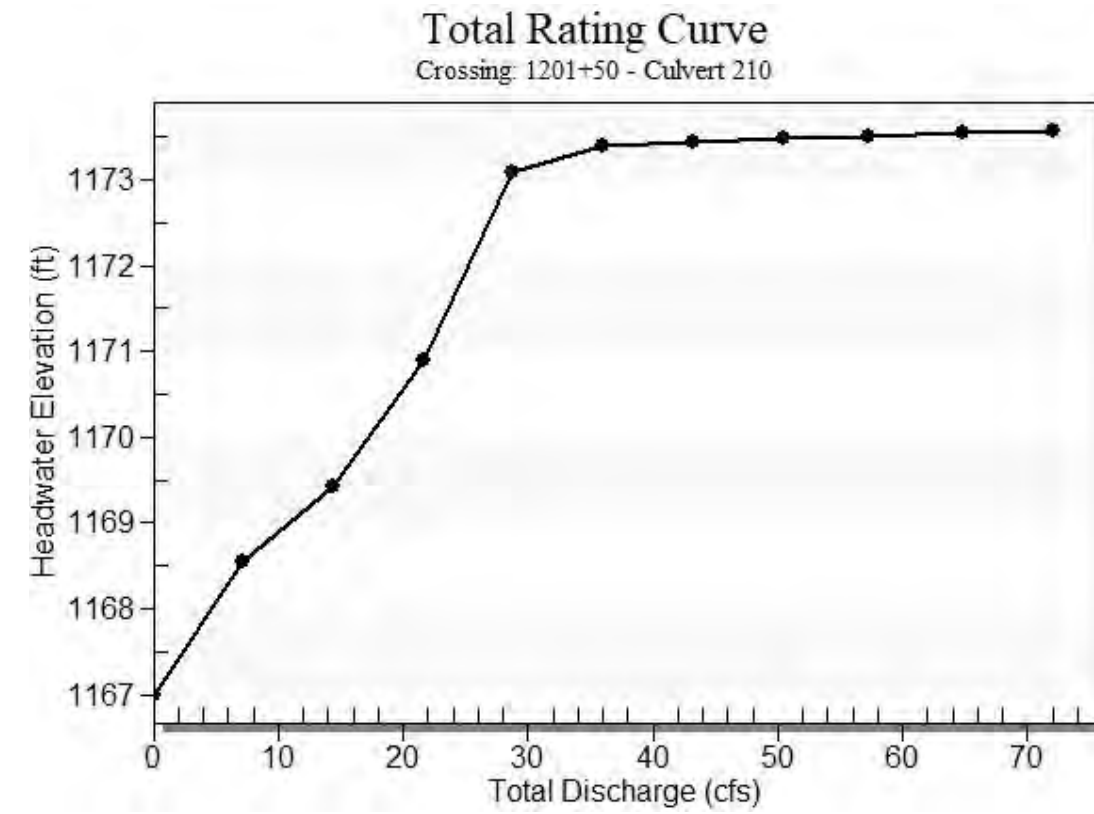
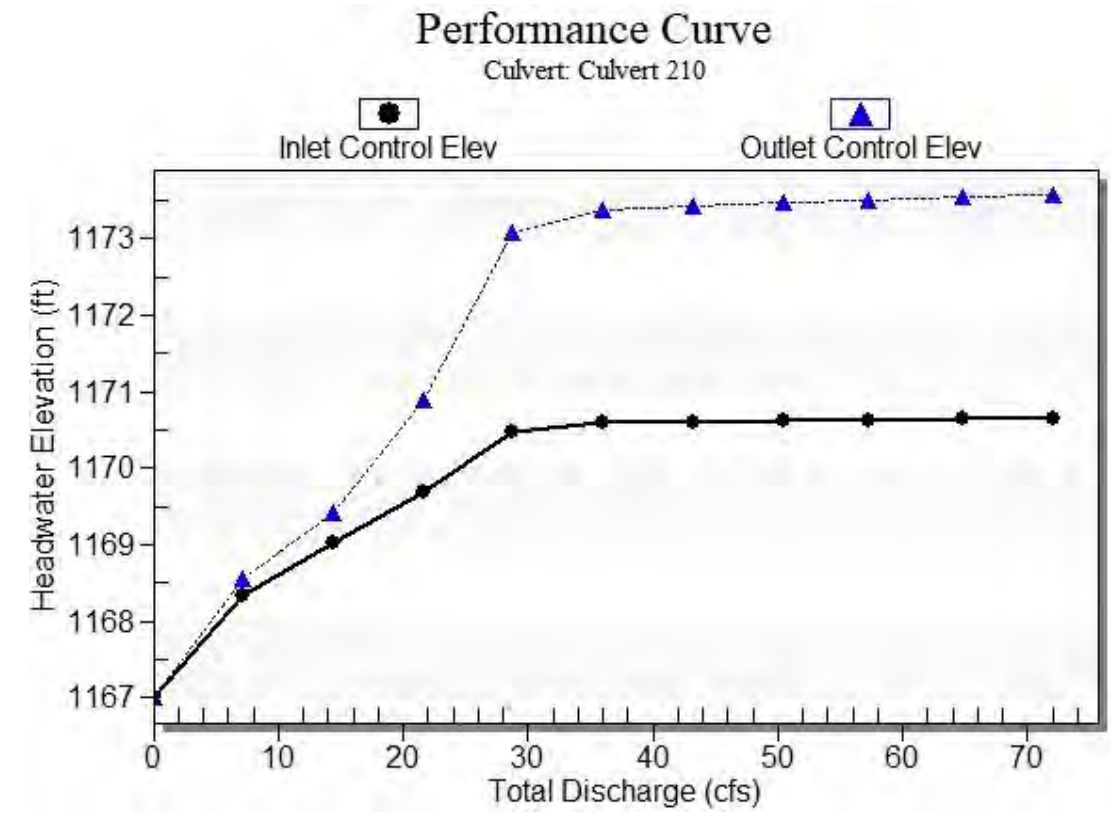


Table 2 - Culvert Summary Table: Culvert 210

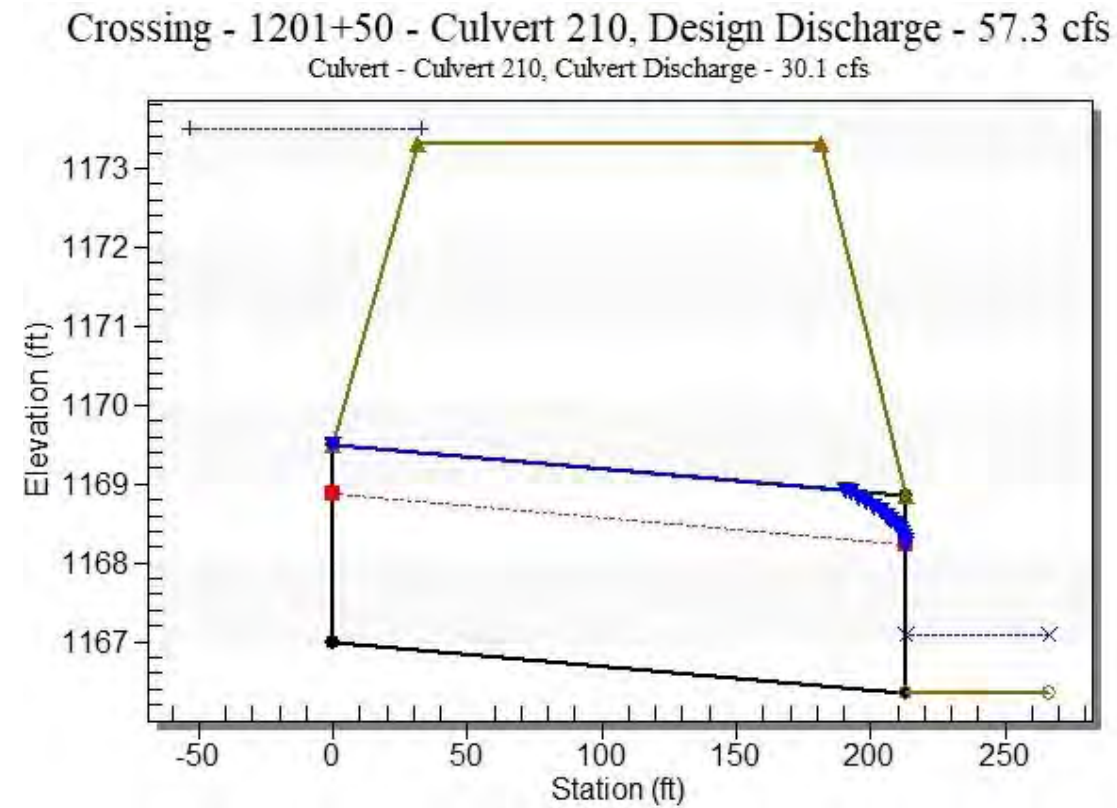
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1167.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.20	7.20	1168.56	1.332	1.557	2-M2c	1.346	0.886	0.886	0.213	4.624	2.165
14.40	14.40	1169.42	2.010	2.417	2-M2c	2.500	1.278	1.278	0.321	5.707	2.812
21.60	21.60	1170.90	2.679	3.898	7-M2c	2.500	1.577	1.577	0.408	6.620	3.264
28.80	28.80	1173.09	3.471	6.087	7-M2c	2.500	1.828	1.828	0.483	7.490	3.624
36.00	29.73	1173.39	3.586	6.386	7-M2c	2.500	1.856	1.856	0.551	7.605	3.925
43.20	29.87	1173.44	3.605	6.436	7-M2c	2.500	1.861	1.861	0.613	7.624	4.187
50.40	29.99	1173.48	3.620	6.477	7-M2c	2.500	1.864	1.864	0.671	7.638	4.418
57.33	30.09	1173.51	3.632	6.512	7-M2c	2.500	1.867	1.867	0.723	7.651	4.620
64.80	30.19	1173.55	3.645	6.547	7-M2c	2.500	1.870	1.870	0.776	7.663	4.819
72.00	30.27	1173.58	3.657	6.579	7-M2c	2.500	1.873	1.873	0.825	7.674	4.996

 Straight Culvert
 Inlet Elevation (invert): 1167.00 ft, Outlet Elevation (invert): 1166.36 ft
 Culvert Length: 213.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 210



Water Surface Profile Plot for Culvert: Culvert 210



Site Data - Culvert 210

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1167.00 ft
 Outlet Station: 213.00 ft
 Outlet Elevation: 1166.36 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 210

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1201+50 - Culvert 210)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1166.36	0.00	0.00	0.00	0.00
7.20	1166.57	0.21	2.16	0.04	0.84
14.40	1166.68	0.32	2.81	0.06	0.90
21.60	1166.77	0.41	3.26	0.08	0.93
28.80	1166.84	0.48	3.62	0.09	0.96
36.00	1166.91	0.55	3.93	0.10	0.98
43.20	1166.97	0.61	4.19	0.11	0.99
50.40	1167.03	0.67	4.42	0.13	1.01
57.33	1167.08	0.72	4.62	0.14	1.02
64.80	1167.14	0.78	4.82	0.15	1.03
72.00	1167.18	0.82	5.00	0.15	1.04

Tailwater Channel Data - 1201+50 - Culvert 210

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1166.36 ft

Roadway Data for Crossing: 1201+50 - Culvert 210

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1173.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 215

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 57.33 cfs

Maximum Flow: 72 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1202+02 - Culvert 215

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 215 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1166.90	0.00	0.00	0.00	1
1167.16	7.20	7.20	0.00	1
1167.29	14.40	14.40	0.00	1
1167.40	21.60	21.60	0.00	1
1167.49	28.80	28.80	0.00	1
1167.57	36.00	36.00	0.00	1
1167.65	43.20	43.20	0.00	1
1167.73	50.40	50.40	0.00	1
1167.79	57.33	57.33	0.00	1
1167.86	64.80	64.80	0.00	1
1167.93	72.00	72.00	0.00	1
1173.81	1002.03	1002.03	0.00	Overtopping

Rating Curve Plot for Crossing: 1202+02 - Culvert 215

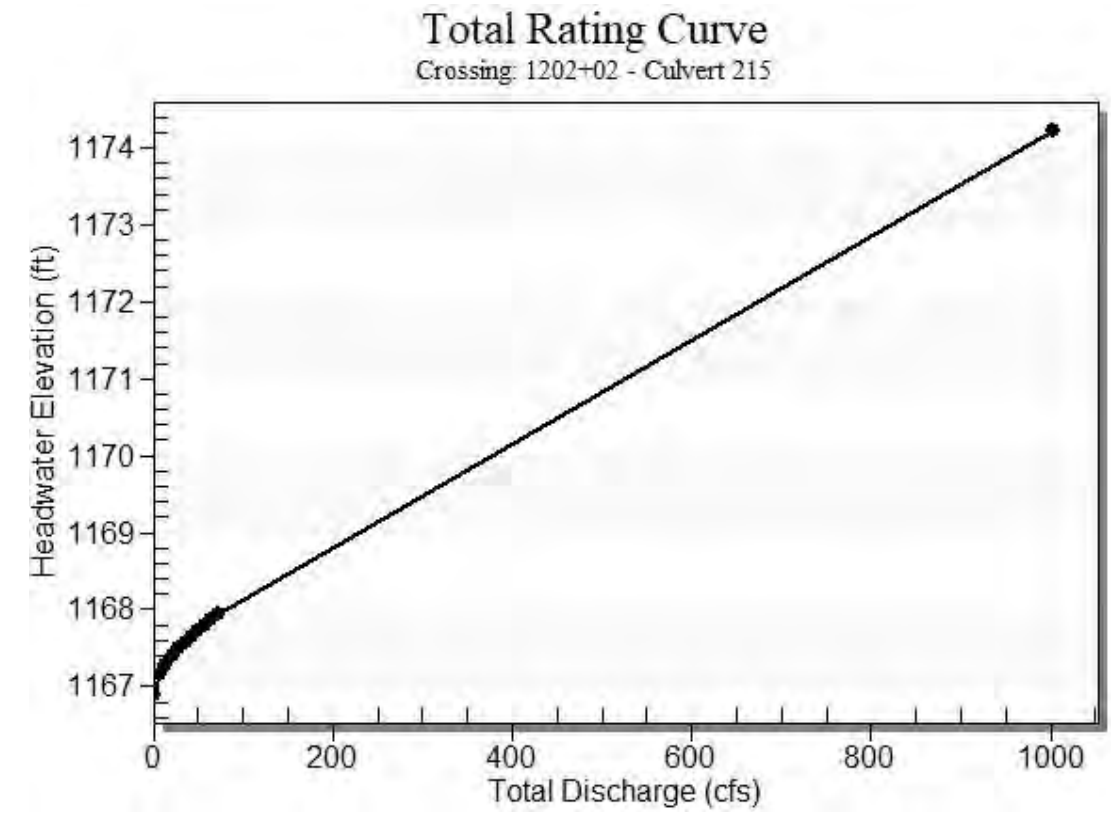
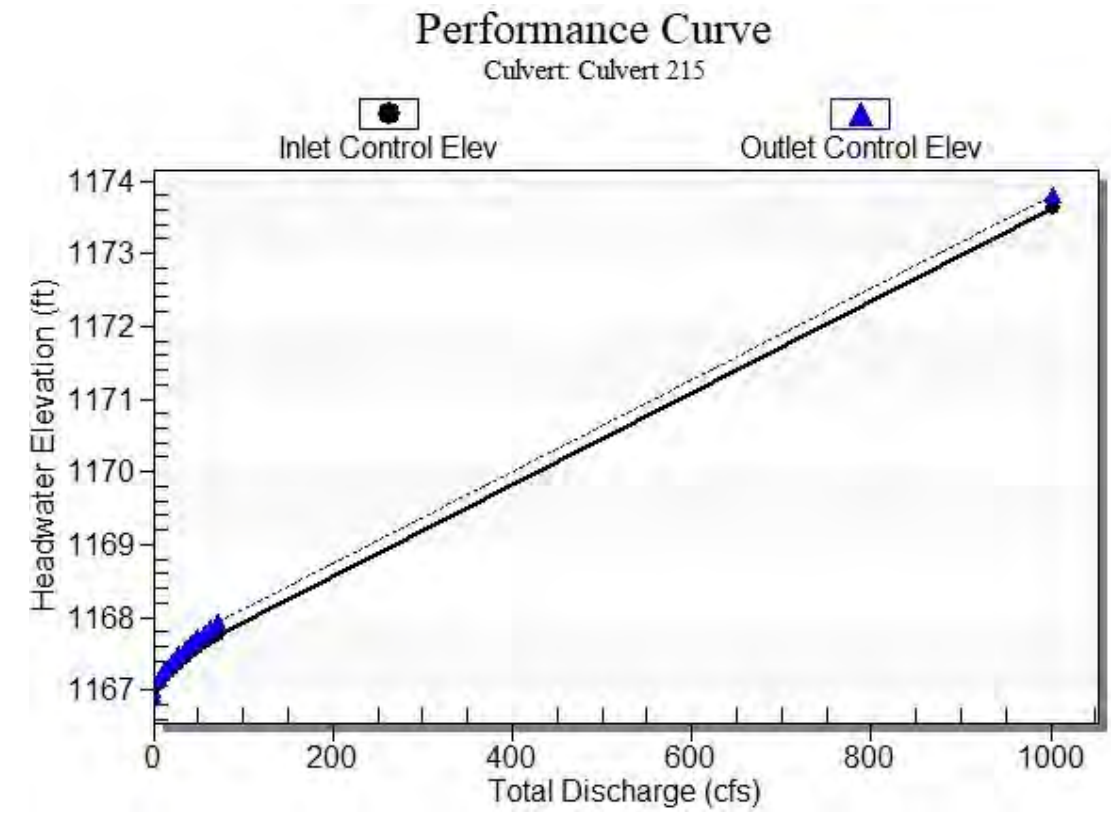


Table 2 - Culvert Summary Table: Culvert 215

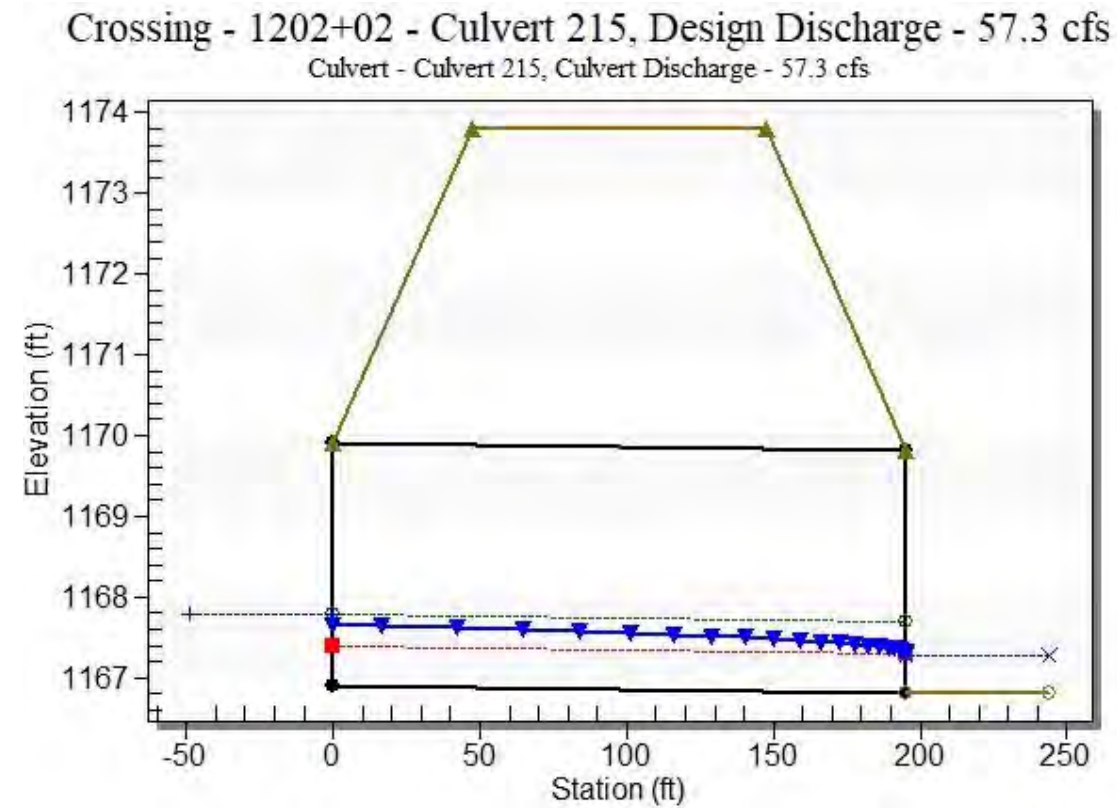
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1166.90	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.20	7.20	1167.16	0.187	0.258	3-M2t	0.242	0.121	0.133	0.133	1.803	1.619
14.40	14.40	1167.29	0.296	0.389	3-M2t	0.371	0.193	0.202	0.202	2.380	2.125
21.60	21.60	1167.40	0.388	0.495	3-M2t	0.477	0.253	0.257	0.257	2.801	2.488
28.80	28.80	1167.49	0.470	0.588	2-M2c	0.571	0.306	0.306	0.305	3.138	2.783
36.00	36.00	1167.57	0.545	0.673	2-M2c	0.657	0.355	0.355	0.349	3.381	3.033
43.20	43.20	1167.65	0.616	0.752	2-M2c	0.738	0.401	0.401	0.389	3.593	3.253
50.40	50.40	1167.73	0.683	0.826	2-M2c	0.813	0.444	0.444	0.426	3.782	3.450
57.33	57.33	1167.79	0.744	0.894	2-M2c	0.883	0.484	0.484	0.460	3.948	3.625
64.80	64.80	1167.86	0.807	0.964	2-M2c	0.955	0.525	0.525	0.495	4.112	3.797
72.00	72.00	1167.93	0.866	1.029	2-M2c	1.023	0.563	0.563	0.527	4.259	3.951

 Straight Culvert
 Inlet Elevation (invert): 1166.90 ft, Outlet Elevation (invert): 1166.82 ft
 Culvert Length: 195.00 ft, Culvert Slope: 0.0004

Culvert Performance Curve Plot: Culvert 215



Water Surface Profile Plot for Culvert: Culvert 215



Site Data - Culvert 215

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1166.90 ft
 Outlet Station: 195.00 ft
 Outlet Elevation: 1166.82 ft
 Number of Barrels: 3

Culvert Data Summary - Culvert 215

Barrel Shape: Concrete Box
 Barrel Span: 10.00 ft
 Barrel Rise: 3.00 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge (30-75° flare) Wingwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1202+02 - Culvert 215)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1166.82	0.00	0.00	0.00	0.00
7.20	1166.95	0.13	1.62	0.02	0.79
14.40	1167.02	0.20	2.12	0.04	0.84
21.60	1167.08	0.26	2.49	0.05	0.87
28.80	1167.13	0.31	2.78	0.06	0.90
36.00	1167.17	0.35	3.03	0.07	0.92
43.20	1167.21	0.39	3.25	0.07	0.93
50.40	1167.25	0.43	3.45	0.08	0.95
57.33	1167.28	0.46	3.62	0.09	0.96
64.80	1167.31	0.49	3.80	0.09	0.97
72.00	1167.35	0.53	3.95	0.10	0.98

Tailwater Channel Data - 1202+02 - Culvert 215

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 33.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1166.82 ft

Roadway Data for Crossing: 1202+02 - Culvert 215

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1173.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 100.00 ft

HY-8 Culvert Analysis Report Structure 220

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 19 cfs

Maximum Flow: 24 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1208+00 - Culvert 220

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 220 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1168.80	0.00	0.00	0.00	1
1169.65	2.40	2.40	0.00	1
1170.03	4.80	4.80	0.00	1
1170.36	7.20	7.20	0.00	1
1170.64	9.60	9.60	0.00	1
1170.92	12.00	12.00	0.00	1
1171.21	14.40	14.40	0.00	1
1171.52	16.80	16.80	0.00	1
1171.97	19.00	19.00	0.00	1
1172.62	21.60	21.60	0.00	1
1173.25	24.00	24.00	0.00	1
1174.31	27.51	27.51	0.00	Overtopping

Rating Curve Plot for Crossing: 1208+00 - Culvert 220

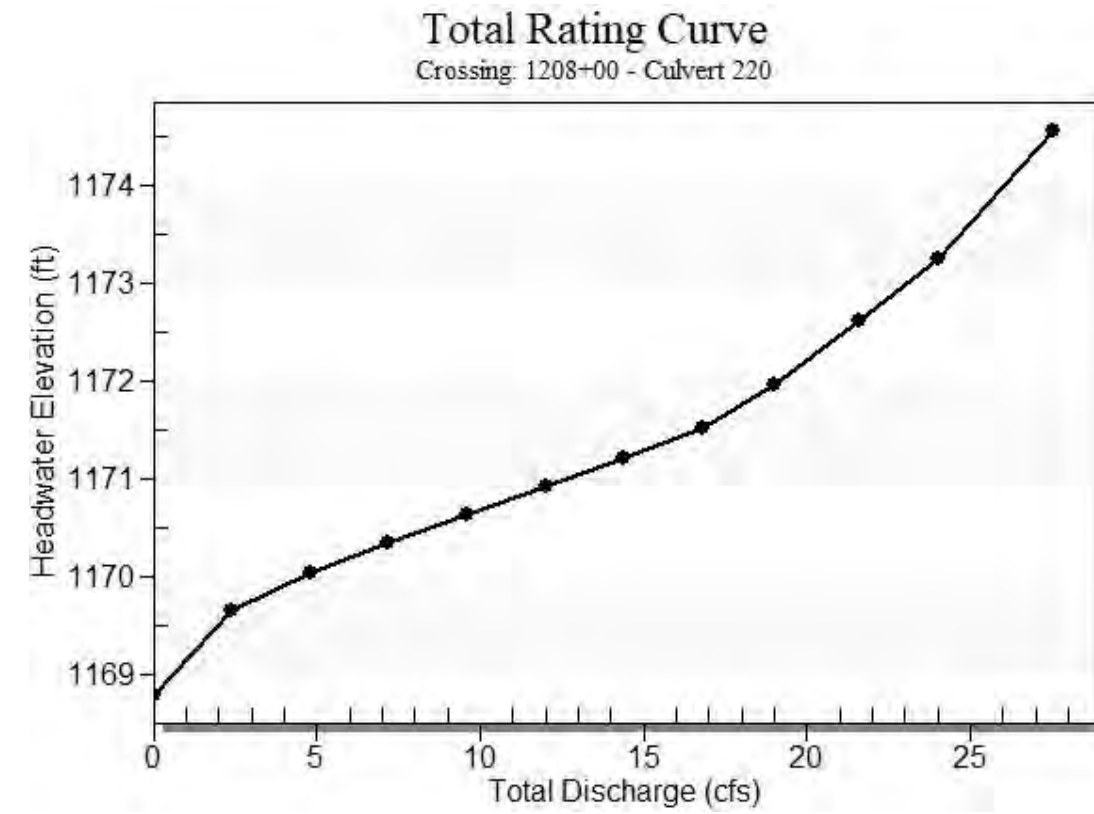
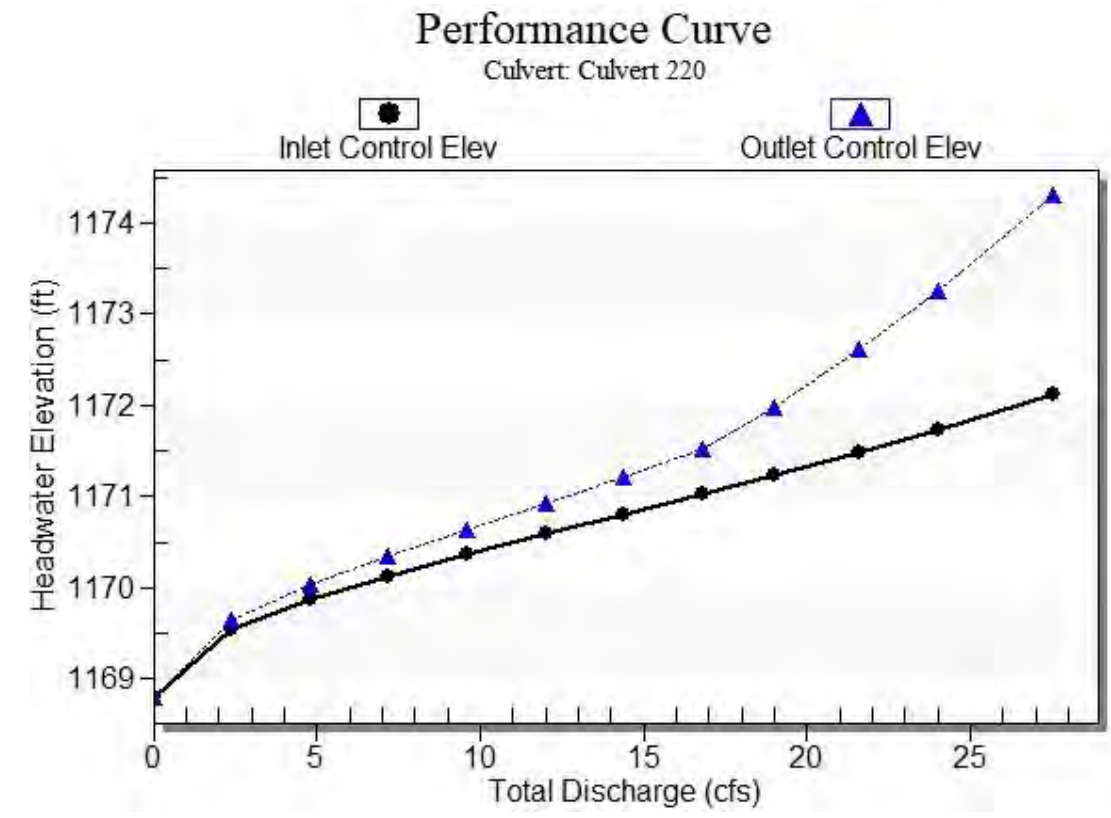


Table 2 - Culvert Summary Table: Culvert 220

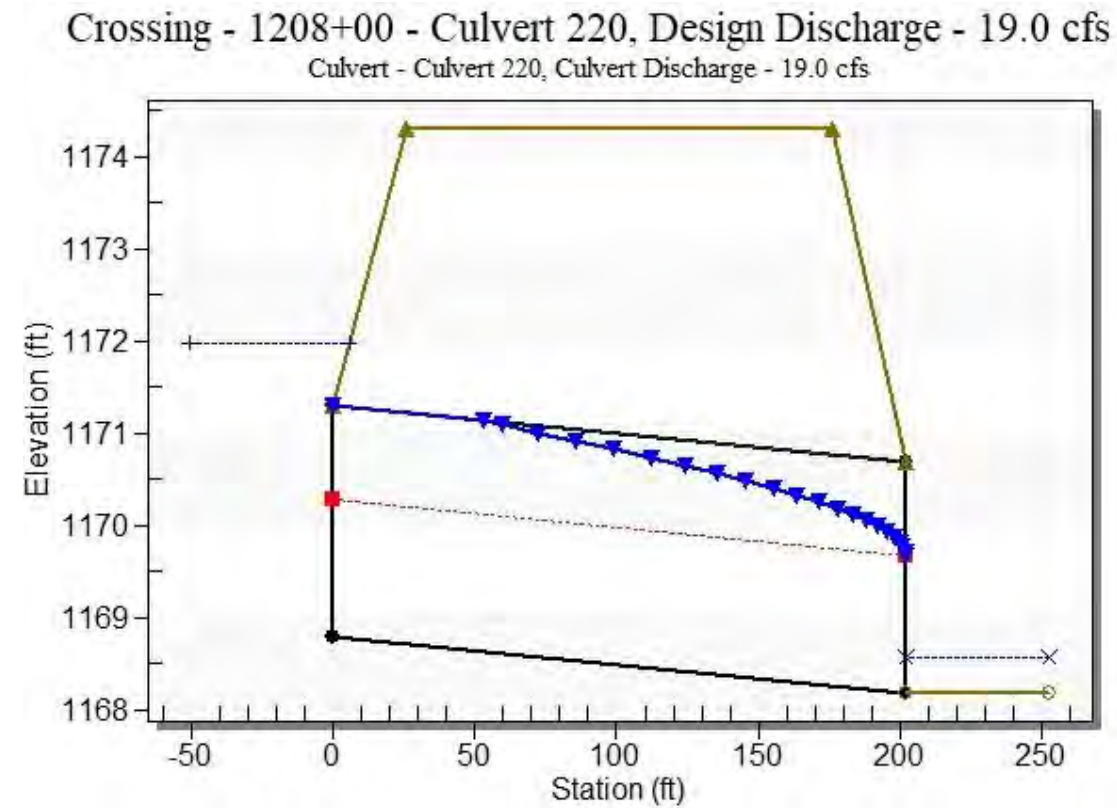
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1168.80	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
2.40	2.40	1169.65	0.744	0.850	2-M2c	0.731	0.502	0.502	0.110	3.414	1.419
4.80	4.80	1170.03	1.071	1.233	2-M2c	1.060	0.718	0.718	0.167	4.120	1.855
7.20	7.20	1170.36	1.332	1.555	2-M2c	1.344	0.886	0.886	0.213	4.624	2.165
9.60	9.60	1170.64	1.569	1.845	2-M2c	1.625	1.031	1.031	0.252	5.027	2.414
12.00	12.00	1170.92	1.793	2.122	2-M2c	1.957	1.162	1.162	0.288	5.369	2.627
14.40	14.40	1171.21	2.010	2.406	2-M2c	2.500	1.278	1.278	0.321	5.707	2.812
16.80	16.80	1171.52	2.227	2.725	7-M2c	2.500	1.381	1.381	0.352	6.041	2.975
19.00	19.00	1171.97	2.429	3.168	7-M2c	2.500	1.474	1.474	0.378	6.311	3.114
21.60	21.60	1172.62	2.679	3.825	7-M2c	2.500	1.577	1.577	0.408	6.620	3.264
24.00	24.00	1173.25	2.924	4.448	7-M2c	2.500	1.664	1.664	0.434	6.915	3.392

 Straight Culvert
 Inlet Elevation (invert): 1168.80 ft, Outlet Elevation (invert): 1168.19 ft
 Culvert Length: 202.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 220



Water Surface Profile Plot for Culvert: Culvert 220



Site Data - Culvert 220

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1168.80 ft
 Outlet Station: 202.00 ft
 Outlet Elevation: 1168.19 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 220

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1208+00 - Culvert 220)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1168.19	0.00	0.00	0.00	0.00
2.40	1168.30	0.11	1.42	0.02	0.76
4.80	1168.36	0.17	1.85	0.03	0.81
7.20	1168.40	0.21	2.16	0.04	0.84
9.60	1168.44	0.25	2.41	0.05	0.87
12.00	1168.48	0.29	2.63	0.05	0.89
14.40	1168.51	0.32	2.81	0.06	0.90
16.80	1168.54	0.35	2.98	0.07	0.91
19.00	1168.57	0.38	3.11	0.07	0.92
21.60	1168.60	0.41	3.26	0.08	0.93
24.00	1168.62	0.43	3.39	0.08	0.94

Tailwater Channel Data - 1208+00 - Culvert 220

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1168.19 ft

Roadway Data for Crossing: 1208+00 - Culvert 220

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1174.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 225

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 19 cfs

Maximum Flow: 24 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1211+00 - Culvert 225

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 225 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1169.00	0.00	0.00	0.00	1
1169.85	2.40	2.40	0.00	1
1170.23	4.80	4.80	0.00	1
1170.56	7.20	7.20	0.00	1
1170.84	9.60	9.60	0.00	1
1171.12	12.00	12.00	0.00	1
1171.41	14.40	14.40	0.00	1
1171.72	16.80	16.80	0.00	1
1172.17	19.00	19.00	0.00	1
1172.82	21.60	21.60	0.00	1
1173.45	24.00	24.00	0.00	1
1174.81	28.49	28.49	0.00	Overtopping

Rating Curve Plot for Crossing: 1211+00 - Culvert 225

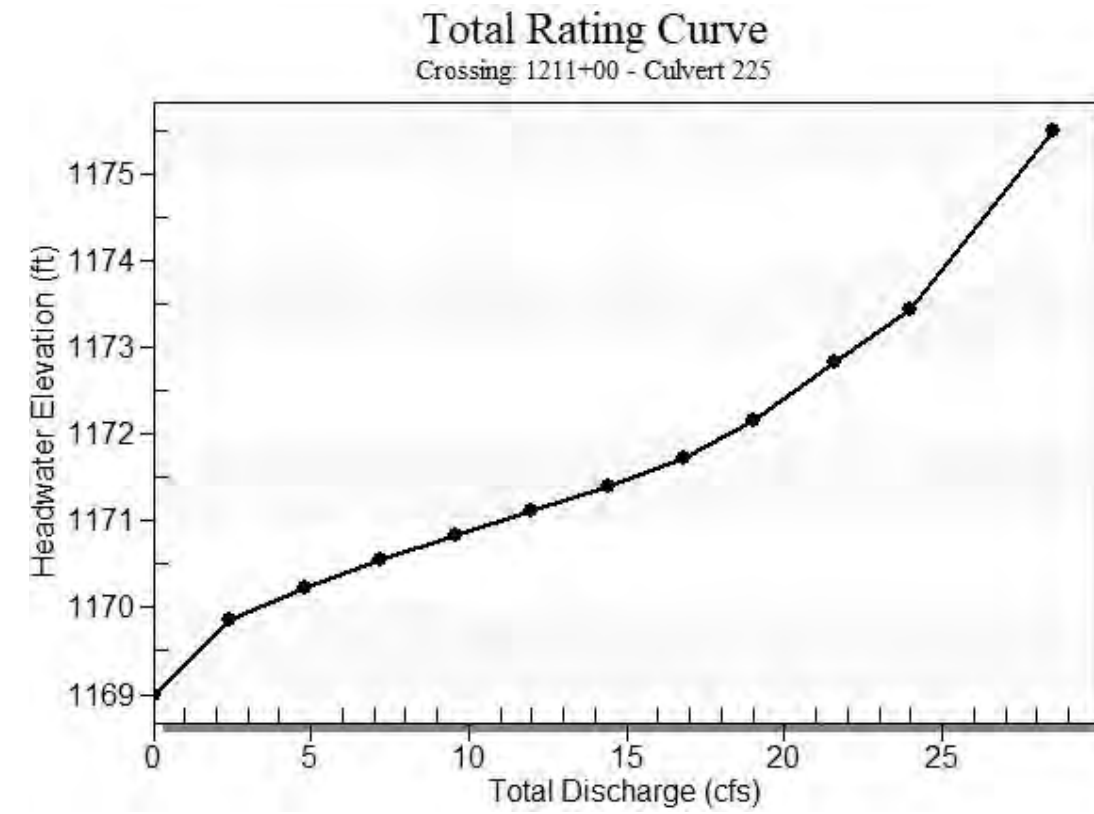
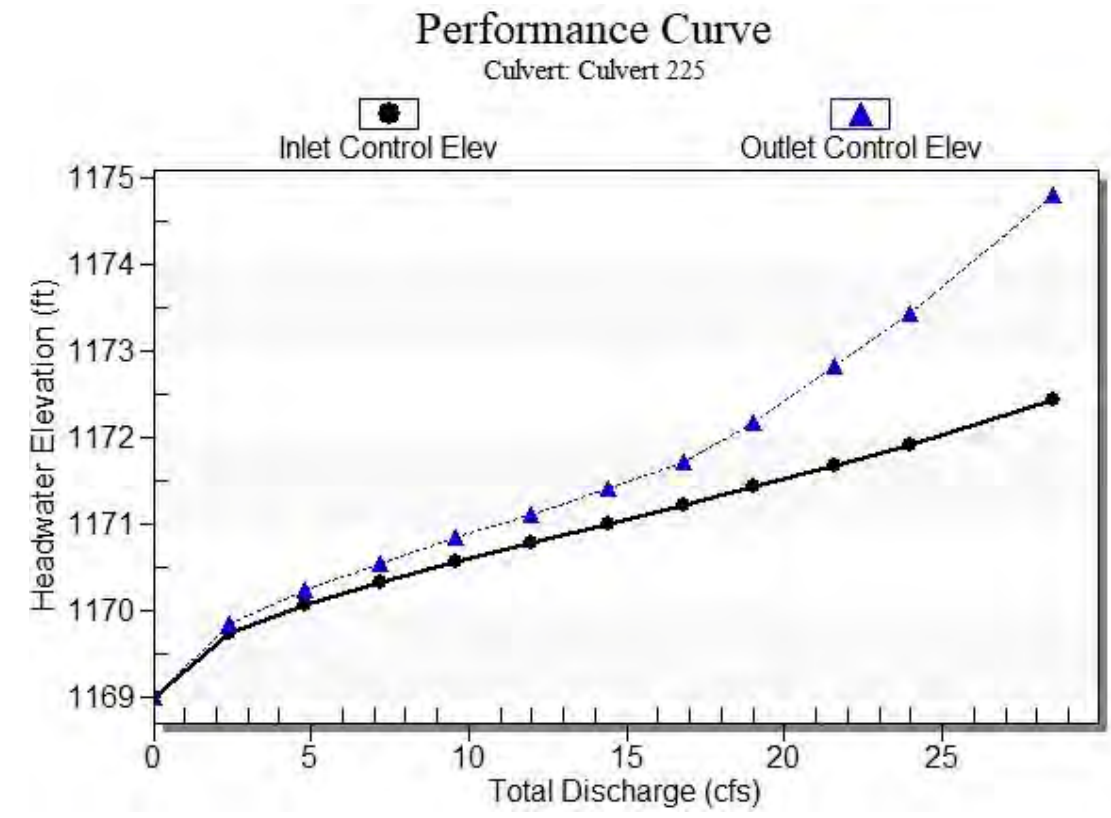


Table 2 - Culvert Summary Table: Culvert 225

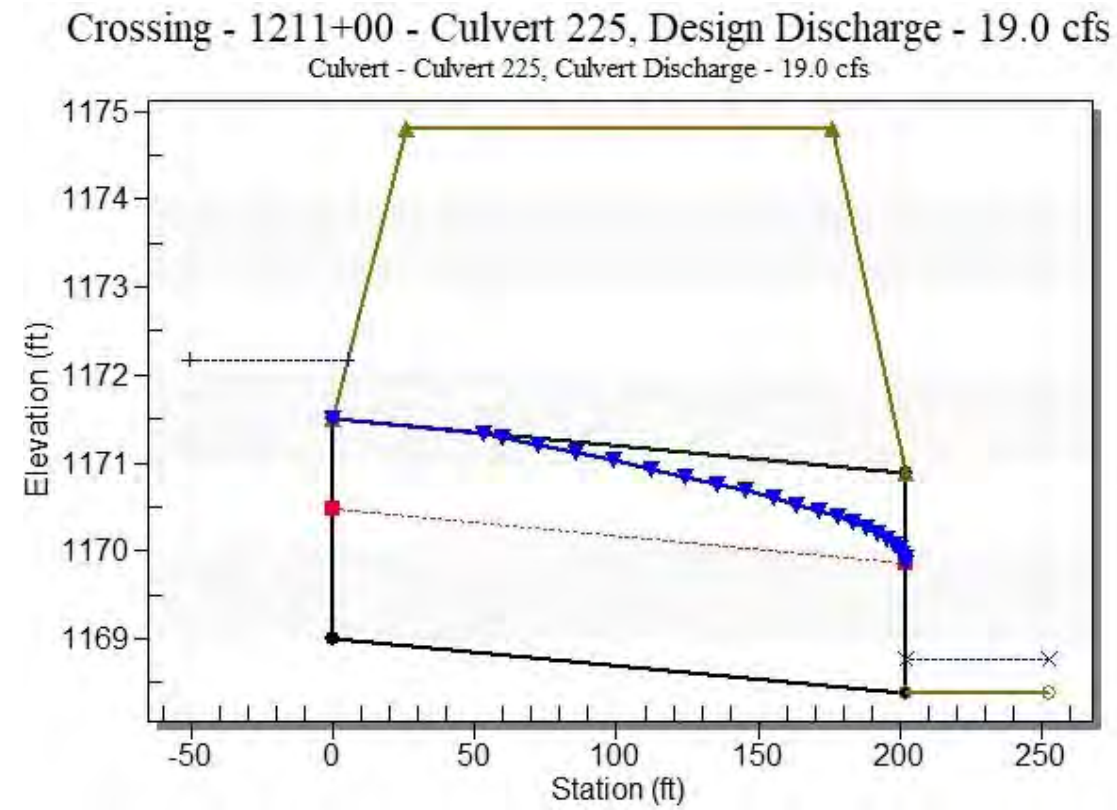
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1169.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
2.40	2.40	1169.85	0.744	0.850	2-M2c	0.731	0.502	0.502	0.110	3.414	1.419
4.80	4.80	1170.23	1.071	1.233	2-M2c	1.060	0.718	0.718	0.167	4.120	1.855
7.20	7.20	1170.56	1.332	1.555	2-M2c	1.344	0.886	0.886	0.213	4.624	2.165
9.60	9.60	1170.84	1.569	1.845	2-M2c	1.625	1.031	1.031	0.252	5.027	2.414
12.00	12.00	1171.12	1.793	2.122	2-M2c	1.957	1.162	1.162	0.288	5.369	2.627
14.40	14.40	1171.41	2.010	2.406	2-M2c	2.500	1.278	1.278	0.321	5.707	2.812
16.80	16.80	1171.72	2.227	2.725	7-M2c	2.500	1.381	1.381	0.352	6.041	2.975
19.00	19.00	1172.17	2.429	3.168	7-M2c	2.500	1.474	1.474	0.378	6.311	3.114
21.60	21.60	1172.82	2.679	3.825	7-M2c	2.500	1.577	1.577	0.408	6.620	3.264
24.00	24.00	1173.45	2.924	4.448	7-M2c	2.500	1.664	1.664	0.434	6.915	3.392

 Straight Culvert
 Inlet Elevation (invert): 1169.00 ft, Outlet Elevation (invert): 1168.39 ft
 Culvert Length: 202.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 225



Water Surface Profile Plot for Culvert: Culvert 225



Site Data - Culvert 225

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1169.00 ft
 Outlet Station: 202.00 ft
 Outlet Elevation: 1168.39 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 225

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1211+00 - Culvert 225)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1168.39	0.00	0.00	0.00	0.00
2.40	1168.50	0.11	1.42	0.02	0.76
4.80	1168.56	0.17	1.85	0.03	0.81
7.20	1168.60	0.21	2.16	0.04	0.84
9.60	1168.64	0.25	2.41	0.05	0.87
12.00	1168.68	0.29	2.63	0.05	0.89
14.40	1168.71	0.32	2.81	0.06	0.90
16.80	1168.74	0.35	2.98	0.07	0.91
19.00	1168.77	0.38	3.11	0.07	0.92
21.60	1168.80	0.41	3.26	0.08	0.93
24.00	1168.82	0.43	3.39	0.08	0.94

Tailwater Channel Data - 1211+00 - Culvert 225

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1168.39 ft

Roadway Data for Crossing: 1211+00 - Culvert 225

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1174.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 230

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 19 cfs

Maximum Flow: 24 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1220+00 - Culvert 230

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 230 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1170.50	0.00	0.00	0.00	1
1171.12	2.40	2.40	0.00	1
1171.44	4.80	4.80	0.00	1
1171.75	7.20	7.20	0.00	1
1172.04	9.60	9.60	0.00	1
1172.35	12.00	12.00	0.00	1
1172.82	14.40	14.40	0.00	1
1173.49	16.80	16.80	0.00	1
1174.19	19.00	19.00	0.00	1
1175.07	21.60	21.60	0.00	1
1175.82	24.00	23.51	0.39	46
1175.81	23.51	23.51	0.00	Overtopping

Rating Curve Plot for Crossing: 1220+00 - Culvert 230

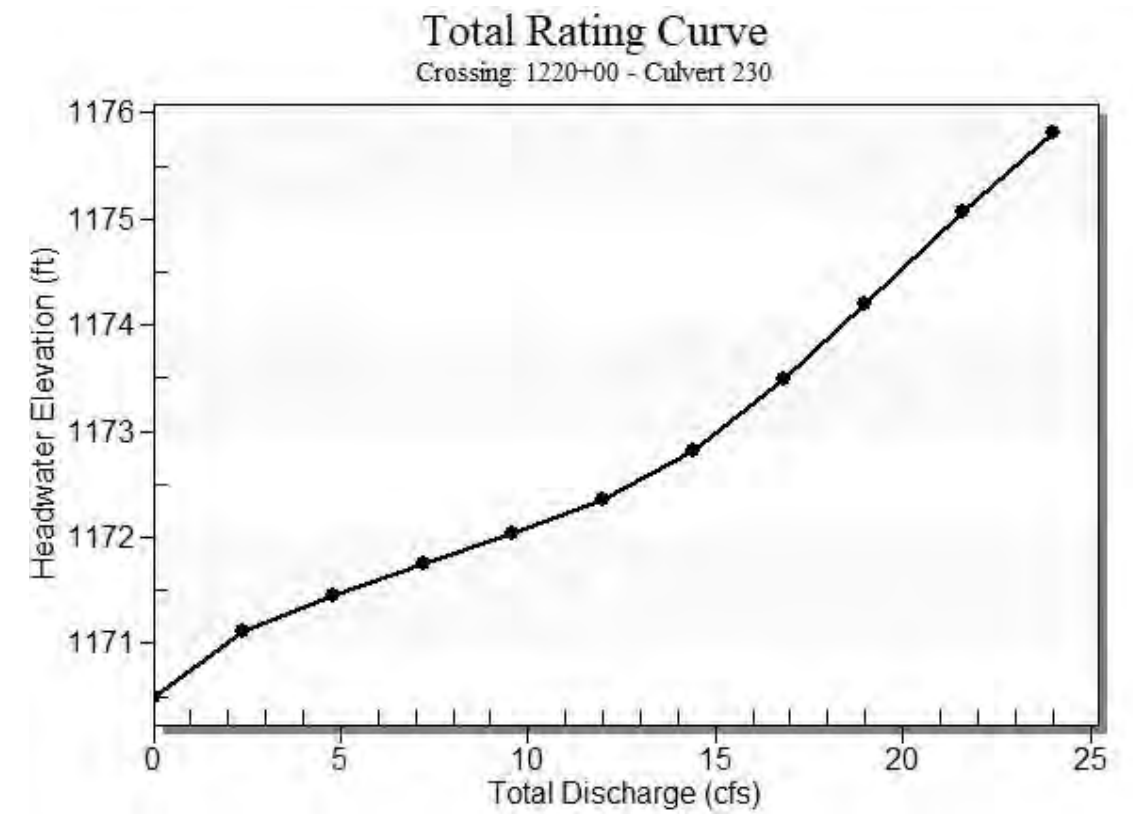
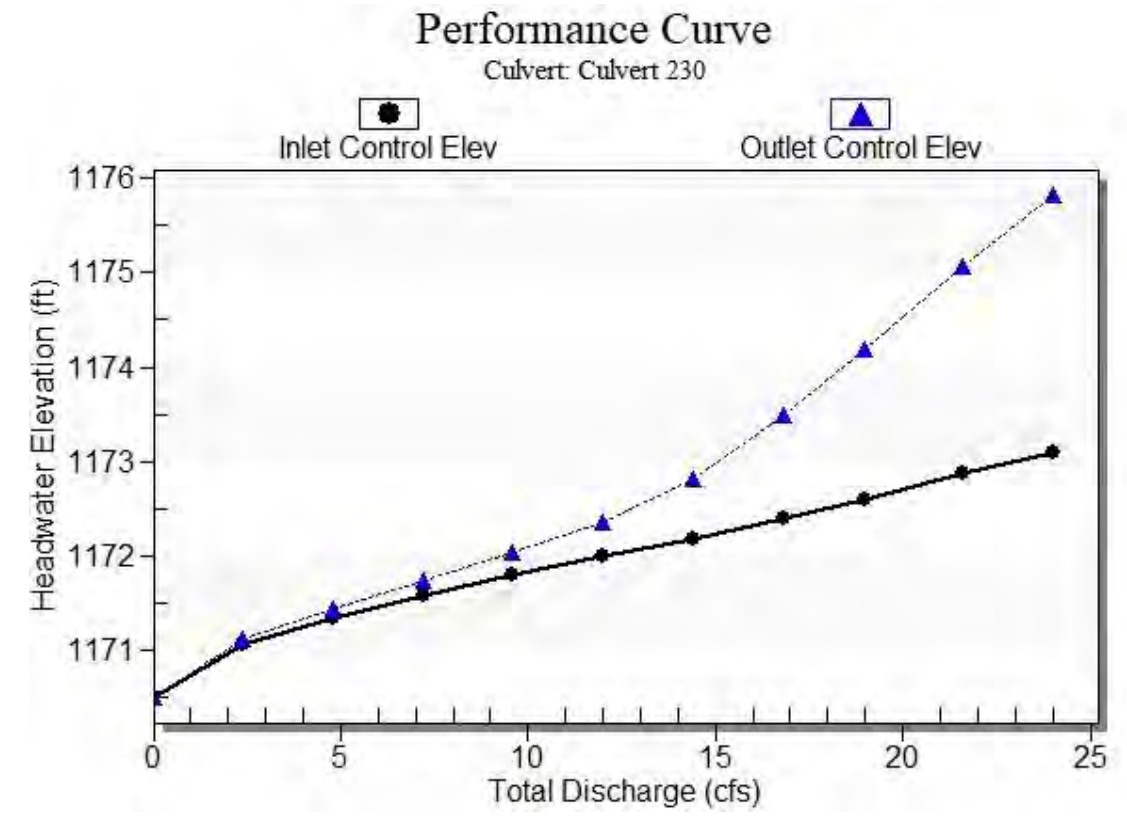


Table 2 - Culvert Summary Table: Culvert 230

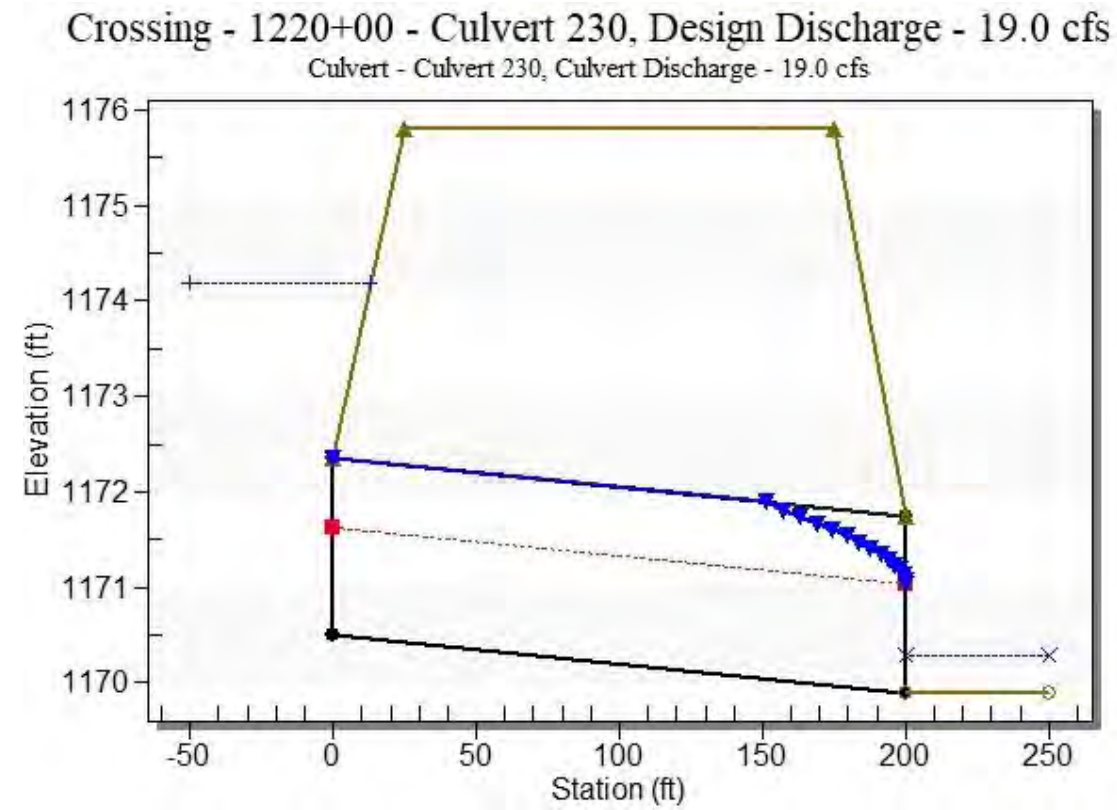
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1170.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
2.40	2.40	1171.12	0.556	0.616	2-M2c	0.521	0.338	0.338	0.110	3.041	1.419
4.80	4.80	1171.44	0.836	0.944	2-M2c	0.798	0.502	0.502	0.167	3.754	1.855
7.20	7.20	1171.75	1.077	1.246	2-M2c	1.072	0.639	0.639	0.213	4.258	2.165
9.60	9.60	1172.04	1.290	1.538	2-M2c	1.407	0.759	0.759	0.252	4.694	2.414
12.00	12.00	1172.35	1.488	1.852	7-M2c	1.850	0.864	0.864	0.288	5.115	2.627
14.40	14.40	1172.82	1.685	2.319	7-M2c	1.850	0.956	0.956	0.321	5.527	2.812
16.80	16.80	1173.49	1.892	2.986	7-M2c	1.850	1.045	1.045	0.352	5.897	2.975
19.00	19.00	1174.19	2.099	3.692	7-M2c	1.850	1.125	1.125	0.378	6.208	3.114
21.60	21.60	1175.07	2.372	4.573	7-M2c	1.850	1.211	1.211	0.408	6.591	3.264
24.00	23.51	1175.82	2.596	5.328	7-M2c	1.850	1.275	1.275	0.434	6.849	3.392

 Straight Culvert
 Inlet Elevation (invert): 1170.50 ft, Outlet Elevation (invert): 1169.90 ft
 Culvert Length: 200.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 230



Water Surface Profile Plot for Culvert: Culvert 230



Site Data - Culvert 230

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1170.50 ft
 Outlet Station: 200.00 ft
 Outlet Elevation: 1169.90 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 230

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1220+00 - Culvert 230)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1169.90	0.00	0.00	0.00	0.00
2.40	1170.01	0.11	1.42	0.02	0.76
4.80	1170.07	0.17	1.85	0.03	0.81
7.20	1170.11	0.21	2.16	0.04	0.84
9.60	1170.15	0.25	2.41	0.05	0.87
12.00	1170.19	0.29	2.63	0.05	0.89
14.40	1170.22	0.32	2.81	0.06	0.90
16.80	1170.25	0.35	2.98	0.07	0.91
19.00	1170.28	0.38	3.11	0.07	0.92
21.60	1170.31	0.41	3.26	0.08	0.93
24.00	1170.33	0.43	3.39	0.08	0.94

Tailwater Channel Data - 1220+00 - Culvert 230

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1169.90 ft

Roadway Data for Crossing: 1220+00 - Culvert 230

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1175.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report

Structure 235

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 25 cfs

Maximum Flow: 31 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1224+00 - Culvert 235

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 235 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1171.00	0.00	0.00	0.00	1
1171.72	3.10	3.10	0.00	1
1172.12	6.20	6.20	0.00	1
1172.50	9.30	9.30	0.00	1
1172.91	12.40	12.40	0.00	1
1173.62	15.50	15.50	0.00	1
1174.54	18.60	18.60	0.00	1
1175.61	21.70	21.70	0.00	1
1176.34	24.80	23.54	1.17	30
1176.34	25.00	23.54	1.35	3
1176.39	31.00	23.69	7.13	4
1176.31	23.51	23.51	0.00	Overtopping

Rating Curve Plot for Crossing: 1224+00 - Culvert 235

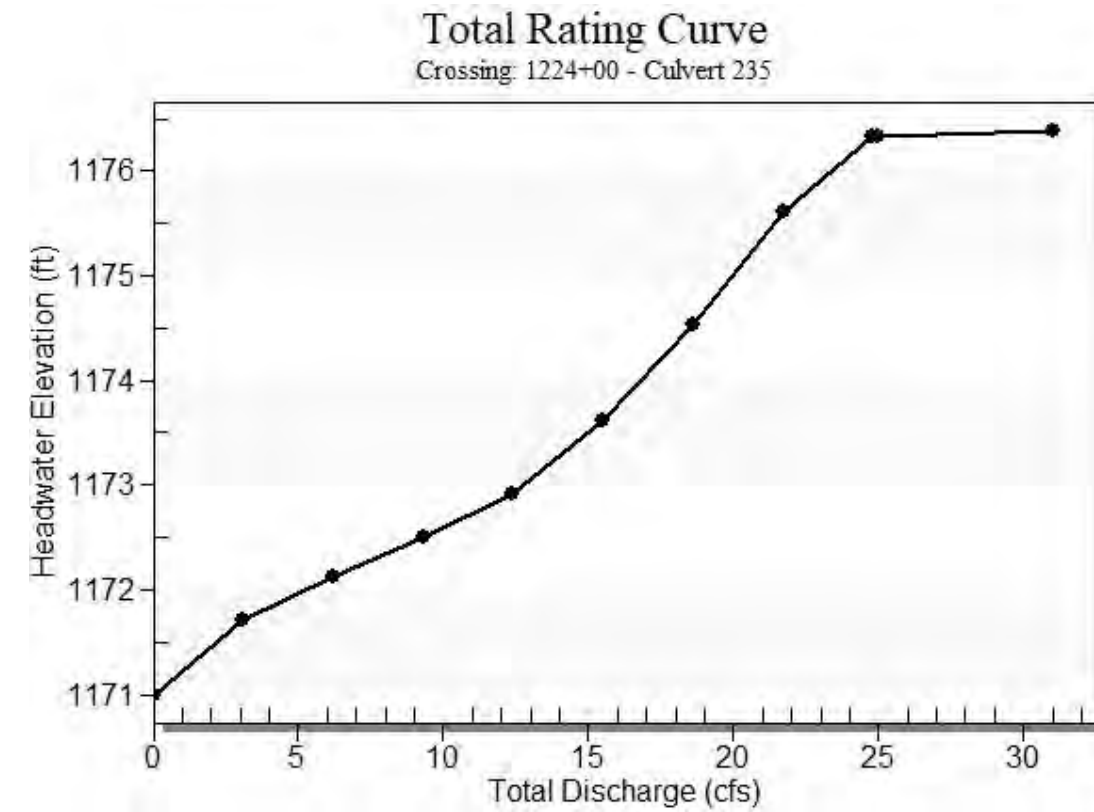
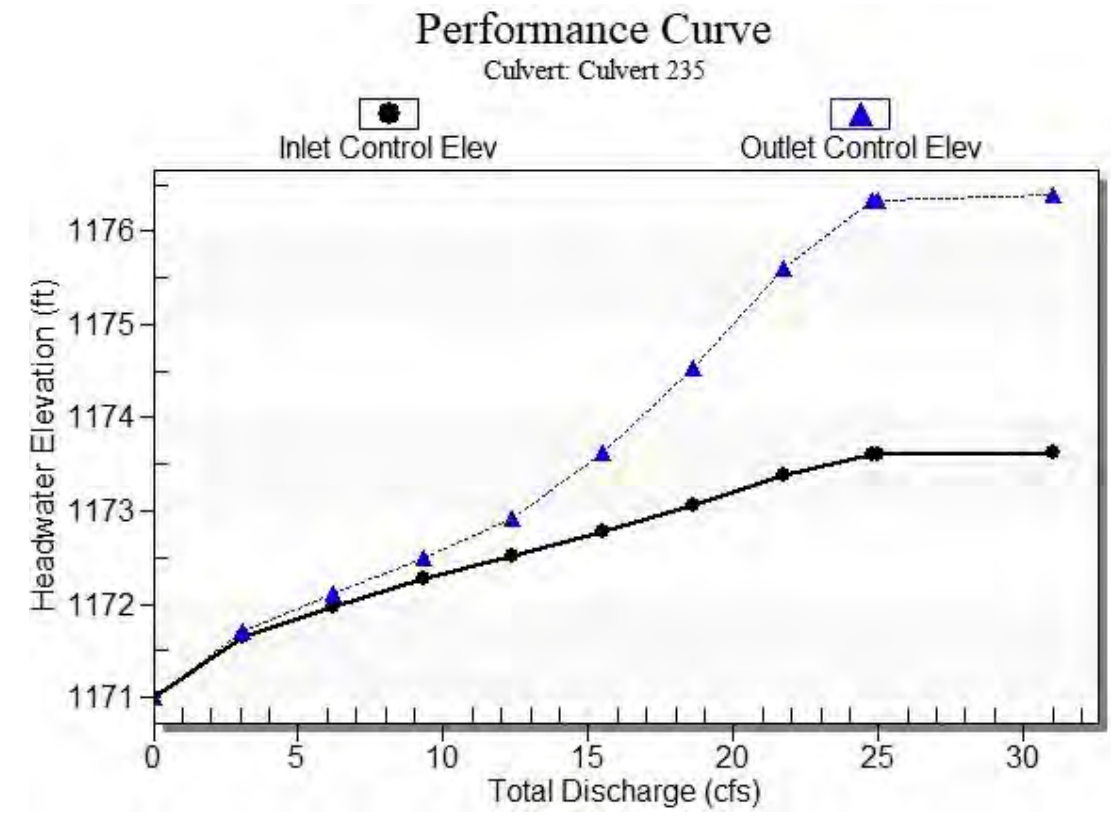


Table 2 - Culvert Summary Table: Culvert 235

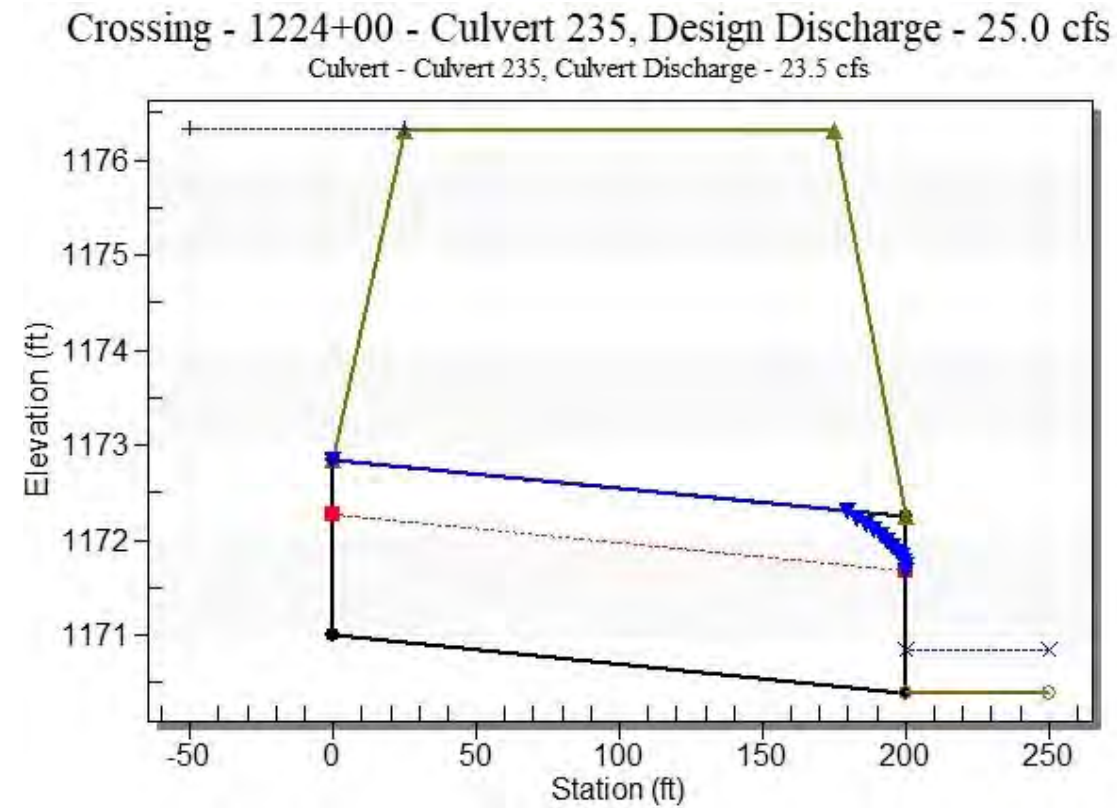
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1171.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.10	3.10	1171.72	0.645	0.717	2-M2c	0.605	0.391	0.391	0.129	3.270	1.567
6.20	6.20	1172.12	0.980	1.123	2-M2c	0.955	0.583	0.583	0.194	4.070	2.046
9.30	9.30	1172.50	1.265	1.502	2-M2c	1.356	0.745	0.745	0.248	4.640	2.386
12.40	12.40	1172.91	1.521	1.910	7-M2c	1.850	0.880	0.880	0.294	5.184	2.658
15.50	15.50	1173.62	1.778	2.617	7-M2c	1.850	0.995	0.995	0.335	5.714	2.889
18.60	18.60	1174.54	2.060	3.538	7-M2c	1.850	1.112	1.112	0.373	6.149	3.091
21.70	21.70	1175.61	2.383	4.610	7-M2c	1.850	1.214	1.214	0.409	6.606	3.270
24.80	23.54	1176.34	2.598	5.336	7-M2c	1.850	1.276	1.276	0.442	6.852	3.433
25.00	23.54	1176.34	2.599	5.338	7-M2c	1.850	1.276	1.276	0.445	6.853	3.442
31.00	23.69	1176.39	2.618	5.394	7-M2c	1.850	1.281	1.281	0.505	6.875	3.720

 Straight Culvert
 Inlet Elevation (invert): 1171.00 ft, Outlet Elevation (invert): 1170.40 ft
 Culvert Length: 200.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 235



Water Surface Profile Plot for Culvert: Culvert 235



Site Data - Culvert 235

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1171.00 ft
 Outlet Station: 200.00 ft
 Outlet Elevation: 1170.40 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 235

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1224+00 - Culvert 235)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1170.40	0.00	0.00	0.00	0.00
3.10	1170.53	0.13	1.57	0.02	0.78
6.20	1170.59	0.19	2.05	0.04	0.83
9.30	1170.65	0.25	2.39	0.05	0.86
12.40	1170.69	0.29	2.66	0.05	0.89
15.50	1170.74	0.34	2.89	0.06	0.91
18.60	1170.77	0.37	3.09	0.07	0.92
21.70	1170.81	0.41	3.27	0.08	0.93
24.80	1170.84	0.44	3.43	0.08	0.95
25.00	1170.84	0.44	3.44	0.08	0.95
31.00	1170.90	0.50	3.72	0.09	0.96

Tailwater Channel Data - 1224+00 - Culvert 235

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1170.40 ft

Roadway Data for Crossing: 1224+00 - Culvert 235

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1176.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 240

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 47.25 cfs

Maximum Flow: 59.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1233+00 - Culvert 240

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 240 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1173.00	0.00	0.00	0.00	1
1174.09	5.95	5.95	0.00	1
1174.85	11.90	11.90	0.00	1
1176.36	17.85	17.85	0.00	1
1177.36	23.80	20.80	2.97	3
1177.41	29.75	20.95	8.70	5
1177.44	35.70	21.06	14.53	4
1177.48	41.65	21.16	20.44	4
1177.51	47.25	21.25	25.87	3
1177.54	53.55	21.33	32.13	3
1177.56	59.50	21.40	38.05	3
1177.31	20.66	20.66	0.00	Overtopping

Rating Curve Plot for Crossing: 1233+00 - Culvert 240

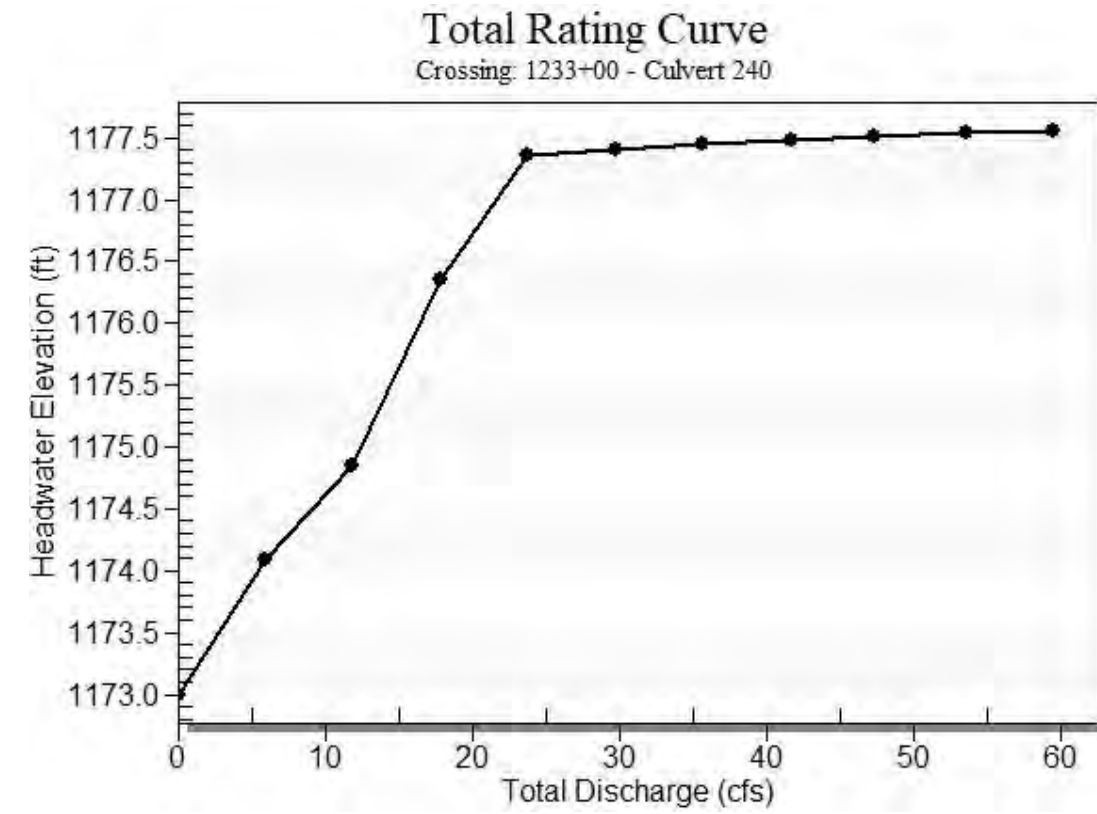
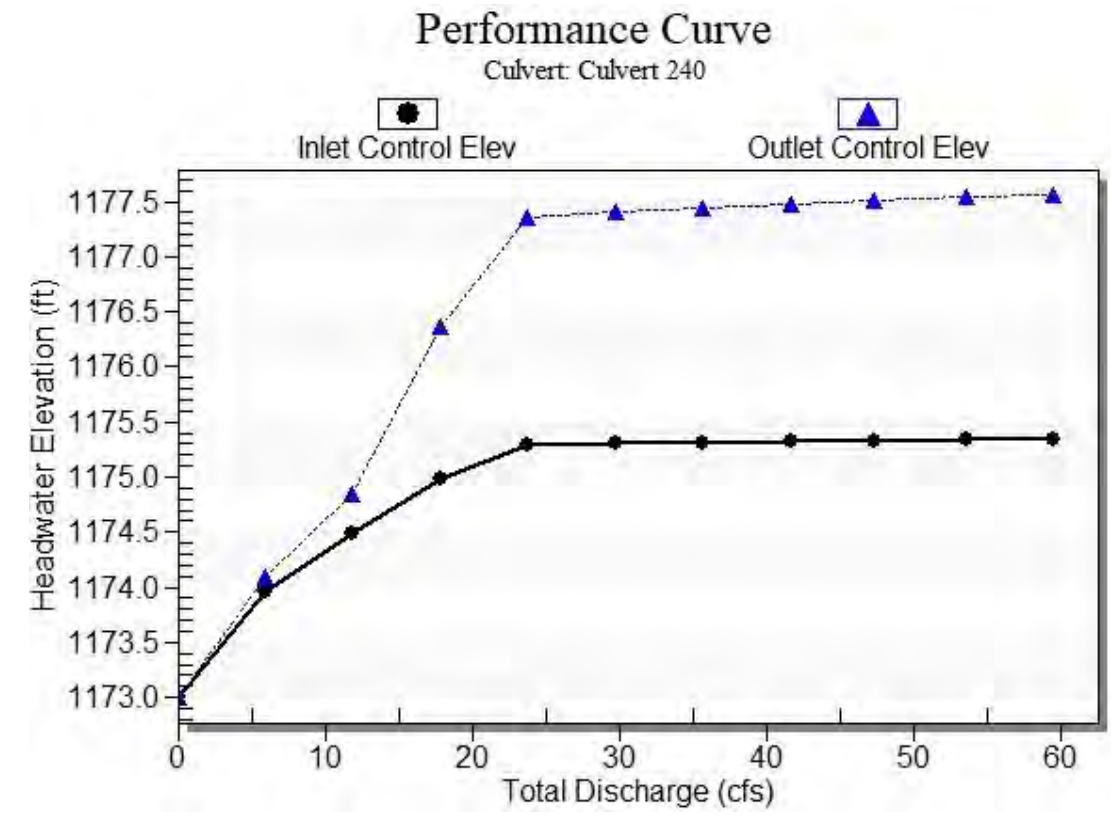


Table 2 - Culvert Summary Table: Culvert 240

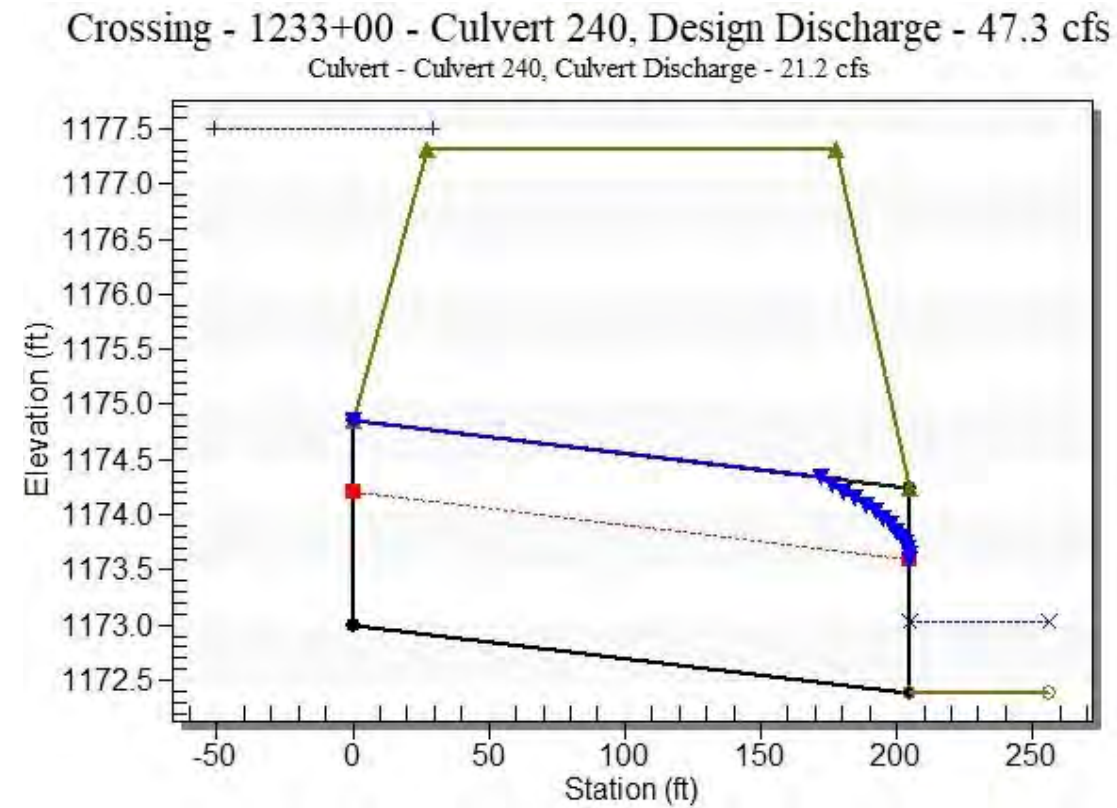
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1173.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.95	5.95	1174.09	0.954	1.093	2-M2c	0.930	0.568	0.568	0.190	4.022	2.013
11.90	11.90	1174.85	1.480	1.845	2-M2c	1.850	0.860	0.860	0.287	5.097	2.617
17.85	17.85	1176.36	1.989	3.359	7-M2c	1.850	1.081	1.081	0.364	6.061	3.044
23.80	20.80	1177.36	2.284	4.357	7-M2c	1.850	1.185	1.185	0.432	6.474	3.381
29.75	20.95	1177.41	2.300	4.406	7-M2c	1.850	1.190	1.190	0.492	6.495	3.666
35.70	21.06	1177.44	2.312	4.444	7-M2c	1.850	1.194	1.194	0.548	6.512	3.913
41.65	21.16	1177.48	2.323	4.478	7-M2c	1.850	1.197	1.197	0.600	6.527	4.133
47.25	21.25	1177.51	2.332	4.507	7-M2c	1.850	1.199	1.199	0.646	6.539	4.319
53.55	21.33	1177.54	2.341	4.536	7-M2c	1.850	1.202	1.202	0.695	6.551	4.513
59.50	21.40	1177.56	2.349	4.563	7-M2c	1.850	1.204	1.204	0.739	6.562	4.680

 Straight Culvert
 Inlet Elevation (invert): 1173.00 ft, Outlet Elevation (invert): 1172.39 ft
 Culvert Length: 205.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 240



Water Surface Profile Plot for Culvert: Culvert 240



Site Data - Culvert 240

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1173.00 ft
 Outlet Station: 205.00 ft
 Outlet Elevation: 1172.39 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 240

Barrel Shape: Pipe Arch
 Barrel Span: 36.10 in
 Barrel Rise: 22.20 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1233+00 - Culvert 240)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1172.39	0.00	0.00	0.00	0.00
5.95	1172.58	0.19	2.01	0.04	0.83
11.90	1172.68	0.29	2.62	0.05	0.88
17.85	1172.75	0.36	3.04	0.07	0.92
23.80	1172.82	0.43	3.38	0.08	0.94
29.75	1172.88	0.49	3.67	0.09	0.96
35.70	1172.94	0.55	3.91	0.10	0.98
41.65	1172.99	0.60	4.13	0.11	0.99
47.25	1173.04	0.65	4.32	0.12	1.00
53.55	1173.08	0.69	4.51	0.13	1.01
59.50	1173.13	0.74	4.68	0.14	1.02

Tailwater Channel Data - 1233+00 - Culvert 240

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1172.39 ft

Roadway Data for Crossing: 1233+00 - Culvert 240

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1177.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 245

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 47.25 cfs

Maximum Flow: 59.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1237+00 - Culvert 245

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 245 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1174.00	0.00	0.00	0.00	1
1175.41	5.95	5.95	0.00	1
1177.82	11.90	11.36	0.45	66
1177.89	17.85	11.47	6.27	6
1177.93	23.80	11.54	12.09	4
1177.97	29.75	11.60	18.08	4
1178.00	35.70	11.65	23.86	3
1178.03	41.65	11.70	29.83	3
1178.05	47.25	11.74	35.45	3
1178.08	53.55	11.79	41.73	3
1178.10	59.50	11.83	47.66	3
1177.81	11.33	11.33	0.00	Overtopping

Rating Curve Plot for Crossing: 1237+00 - Culvert 245

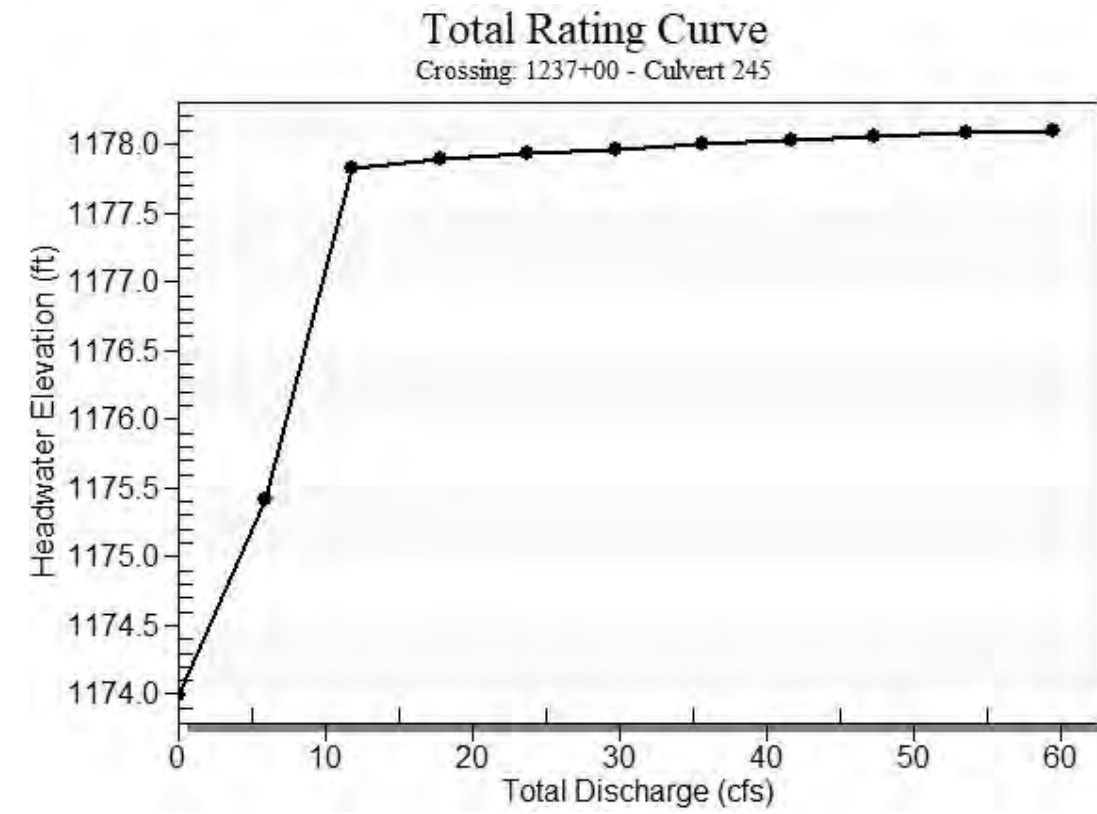
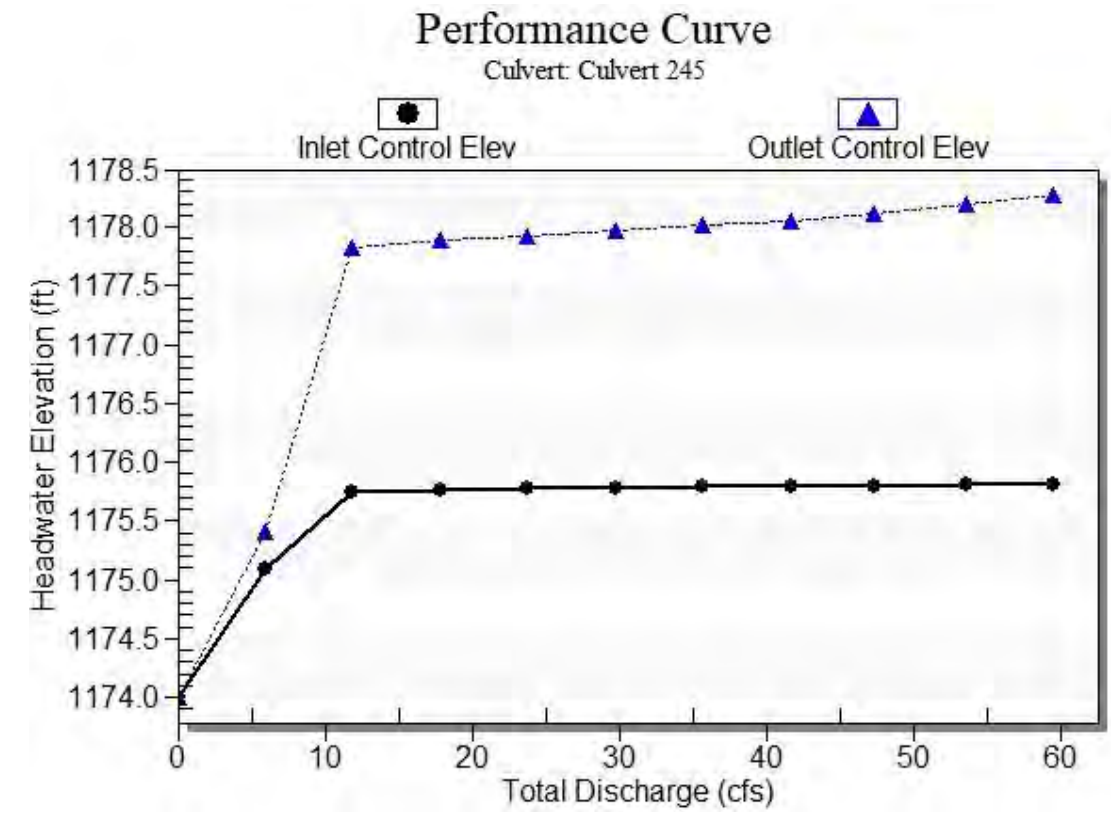


Table 2 - Culvert Summary Table: Culvert 245

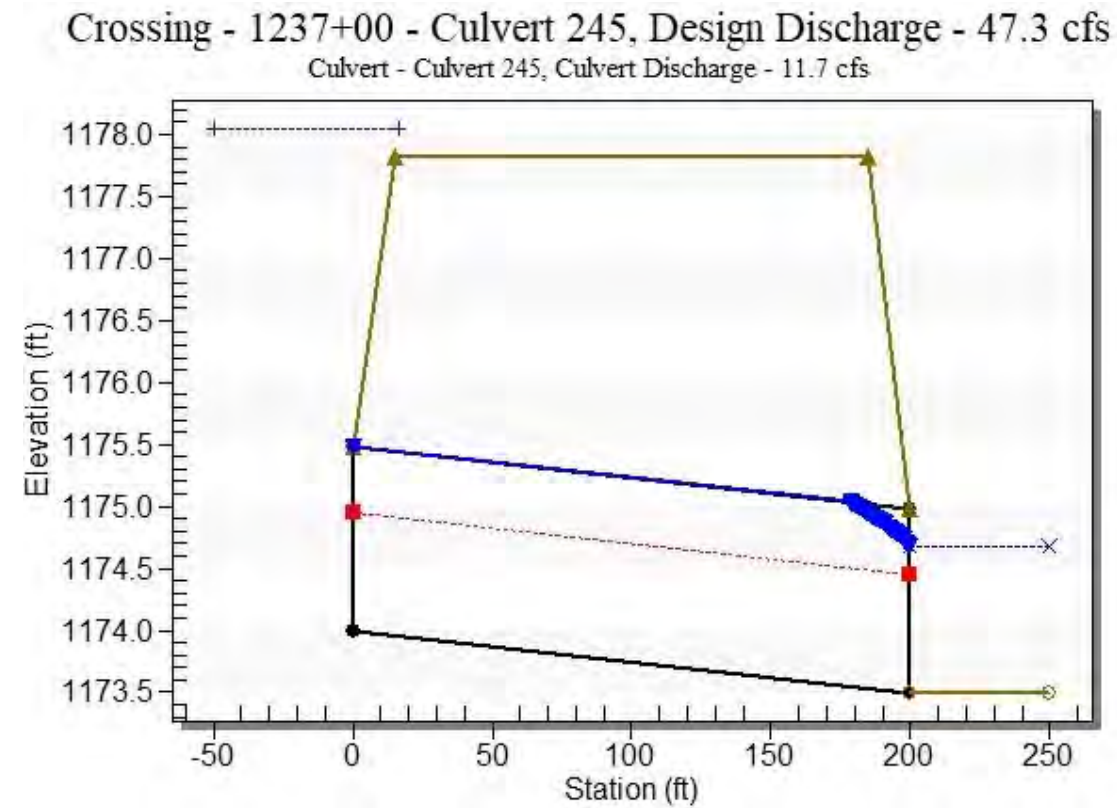
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1174.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.95	5.95	1175.41	1.085	1.410	2-M2c	1.483	0.643	0.643	0.365	4.319	0.968
11.90	11.36	1177.82	1.745	3.823	7-M2c	1.483	0.929	0.929	0.545	5.653	1.231
17.85	11.47	1177.89	1.761	3.887	7-M2c	1.483	0.934	0.934	0.687	5.679	1.408
23.80	11.54	1177.93	1.771	3.929	7-M2c	1.483	0.937	0.937	0.808	5.695	1.546
29.75	11.60	1177.97	1.779	3.965	7-M2c	1.483	0.940	0.940	0.916	5.709	1.659
35.70	11.65	1178.00	1.787	4.021	7-M2t	1.483	0.942	1.013	1.013	5.352	1.757
41.65	11.70	1178.03	1.794	4.053	7-M2t	1.483	0.944	1.102	1.102	4.993	1.842
47.25	11.74	1178.05	1.800	4.112	7-M2t	1.483	0.946	1.181	1.181	4.741	1.915
53.55	11.79	1178.08	1.807	4.197	7-M2t	1.483	0.948	1.263	1.263	4.530	1.988
59.50	11.83	1178.10	1.813	4.275	7-M2t	1.483	0.950	1.337	1.337	4.386	2.052

 Straight Culvert
 Inlet Elevation (invert): 1174.00 ft, Outlet Elevation (invert): 1173.50 ft
 Culvert Length: 200.00 ft, Culvert Slope: 0.0025

Culvert Performance Curve Plot: Culvert 245



Water Surface Profile Plot for Culvert: Culvert 245



Site Data - Culvert 245

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1174.00 ft
 Outlet Station: 200.00 ft
 Outlet Elevation: 1173.50 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 245

Barrel Shape: Pipe Arch
 Barrel Span: 28.90 in
 Barrel Rise: 17.80 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1237+00 - Culvert 245)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1173.50	0.00	0.00	0.00	0.00
5.95	1173.87	0.37	0.97	0.07	0.30
11.90	1174.05	0.55	1.23	0.10	0.32
17.85	1174.19	0.69	1.41	0.13	0.33
23.80	1174.31	0.81	1.55	0.15	0.33
29.75	1174.42	0.92	1.66	0.17	0.34
35.70	1174.51	1.01	1.76	0.19	0.34
41.65	1174.60	1.10	1.84	0.21	0.35
47.25	1174.68	1.18	1.91	0.22	0.35
53.55	1174.76	1.26	1.99	0.24	0.35
59.50	1174.84	1.34	2.05	0.25	0.36

Tailwater Channel Data - 1237+00 - Culvert 245

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1173.50 ft

Roadway Data for Crossing: 1237+00 - Culvert 245

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1177.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report

Structure 250

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 47.25 cfs

Maximum Flow: 59.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1240+33 - Culvert 250

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 250 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1172.10	0.00	0.00	0.00	1
1172.30	5.95	5.95	0.00	1
1172.41	11.90	11.90	0.00	1
1172.50	17.85	17.85	0.00	1
1172.59	23.80	23.80	0.00	1
1172.66	29.75	29.75	0.00	1
1172.73	35.70	35.70	0.00	1
1172.80	41.65	41.65	0.00	1
1172.85	47.25	47.25	0.00	1
1172.92	53.55	53.55	0.00	1
1172.97	59.50	59.50	0.00	1
1176.60	686.96	686.96	0.00	Overtopping

Rating Curve Plot for Crossing: 1240+33 - Culvert 250

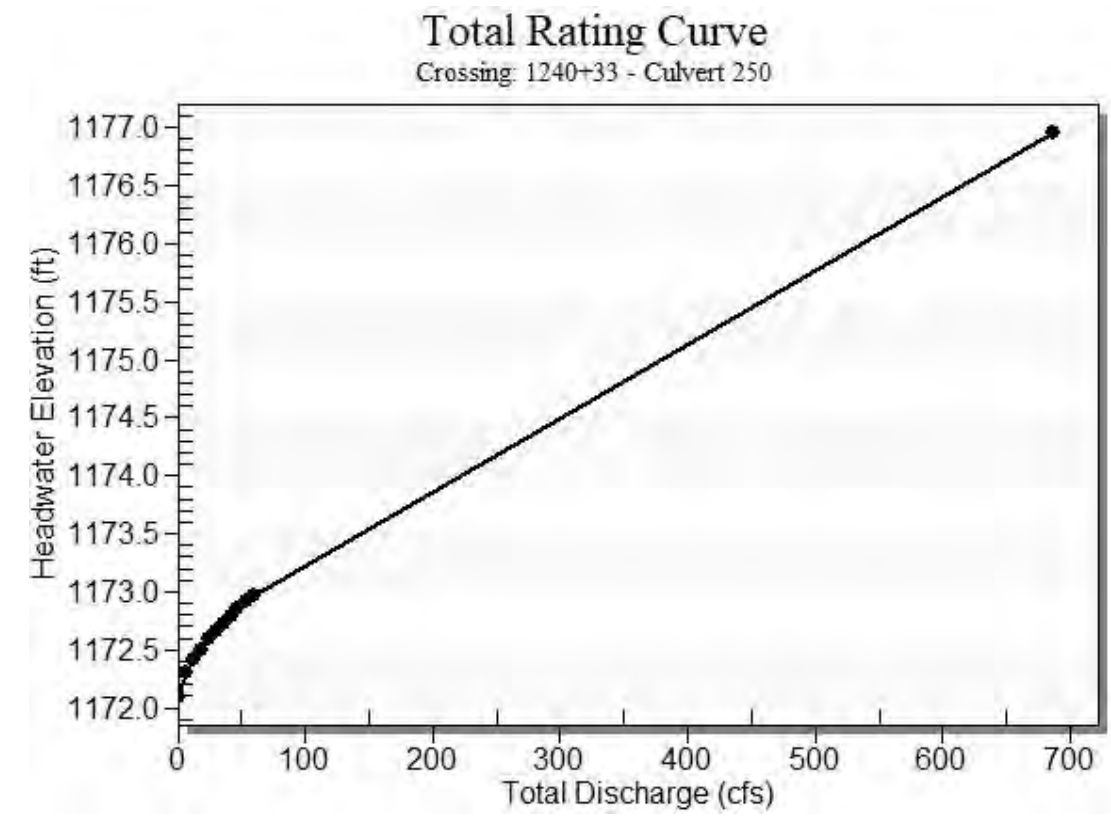
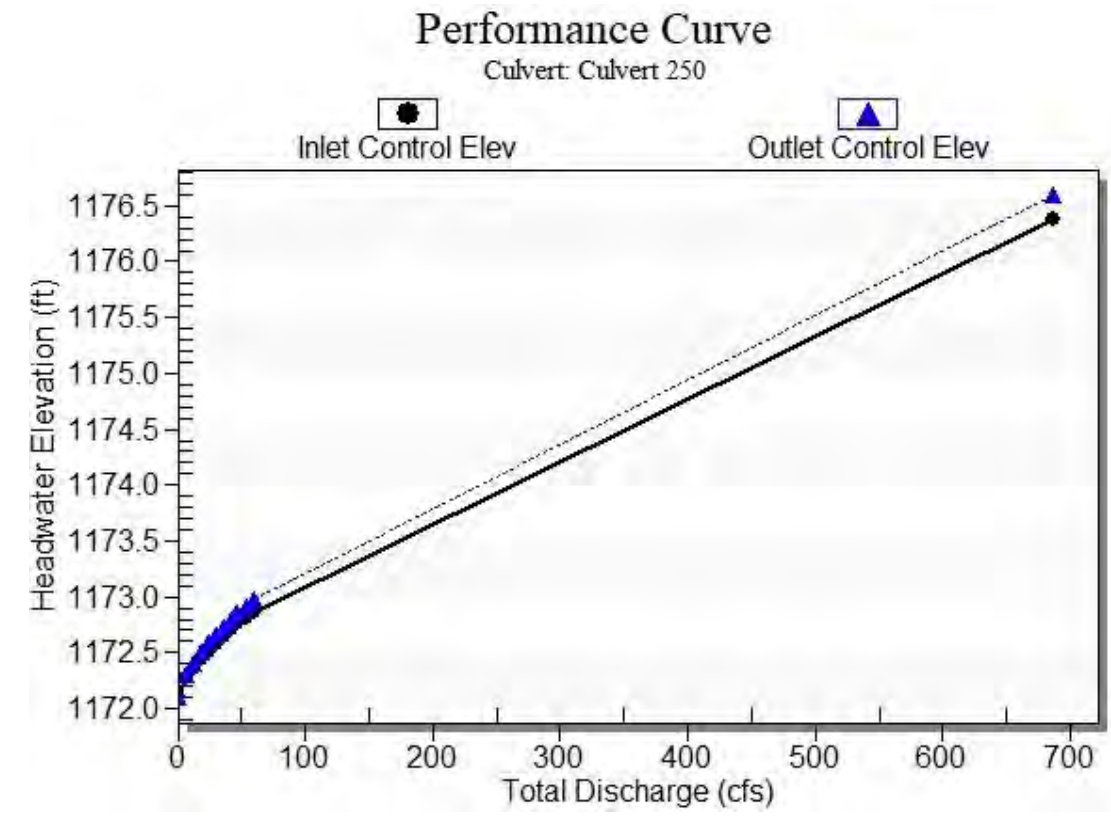


Table 2 - Culvert Summary Table: Culvert 250

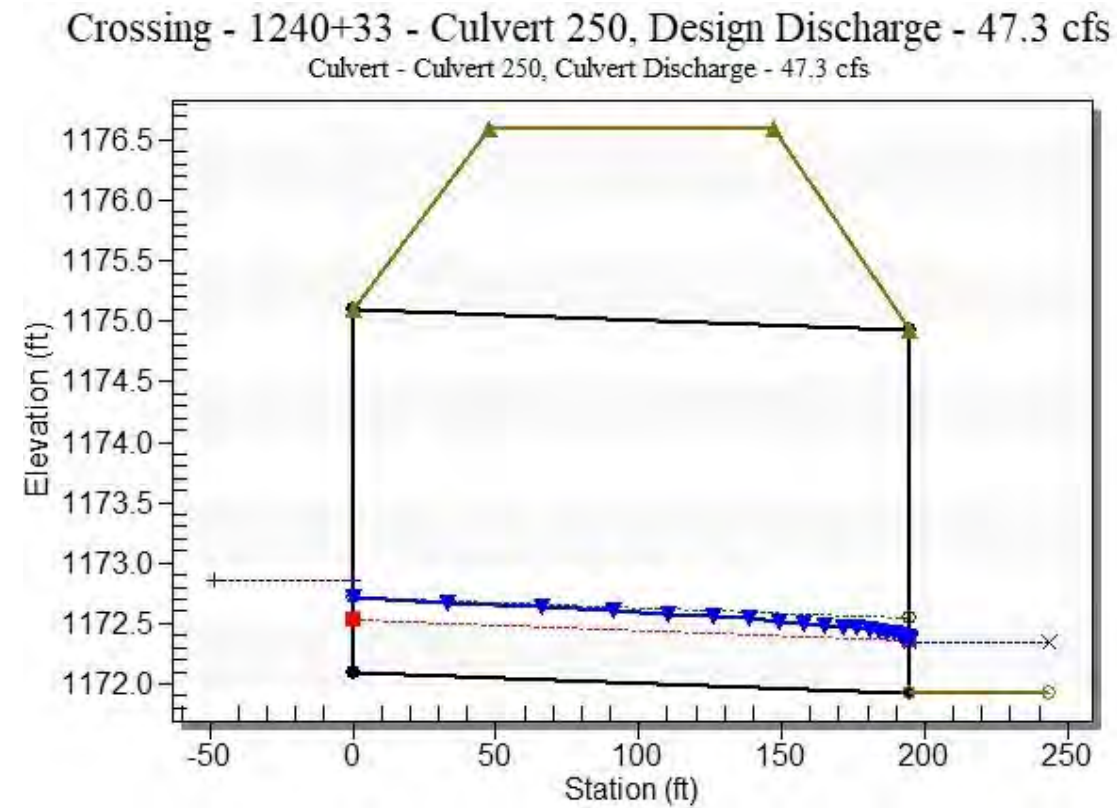
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1172.10	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.95	5.95	1172.30	0.164	0.200	3-M2t	0.170	0.107	0.119	0.119	1.669	1.501
11.90	11.90	1172.41	0.261	0.311	3-M2t	0.261	0.170	0.180	0.180	2.205	1.972
17.85	17.85	1172.50	0.342	0.404	3-M2t	0.335	0.222	0.229	0.229	2.594	2.310
23.80	23.80	1172.59	0.414	0.486	3-M2t	0.401	0.269	0.272	0.272	2.913	2.585
29.75	29.75	1172.66	0.480	0.562	2-M2c	0.461	0.313	0.313	0.311	3.173	2.818
35.70	35.70	1172.73	0.542	0.631	2-M2c	0.516	0.353	0.353	0.347	3.371	3.024
41.65	41.65	1172.80	0.601	0.696	2-M2c	0.568	0.391	0.391	0.380	3.549	3.208
47.25	47.25	1172.85	0.653	0.754	2-M2c	0.616	0.426	0.426	0.410	3.702	3.366
53.55	53.55	1172.92	0.710	0.817	2-M2c	0.666	0.463	0.463	0.442	3.859	3.532
59.50	59.50	1172.97	0.762	0.874	2-M2c	0.712	0.496	0.496	0.470	3.997	3.676

 Straight Culvert
 Inlet Elevation (invert): 1172.10 ft, Outlet Elevation (invert): 1171.93 ft
 Culvert Length: 195.00 ft, Culvert Slope: 0.0009

Culvert Performance Curve Plot: Culvert 250



Water Surface Profile Plot for Culvert: Culvert 250



Site Data - Culvert 250

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1172.10 ft
 Outlet Station: 195.00 ft
 Outlet Elevation: 1171.93 ft
 Number of Barrels: 3

Culvert Data Summary - Culvert 250

Barrel Shape: Concrete Box
 Barrel Span: 10.00 ft
 Barrel Rise: 3.00 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge (30-75° flare) Wingwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1240+33 - Culvert 250)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1171.93	0.00	0.00	0.00	0.00
5.95	1172.05	0.12	1.50	0.02	0.77
11.90	1172.11	0.18	1.97	0.03	0.83
17.85	1172.16	0.23	2.31	0.04	0.86
23.80	1172.20	0.27	2.58	0.05	0.88
29.75	1172.24	0.31	2.82	0.06	0.90
35.70	1172.28	0.35	3.02	0.06	0.92
41.65	1172.31	0.38	3.21	0.07	0.93
47.25	1172.34	0.41	3.37	0.08	0.94
53.55	1172.37	0.44	3.53	0.08	0.95
59.50	1172.40	0.47	3.68	0.09	0.96

Tailwater Channel Data - 1240+33 - Culvert 250

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 33.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1171.93 ft

Roadway Data for Crossing: 1240+33 - Culvert 250

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1176.60 ft
 Roadway Surface: Paved
 Roadway Top Width: 100.00 ft

HY-8 Culvert Analysis Report

Structure 255

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 47.25 cfs

Maximum Flow: 59.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1243+00 - Culvert 255

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 255 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1174.00	0.00	0.00	0.00	1
1174.66	5.95	5.95	0.00	1
1175.00	11.90	11.90	0.00	1
1175.30	17.85	17.85	0.00	1
1175.58	23.80	23.80	0.00	1
1175.85	29.75	29.75	0.00	1
1176.14	35.70	35.70	0.00	1
1176.47	41.65	41.65	0.00	1
1176.93	47.25	47.25	0.00	1
1177.54	53.55	53.55	0.00	1
1177.86	59.50	56.53	2.79	14
1177.81	56.05	56.05	0.00	Overtopping

Rating Curve Plot for Crossing: 1243+00 - Culvert 255

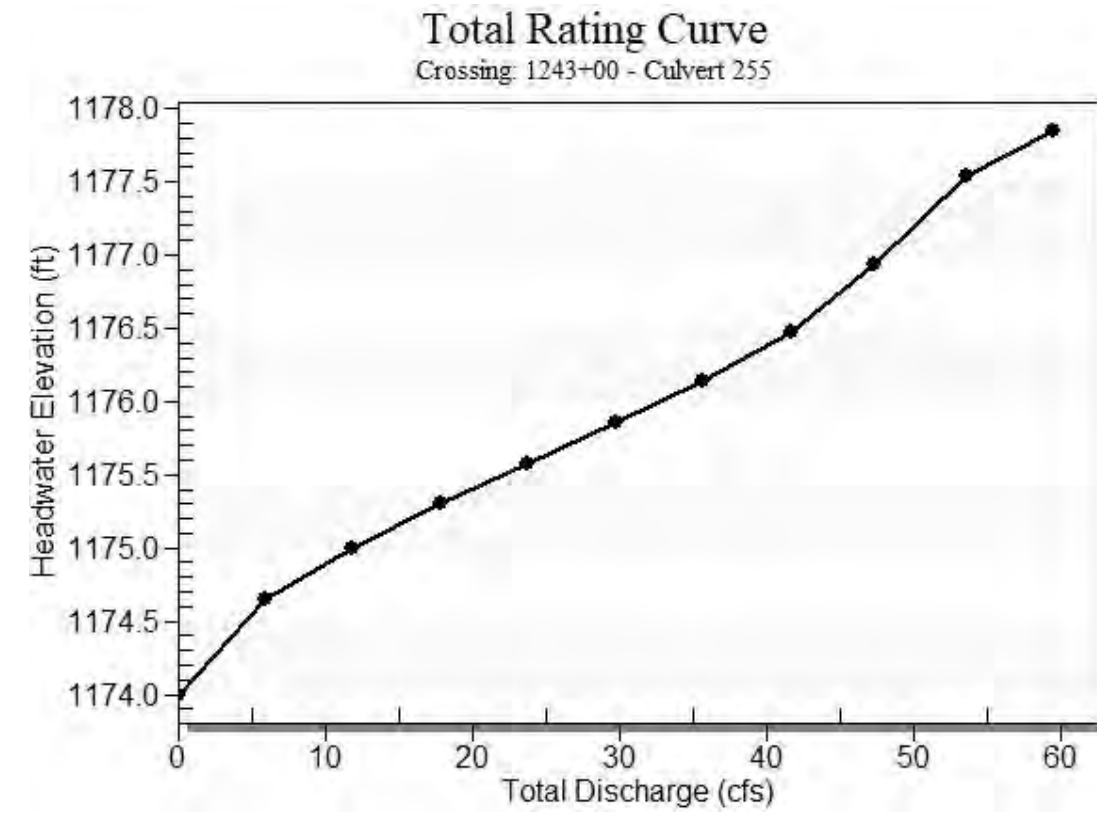
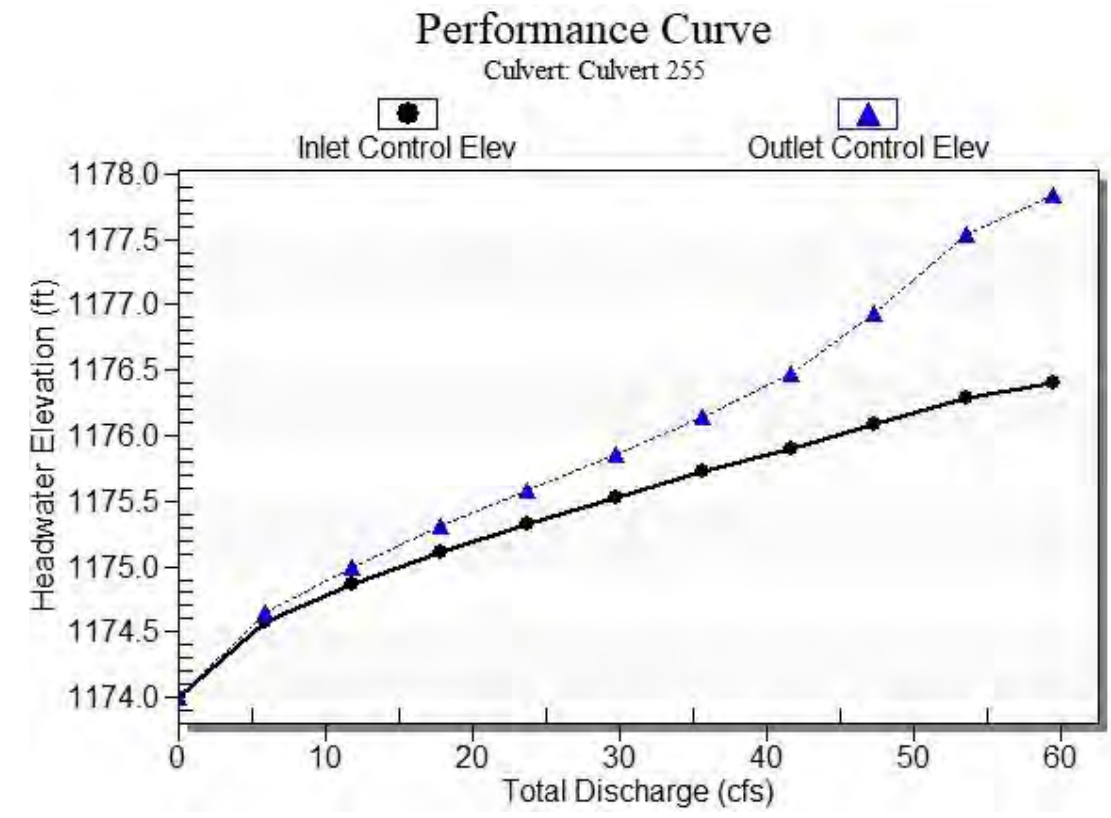


Table 2 - Culvert Summary Table: Culvert 255

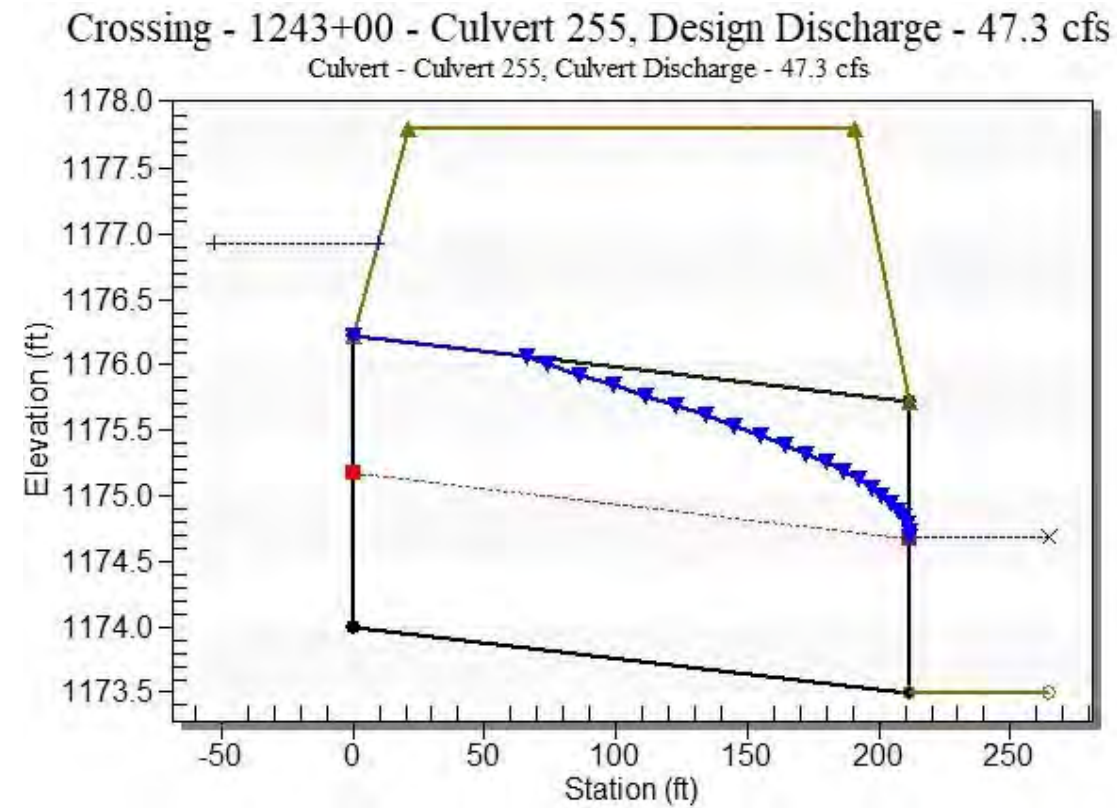
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1174.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.95	5.95	1174.66	0.577	0.655	3-M2t	0.569	0.354	0.365	0.365	2.934	0.968
11.90	11.90	1175.00	0.866	1.001	3-M2t	0.868	0.521	0.545	0.545	3.591	1.231
17.85	17.85	1175.30	1.110	1.303	3-M2t	1.150	0.656	0.687	0.687	4.120	1.408
23.80	23.80	1175.58	1.332	1.580	3-M2t	1.456	0.784	0.808	0.808	4.588	1.546
29.75	29.75	1175.85	1.532	1.854	3-M2t	2.217	0.893	0.916	0.916	5.013	1.659
35.70	35.70	1176.14	1.720	2.139	3-M2t	2.217	0.999	1.013	1.013	5.410	1.757
41.65	41.65	1176.47	1.905	2.468	3-M2t	2.217	1.090	1.102	1.102	5.785	1.842
47.25	47.25	1176.93	2.082	2.933	7-M2t	2.217	1.169	1.181	1.181	6.123	1.915
53.55	53.55	1177.54	2.292	3.537	7-M2t	2.217	1.259	1.263	1.263	6.492	1.988
59.50	56.53	1177.86	2.396	3.842	7-M2t	2.217	1.303	1.337	1.337	6.490	2.052

 Straight Culvert
 Inlet Elevation (invert): 1174.00 ft, Outlet Elevation (invert): 1173.50 ft
 Culvert Length: 212.00 ft, Culvert Slope: 0.0024

Culvert Performance Curve Plot: Culvert 255



Water Surface Profile Plot for Culvert: Culvert 255



Site Data - Culvert 255

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1174.00 ft
 Outlet Station: 212.00 ft
 Outlet Elevation: 1173.50 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 255

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1243+00 - Culvert 255)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1173.50	0.00	0.00	0.00	0.00
5.95	1173.87	0.37	0.97	0.07	0.30
11.90	1174.05	0.55	1.23	0.10	0.32
17.85	1174.19	0.69	1.41	0.13	0.33
23.80	1174.31	0.81	1.55	0.15	0.33
29.75	1174.42	0.92	1.66	0.17	0.34
35.70	1174.51	1.01	1.76	0.19	0.34
41.65	1174.60	1.10	1.84	0.21	0.35
47.25	1174.68	1.18	1.91	0.22	0.35
53.55	1174.76	1.26	1.99	0.24	0.35
59.50	1174.84	1.34	2.05	0.25	0.36

Tailwater Channel Data - 1243+00 - Culvert 255

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1173.50 ft

Roadway Data for Crossing: 1243+00 - Culvert 255

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1177.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report Structure 260

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 10 cfs

Maximum Flow: 12.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1244+20 - Culvert 260

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 260 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1173.23	0.00	0.00	0.00	1
1173.29	1.25	1.25	0.00	1
1173.33	2.50	2.50	0.00	1
1173.36	3.75	3.75	0.00	1
1173.39	5.00	5.00	0.00	1
1173.42	6.25	6.25	0.00	1
1173.44	7.50	7.50	0.00	1
1173.46	8.75	8.75	0.00	1
1173.48	10.00	10.00	0.00	1
1173.50	11.25	11.25	0.00	1
1173.52	12.50	12.50	0.00	1
1177.81	734.83	734.83	0.00	Overtopping

Rating Curve Plot for Crossing: 1244+20 - Culvert 260

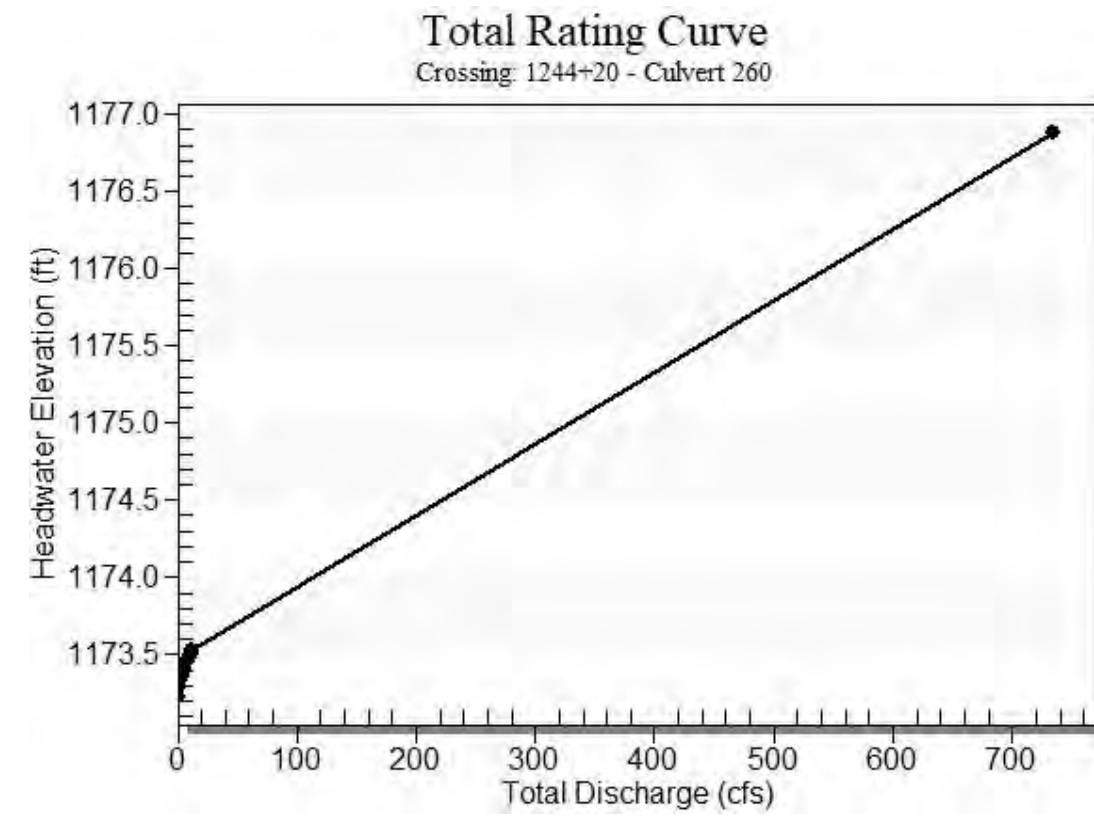


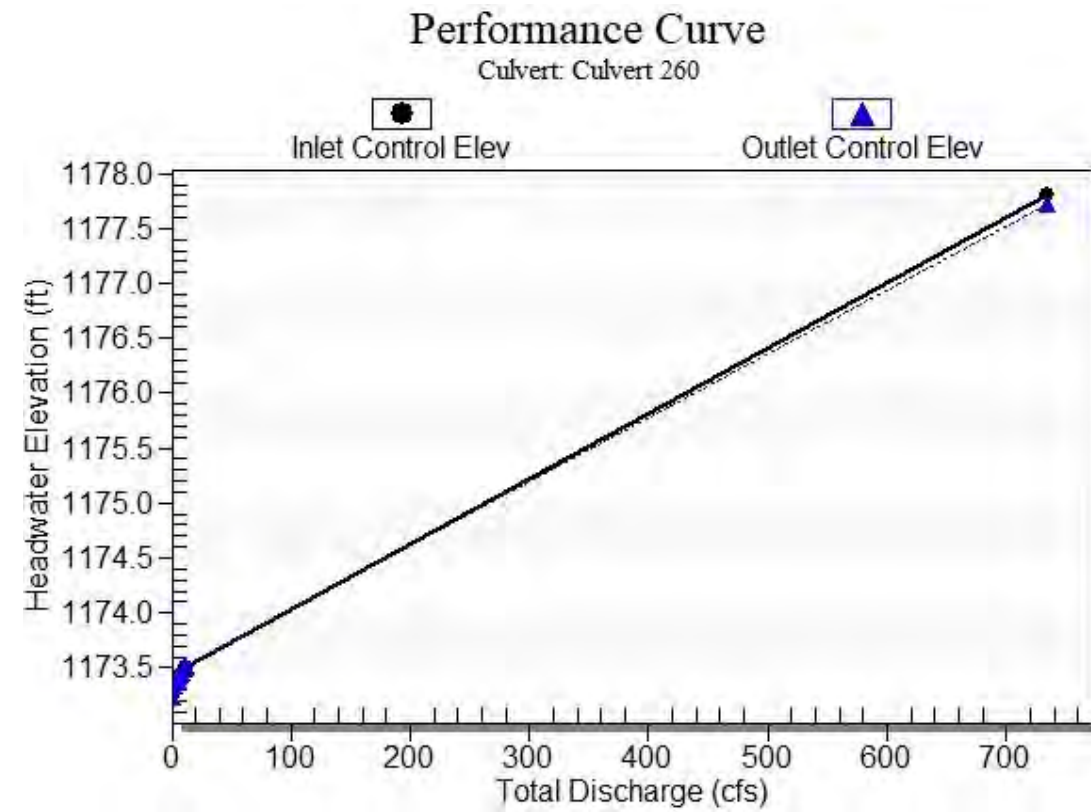
Table 2 - Culvert Summary Table: Culvert 260

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1173.23	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.25	1.25	1173.29	0.058	0.0*	1-S2n	0.034	0.038	0.034	0.047	1.209	0.810
2.50	2.50	1173.33	0.092	0.102	3-M1t	0.069	0.060	0.071	0.071	1.179	1.065
3.75	3.75	1173.36	0.120	0.134	3-M1t	0.089	0.079	0.090	0.090	1.387	1.251
5.00	5.00	1173.39	0.146	0.162	3-M1t	0.105	0.095	0.107	0.107	1.556	1.401
6.25	6.25	1173.42	0.169	0.188	3-M1t	0.121	0.110	0.122	0.122	1.702	1.530
7.50	7.50	1173.44	0.191	0.209	3-M2t	0.138	0.125	0.137	0.137	1.831	1.644
8.75	8.75	1173.46	0.212	0.232	3-M2t	0.154	0.138	0.150	0.150	1.948	1.747
10.00	10.00	1173.48	0.232	0.254	3-M2t	0.165	0.151	0.162	0.162	2.056	1.842
11.25	11.25	1173.50	0.251	0.275	3-M2t	0.177	0.163	0.174	0.174	2.155	1.929
12.50	12.50	1173.52	0.269	0.295	3-M2t	0.188	0.175	0.185	0.185	2.249	2.011

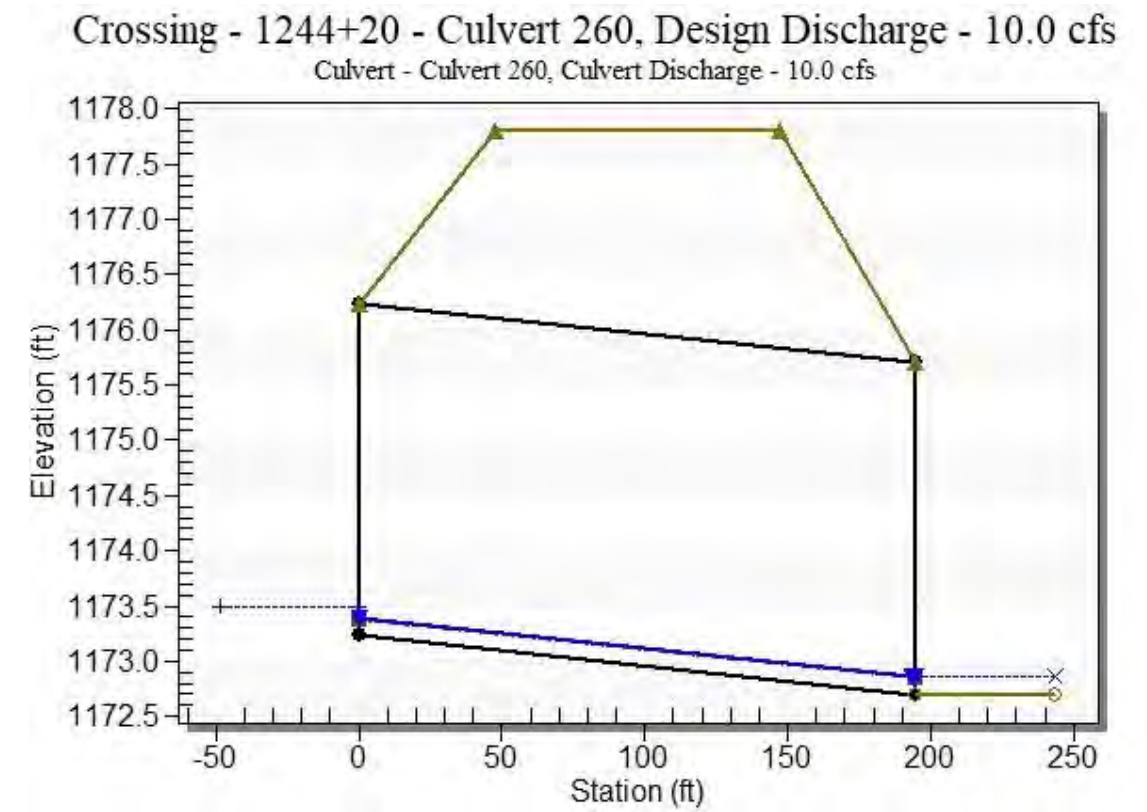
* Full Flow Headwater elevation is below inlet invert.

 Straight Culvert
 Inlet Elevation (invert): 1173.23 ft, Outlet Elevation (invert): 1172.70 ft
 Culvert Length: 195.00 ft, Culvert Slope: 0.0027

Culvert Performance Curve Plot: Culvert 260



Water Surface Profile Plot for Culvert: Culvert 260



Site Data - Culvert 260

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1173.23 ft
 Outlet Station: 195.00 ft
 Outlet Elevation: 1172.70 ft
 Number of Barrels: 3

Culvert Data Summary - Culvert 260

Barrel Shape: Concrete Box
 Barrel Span: 10.00 ft
 Barrel Rise: 3.00 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge (30-75° flare) Wingwall
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 265

Table 3 - Downstream Channel Rating Curve (Crossing: 1244+20 - Culvert 260)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1172.70	0.00	0.00	0.00	0.00
1.25	1172.75	0.05	0.81	0.01	0.66
2.50	1172.77	0.07	1.07	0.01	0.71
3.75	1172.79	0.09	1.25	0.02	0.74
5.00	1172.81	0.11	1.40	0.02	0.76
6.25	1172.82	0.12	1.53	0.02	0.77
7.50	1172.84	0.14	1.64	0.03	0.79
8.75	1172.85	0.15	1.75	0.03	0.80
10.00	1172.86	0.16	1.84	0.03	0.81
11.25	1172.87	0.17	1.93	0.03	0.82
12.50	1172.89	0.19	2.01	0.03	0.83

Tailwater Channel Data - 1244+20 - Culvert 260

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 33.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1172.70 ft

Roadway Data for Crossing: 1244+20 - Culvert 260

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1177.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 100.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 10 cfs

Maximum Flow: 12.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1249+00 - Culvert 265

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 265 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1175.00	0.00	0.00	0.00	1
1175.28	1.25	1.25	0.00	1
1175.41	2.50	2.50	0.00	1
1175.51	3.75	3.75	0.00	1
1175.59	5.00	5.00	0.00	1
1175.68	6.25	6.25	0.00	1
1175.75	7.50	7.50	0.00	1
1175.83	8.75	8.75	0.00	1
1175.90	10.00	10.00	0.00	1
1175.97	11.25	11.25	0.00	1
1176.04	12.50	12.50	0.00	1
1178.31	51.03	51.03	0.00	Overtopping

Rating Curve Plot for Crossing: 1249+00 - Culvert 265

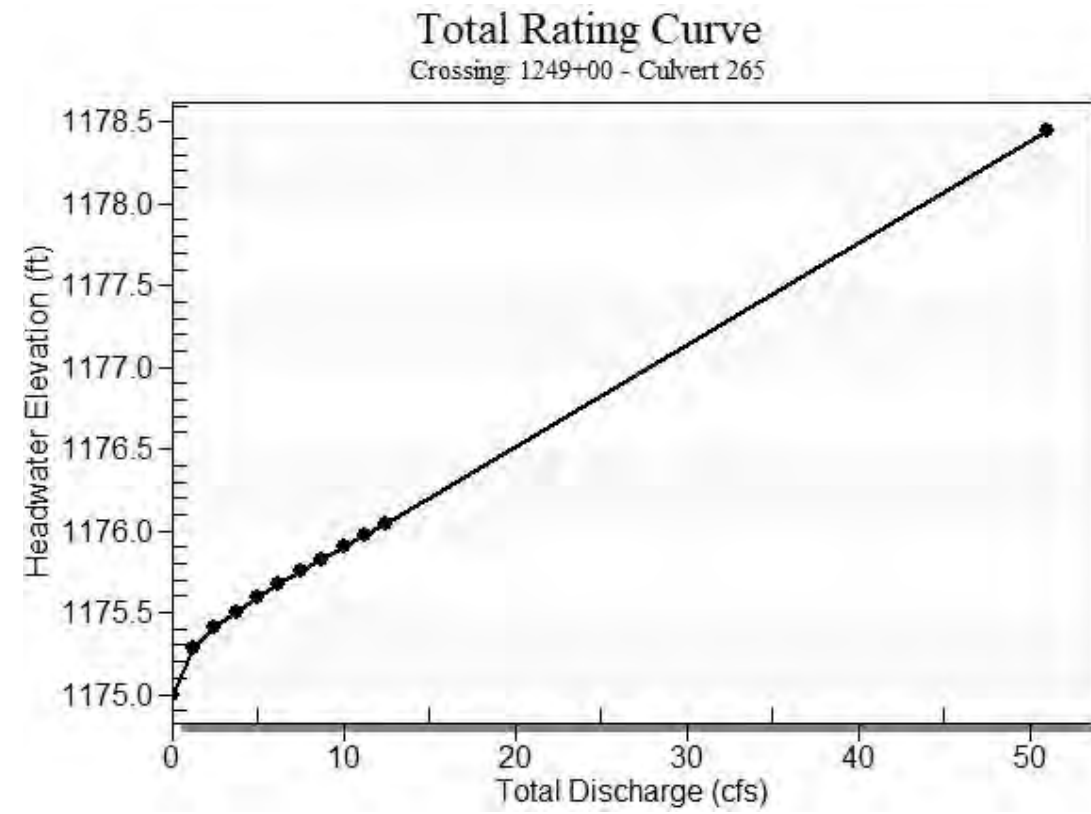
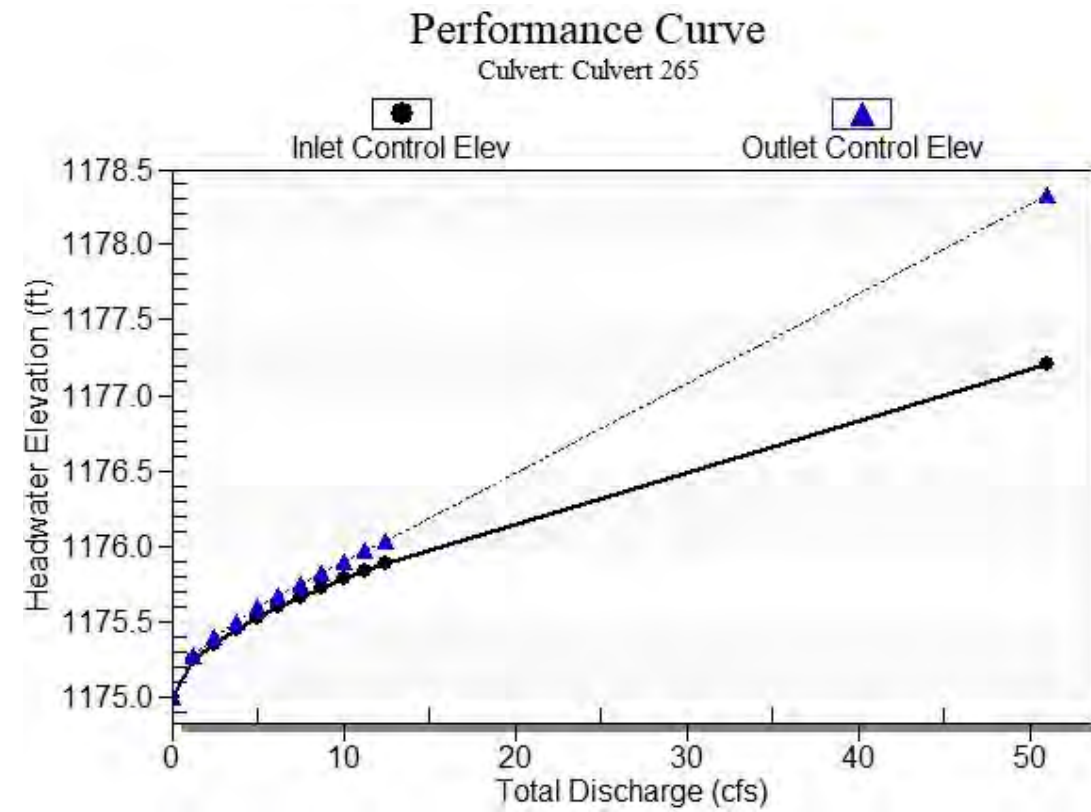


Table 2 - Culvert Summary Table: Culvert 265

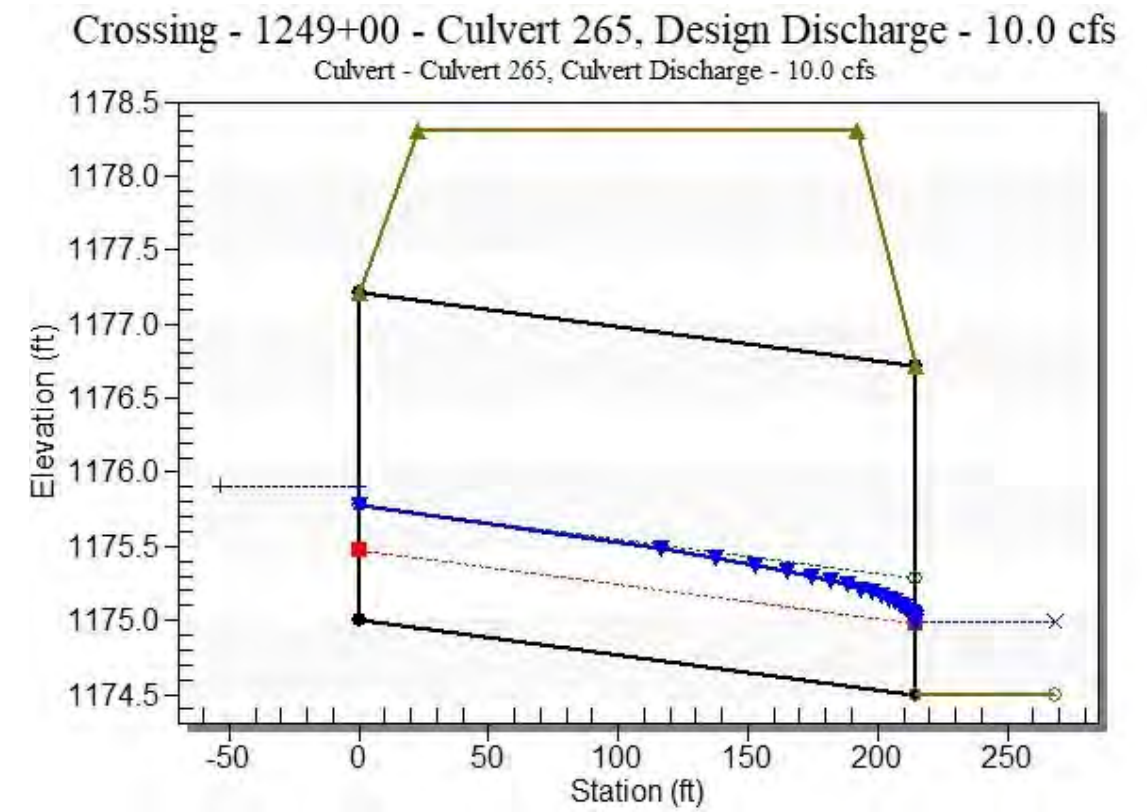
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1175.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.25	1.25	1175.28	0.246	0.282	2-M2c	0.253	0.157	0.157	0.146	1.933	0.546
2.50	2.50	1175.41	0.354	0.405	2-M2c	0.358	0.221	0.221	0.219	2.388	0.708
3.75	3.75	1175.51	0.447	0.506	3-M2t	0.443	0.275	0.279	0.279	2.618	0.821
5.00	5.00	1175.59	0.524	0.594	3-M2t	0.518	0.321	0.330	0.330	2.805	0.910
6.25	6.25	1175.68	0.593	0.675	3-M2t	0.587	0.364	0.376	0.376	2.972	0.985
7.50	7.50	1175.75	0.661	0.753	3-M2t	0.654	0.399	0.418	0.418	3.126	1.050
8.75	8.75	1175.83	0.723	0.827	3-M2t	0.717	0.436	0.457	0.457	3.268	1.108
10.00	10.00	1175.90	0.781	0.898	3-M2t	0.780	0.471	0.494	0.494	3.401	1.160
11.25	11.25	1175.97	0.838	0.968	3-M2t	0.840	0.505	0.528	0.528	3.527	1.207
12.50	12.50	1176.04	0.892	1.036	3-M2t	0.901	0.536	0.561	0.561	3.648	1.251

 Straight Culvert
 Inlet Elevation (invert): 1175.00 ft, Outlet Elevation (invert): 1174.50 ft
 Culvert Length: 215.00 ft, Culvert Slope: 0.0023

Culvert Performance Curve Plot: Culvert 265



Water Surface Profile Plot for Culvert: Culvert 265



Site Data - Culvert 265

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1175.00 ft
 Outlet Station: 215.00 ft
 Outlet Elevation: 1174.50 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 265

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 270

Table 3 - Downstream Channel Rating Curve (Crossing: 1249+00 - Culvert 265)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1174.50	0.00	0.00	0.00	0.00
1.25	1174.65	0.15	0.55	0.03	0.26
2.50	1174.72	0.22	0.71	0.04	0.28
3.75	1174.78	0.28	0.82	0.05	0.29
5.00	1174.83	0.33	0.91	0.06	0.29
6.25	1174.88	0.38	0.99	0.07	0.30
7.50	1174.92	0.42	1.05	0.08	0.30
8.75	1174.96	0.46	1.11	0.09	0.31
10.00	1174.99	0.49	1.16	0.09	0.31
11.25	1175.03	0.53	1.21	0.10	0.31
12.50	1175.06	0.56	1.25	0.11	0.32

Tailwater Channel Data - 1249+00 - Culvert 265

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1174.50 ft

Roadway Data for Crossing: 1249+00 - Culvert 265

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1178.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 10.666 cfs

Maximum Flow: 13.333 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1253+00 - Culvert 270

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 270 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1174.90	0.00	0.00	0.00	1
1174.97	1.33	1.33	0.00	1
1175.01	2.67	2.67	0.00	1
1175.04	4.00	4.00	0.00	1
1175.07	5.33	5.33	0.00	1
1175.10	6.67	6.67	0.00	1
1175.13	8.00	8.00	0.00	1
1175.15	9.33	9.33	0.00	1
1175.17	10.67	10.67	0.00	1
1175.19	12.00	12.00	0.00	1
1175.22	13.33	13.33	0.00	1
1178.81	603.21	603.21	0.00	Overtopping

Rating Curve Plot for Crossing: 1253+00 - Culvert 270

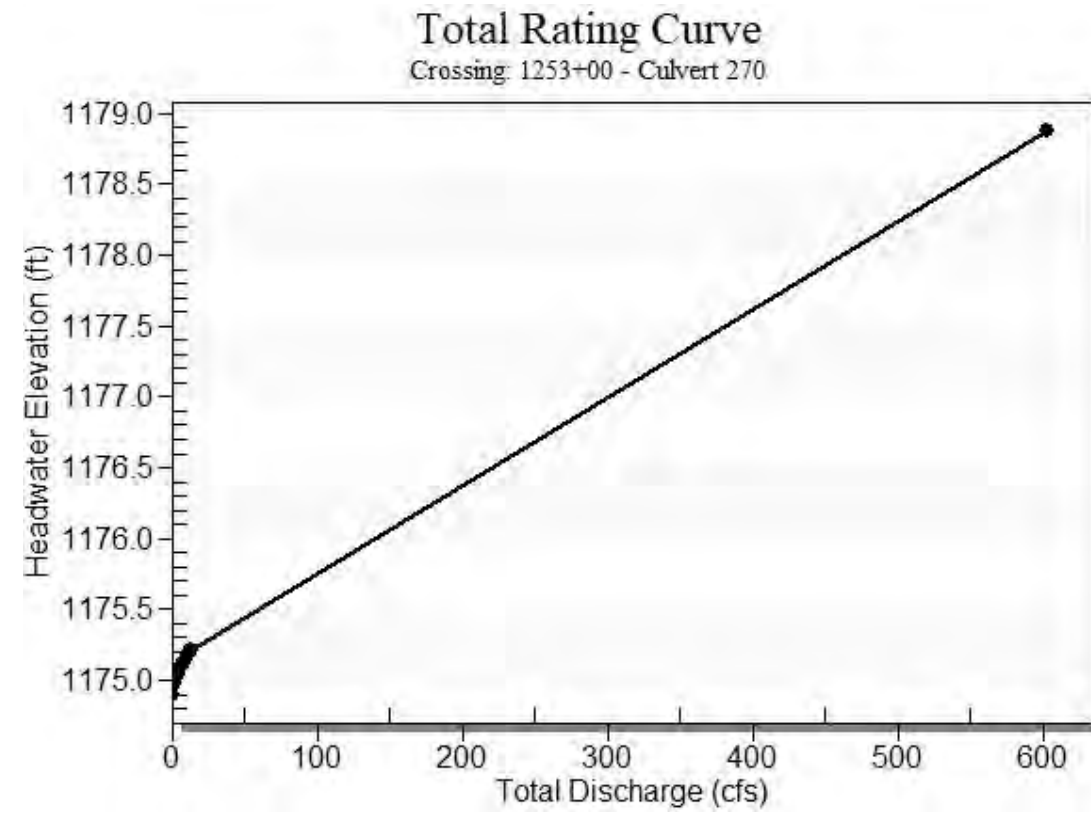
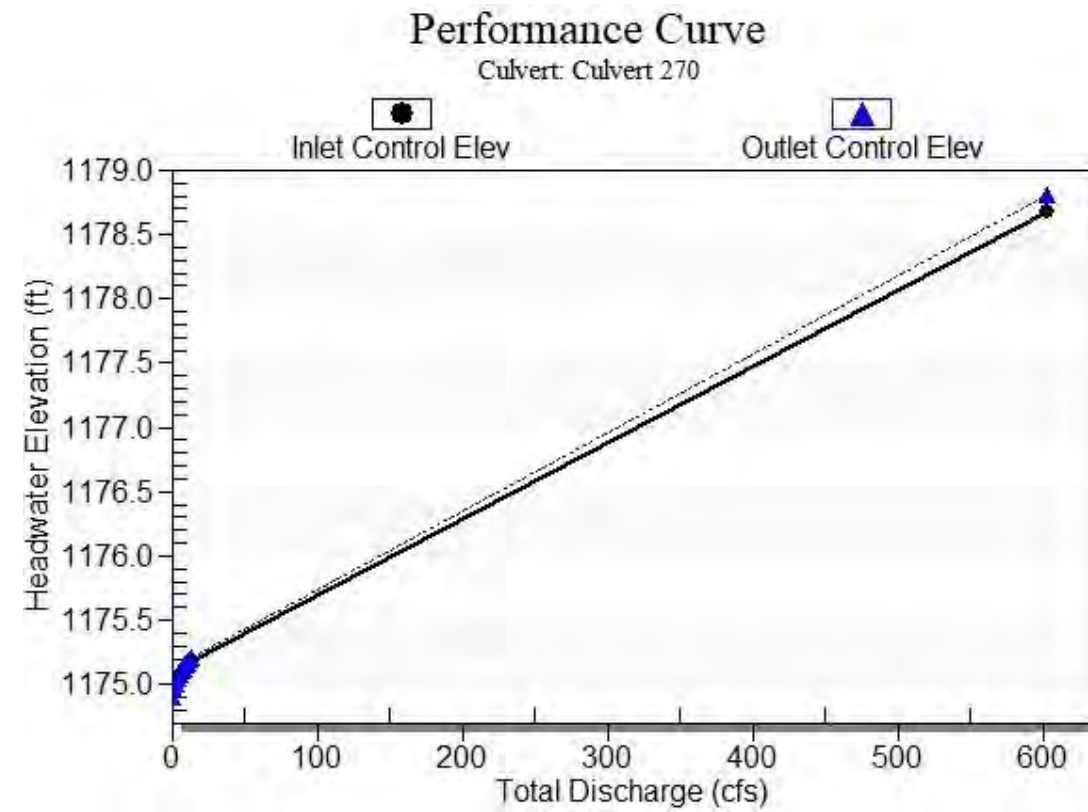


Table 2 - Culvert Summary Table: Culvert 270

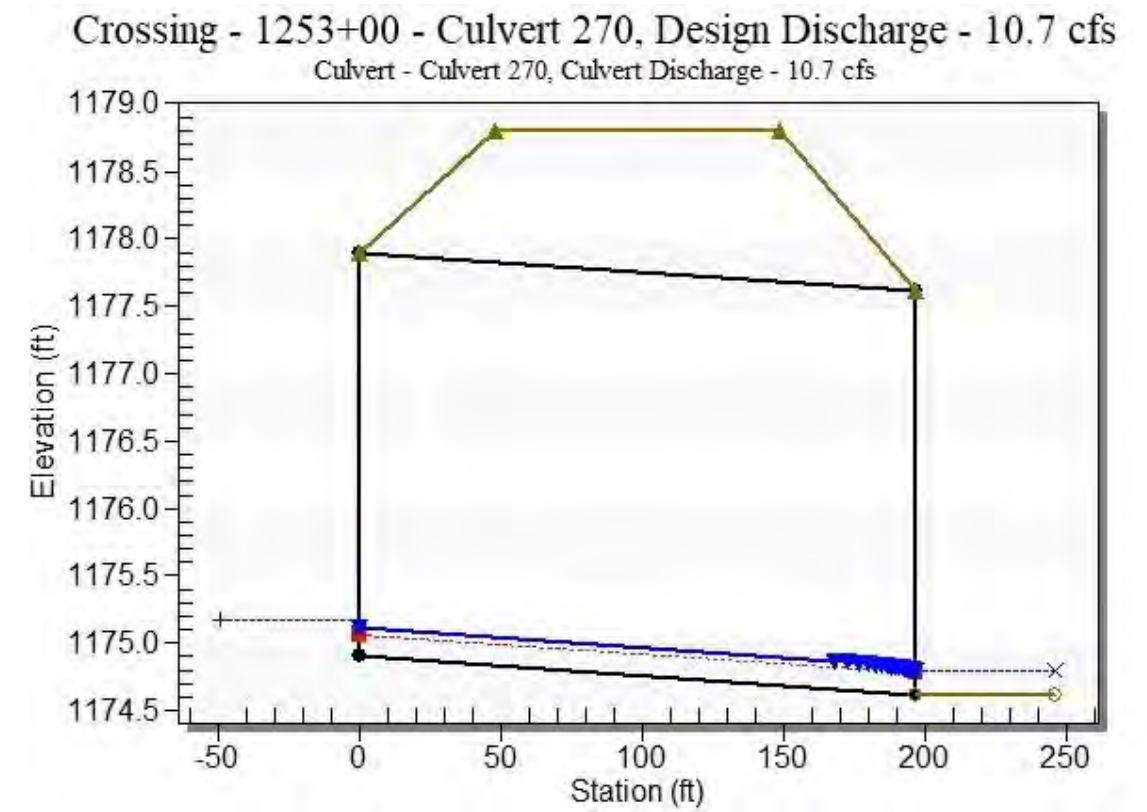
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1174.90	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.33	1.33	1174.97	0.061	0.067	3-M2t	0.051	0.039	0.048	0.048	0.917	0.830
2.67	2.67	1175.01	0.096	0.110	3-M2t	0.088	0.063	0.073	0.073	1.210	1.093
4.00	4.00	1175.04	0.126	0.143	3-M2t	0.112	0.082	0.094	0.094	1.423	1.283
5.33	5.33	1175.07	0.153	0.173	3-M2t	0.136	0.099	0.111	0.111	1.597	1.438
6.67	6.67	1175.10	0.177	0.201	3-M2t	0.158	0.115	0.127	0.127	1.747	1.570
8.00	8.00	1175.13	0.200	0.226	3-M2t	0.175	0.130	0.142	0.142	1.879	1.687
9.33	9.33	1175.15	0.222	0.249	3-M2t	0.192	0.144	0.156	0.156	1.999	1.792
10.67	10.67	1175.17	0.242	0.272	3-M2t	0.209	0.158	0.168	0.168	2.111	1.890
12.00	12.00	1175.19	0.262	0.294	3-M2t	0.226	0.171	0.181	0.181	2.212	1.978
13.33	13.33	1175.22	0.281	0.315	3-M2t	0.241	0.183	0.192	0.192	2.309	2.063

 Straight Culvert
 Inlet Elevation (invert): 1174.90 ft, Outlet Elevation (invert): 1174.62 ft
 Culvert Length: 197.00 ft, Culvert Slope: 0.0014

Culvert Performance Curve Plot: Culvert 270



Water Surface Profile Plot for Culvert: Culvert 270



Site Data - Culvert 270

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 1174.90 ft
Outlet Station: 197.00 ft
Outlet Elevation: 1174.62 ft
Number of Barrels: 3

Culvert Data Summary - Culvert 270

Barrel Shape: Concrete Box
Barrel Span: 10.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75° flare) Wingwall
Inlet Depression: None

HY-8 Culvert Analysis Report Structure 275

Table 3 - Downstream Channel Rating Curve (Crossing: 1253+00 - Culvert 270)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1174.62	0.00	0.00	0.00	0.00
1.33	1174.67	0.05	0.83	0.01	0.67
2.67	1174.69	0.07	1.09	0.01	0.71
4.00	1174.71	0.09	1.28	0.02	0.74
5.33	1174.73	0.11	1.44	0.02	0.76
6.67	1174.75	0.13	1.57	0.02	0.78
8.00	1174.76	0.14	1.69	0.03	0.79
9.33	1174.78	0.16	1.79	0.03	0.81
10.67	1174.79	0.17	1.89	0.03	0.82
12.00	1174.80	0.18	1.98	0.03	0.83
13.33	1174.81	0.19	2.06	0.04	0.84

Tailwater Channel Data - 1253+00 - Culvert 270

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 33.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1174.62 ft

Roadway Data for Crossing: 1253+00 - Culvert 270

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1178.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 100.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 10.666 cfs

Maximum Flow: 13.333 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1255+00 - Culvert 275

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 275 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1175.50	0.00	0.00	0.00	1
1175.79	1.33	1.33	0.00	1
1175.92	2.67	2.67	0.00	1
1176.02	4.00	4.00	0.00	1
1176.11	5.33	5.33	0.00	1
1176.20	6.67	6.67	0.00	1
1176.28	8.00	8.00	0.00	1
1176.36	9.33	9.33	0.00	1
1176.43	10.67	10.67	0.00	1
1176.50	12.00	12.00	0.00	1
1176.58	13.33	13.33	0.00	1
1178.81	51.45	51.45	0.00	Overtopping

Rating Curve Plot for Crossing: 1255+00 - Culvert 275

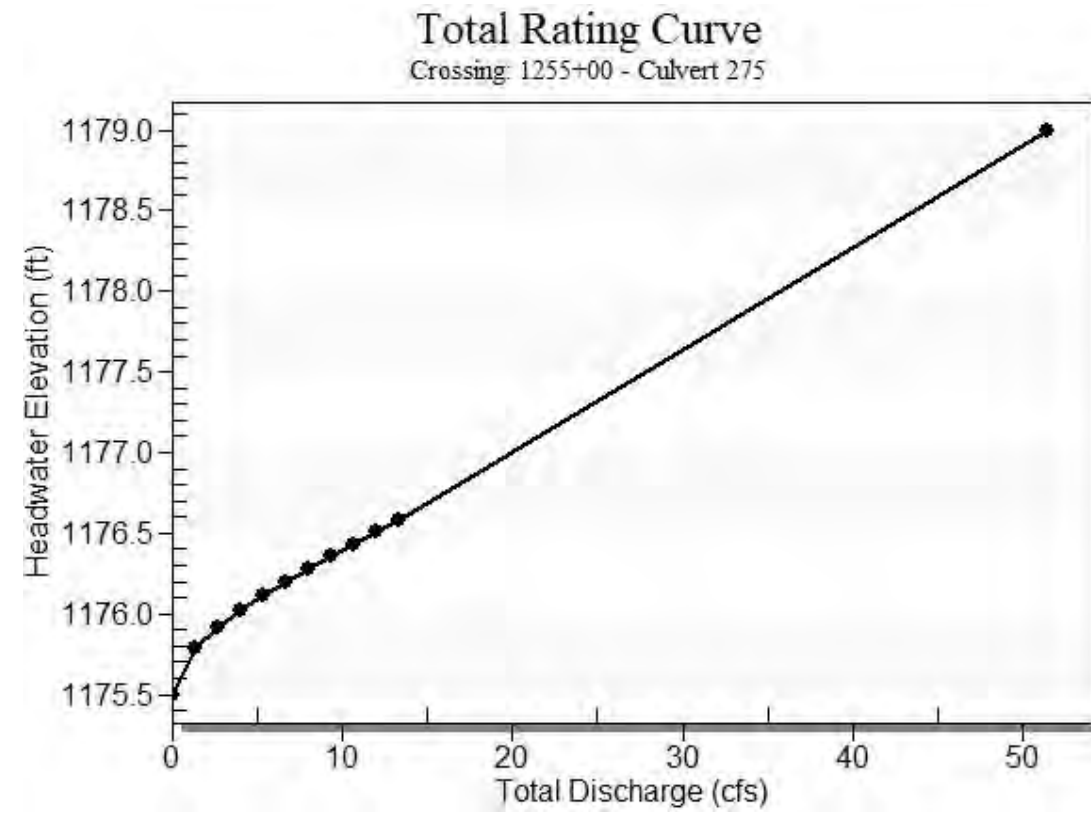
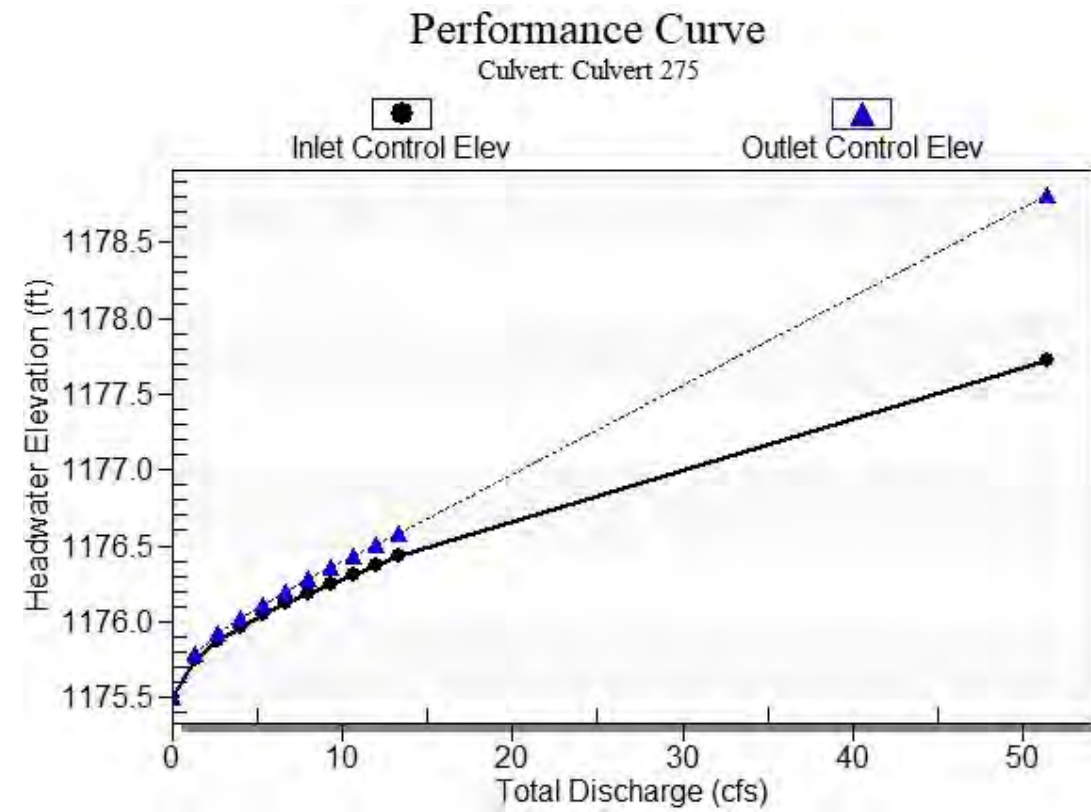


Table 2 - Culvert Summary Table: Culvert 275

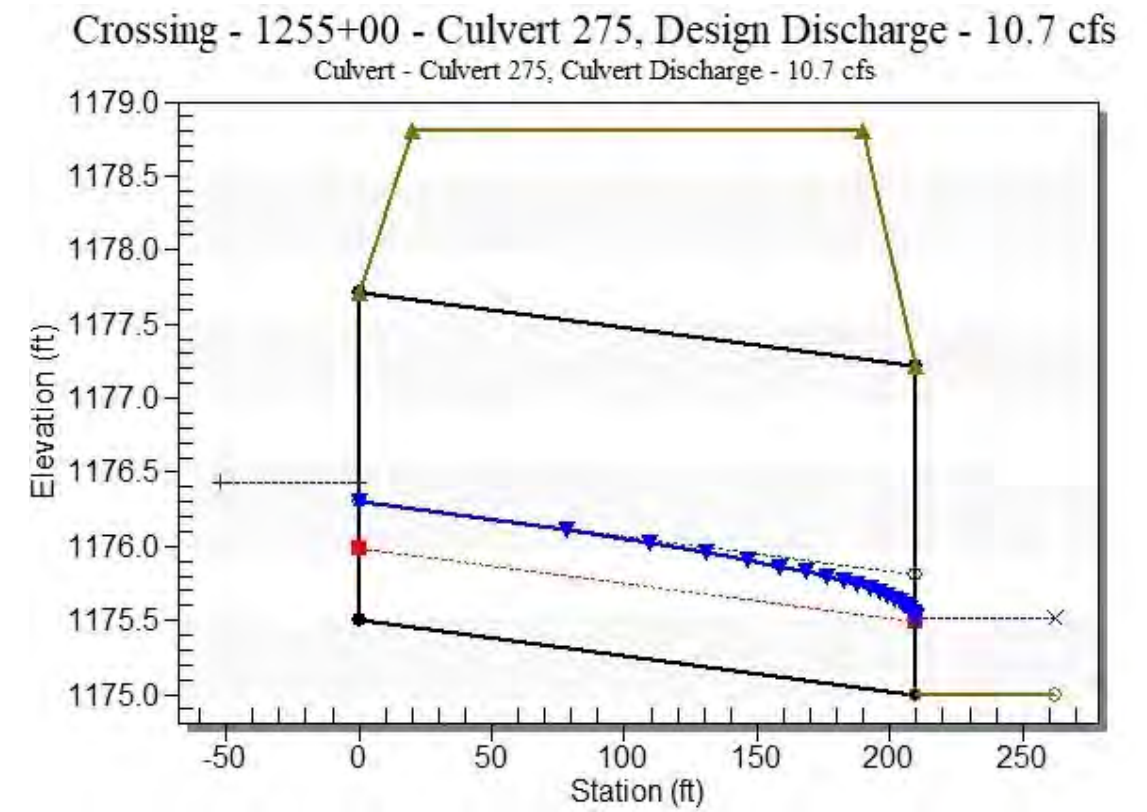
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1175.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.33	1.33	1175.79	0.256	0.290	2-M2c	0.259	0.162	0.162	0.151	1.964	0.559
2.67	2.67	1175.92	0.369	0.418	2-M2c	0.368	0.228	0.228	0.228	2.429	0.725
4.00	4.00	1176.02	0.461	0.522	3-M2t	0.456	0.284	0.290	0.290	2.656	0.840
5.33	5.33	1176.11	0.544	0.614	3-M2t	0.533	0.333	0.343	0.343	2.850	0.931
6.67	6.67	1176.20	0.616	0.699	3-M2t	0.606	0.377	0.390	0.390	3.025	1.008
8.00	8.00	1176.28	0.686	0.780	3-M2t	0.675	0.414	0.434	0.434	3.184	1.074
9.33	9.33	1176.36	0.750	0.857	3-M2t	0.741	0.453	0.474	0.474	3.331	1.133
10.67	10.67	1176.43	0.812	0.932	3-M2t	0.806	0.489	0.512	0.512	3.469	1.186
12.00	12.00	1176.50	0.870	1.005	3-M2t	0.870	0.524	0.548	0.548	3.601	1.234
13.33	13.33	1176.58	0.929	1.076	3-M2t	0.933	0.553	0.582	0.582	3.725	1.279

 Straight Culvert
 Inlet Elevation (invert): 1175.50 ft, Outlet Elevation (invert): 1175.00 ft
 Culvert Length: 210.00 ft, Culvert Slope: 0.0024

Culvert Performance Curve Plot: Culvert 275



Water Surface Profile Plot for Culvert: Culvert 275



Site Data - Culvert 275

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1175.50 ft
 Outlet Station: 210.00 ft
 Outlet Elevation: 1175.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 275

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 280

Table 3 - Downstream Channel Rating Curve (Crossing: 1255+00 - Culvert 275)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1175.00	0.00	0.00	0.00	0.00
1.33	1175.15	0.15	0.56	0.03	0.26
2.67	1175.23	0.23	0.72	0.04	0.28
4.00	1175.29	0.29	0.84	0.05	0.29
5.33	1175.34	0.34	0.93	0.06	0.29
6.67	1175.39	0.39	1.01	0.07	0.30
8.00	1175.43	0.43	1.07	0.08	0.31
9.33	1175.47	0.47	1.13	0.09	0.31
10.67	1175.51	0.51	1.19	0.10	0.31
12.00	1175.55	0.55	1.23	0.10	0.32
13.33	1175.58	0.58	1.28	0.11	0.32

Tailwater Channel Data - 1255+00 - Culvert 275

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1175.00 ft

Roadway Data for Crossing: 1255+00 - Culvert 275

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1178.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 10.666 cfs

Maximum Flow: 13.333 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1261+00 - Culvert 280

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 280 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1176.40	0.00	0.00	0.00	1
1176.69	1.33	1.33	0.00	1
1176.82	2.67	2.67	0.00	1
1176.92	4.00	4.00	0.00	1
1177.01	5.33	5.33	0.00	1
1177.10	6.67	6.67	0.00	1
1177.18	8.00	8.00	0.00	1
1177.26	9.33	9.33	0.00	1
1177.33	10.67	10.67	0.00	1
1177.40	12.00	12.00	0.00	1
1177.48	13.33	13.33	0.00	1
1179.31	47.15	47.15	0.00	Overtopping

Rating Curve Plot for Crossing: 1261+00 - Culvert 280

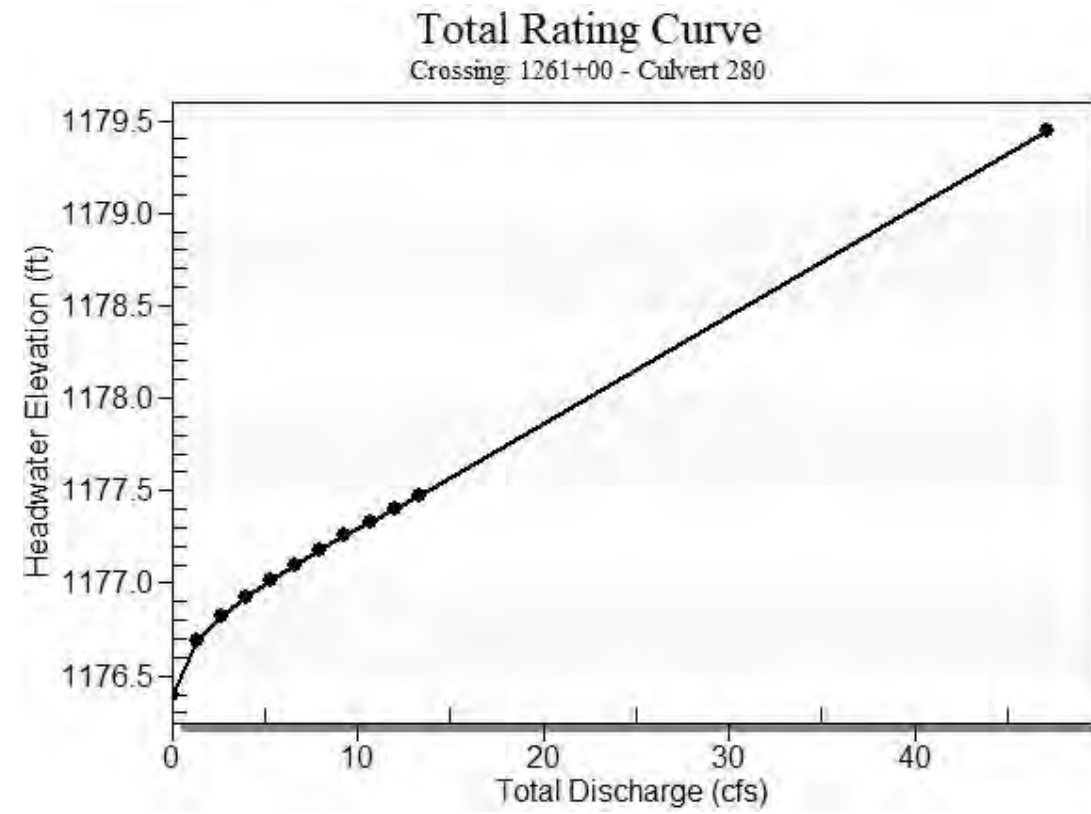
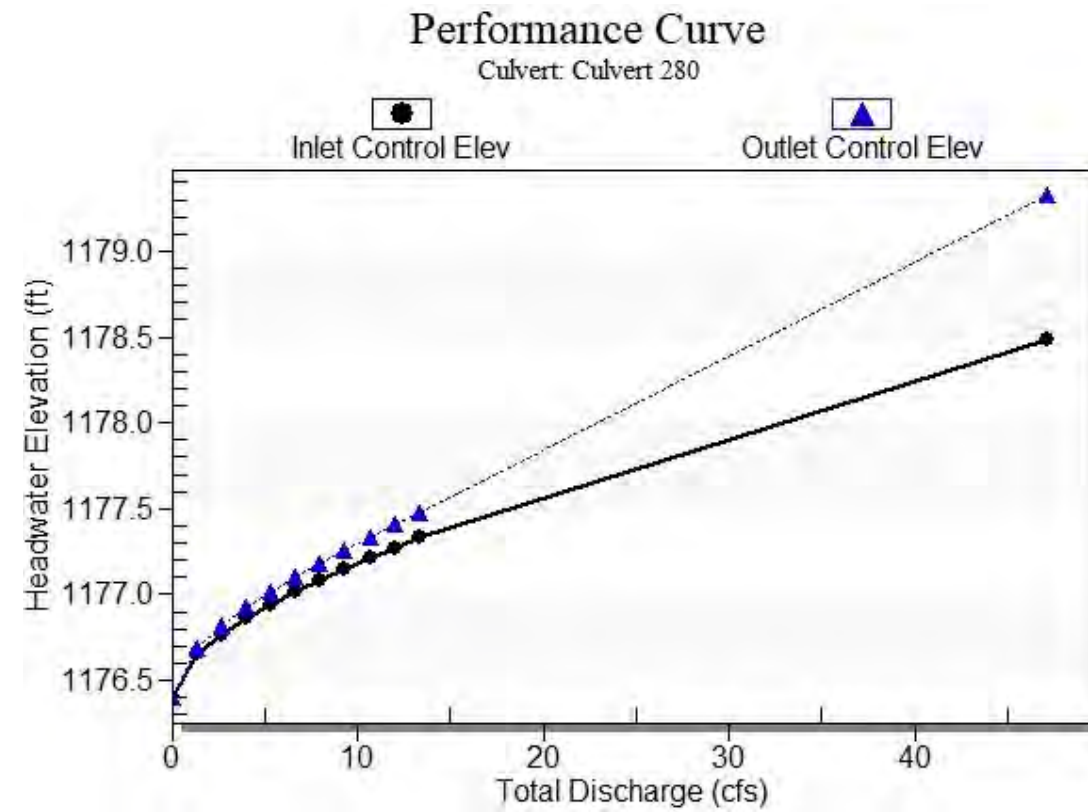


Table 2 - Culvert Summary Table: Culvert 280

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1176.40	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.33	1.33	1176.69	0.256	0.290	2-M2c	0.259	0.162	0.162	0.151	1.964	0.559
2.67	2.67	1176.82	0.369	0.418	2-M2c	0.368	0.228	0.228	0.228	2.429	0.725
4.00	4.00	1176.92	0.461	0.522	3-M2t	0.456	0.284	0.290	0.290	2.656	0.840
5.33	5.33	1177.01	0.544	0.614	3-M2t	0.533	0.333	0.343	0.343	2.850	0.931
6.67	6.67	1177.10	0.616	0.699	3-M2t	0.606	0.377	0.390	0.390	3.025	1.008
8.00	8.00	1177.18	0.686	0.780	3-M2t	0.675	0.414	0.434	0.434	3.184	1.074
9.33	9.33	1177.26	0.750	0.857	3-M2t	0.741	0.453	0.474	0.474	3.331	1.133
10.67	10.67	1177.33	0.812	0.932	3-M2t	0.806	0.489	0.512	0.512	3.469	1.186
12.00	12.00	1177.40	0.870	1.005	3-M2t	0.870	0.524	0.548	0.548	3.601	1.234
13.33	13.33	1177.48	0.929	1.076	3-M2t	0.933	0.553	0.582	0.582	3.725	1.279

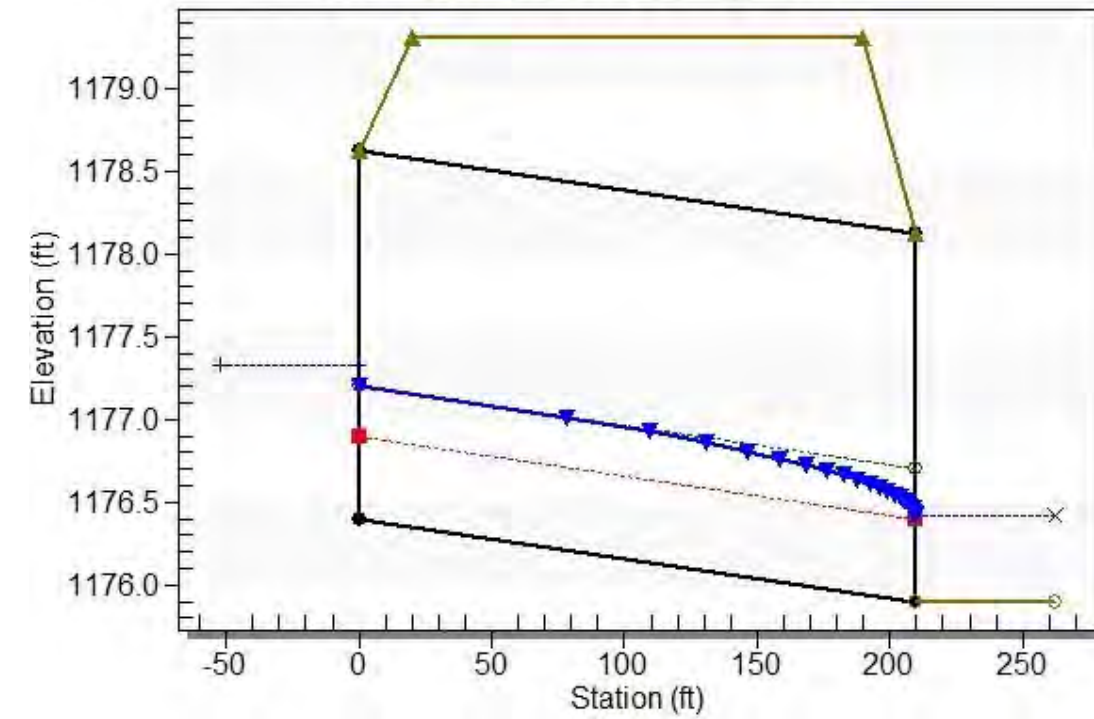
 Straight Culvert
 Inlet Elevation (invert): 1176.40 ft, Outlet Elevation (invert): 1175.90 ft
 Culvert Length: 210.00 ft, Culvert Slope: 0.0024

Culvert Performance Curve Plot: Culvert 280



Water Surface Profile Plot for Culvert: Culvert 280

Crossing - 1261+00 - Culvert 280, Design Discharge - 10.7 cfs
Culvert - Culvert 280, Culvert Discharge - 10.7 cfs



Site Data - Culvert 280

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 1176.40 ft
Outlet Station: 210.00 ft
Outlet Elevation: 1175.90 ft
Number of Barrels: 2

Culvert Data Summary - Culvert 280

Barrel Shape: Pipe Arch
Barrel Span: 43.30 in
Barrel Rise: 26.60 in
Barrel Material: Steel or Aluminum
Embedment: 0.00 in
Barrel Manning's n: 0.0250
Culvert Type: Straight
Inlet Configuration: Projecting
Inlet Depression: None

HY-8 Culvert Analysis Report Structure 285

Table 3 - Downstream Channel Rating Curve (Crossing: 1261+00 - Culvert 280)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1175.90	0.00	0.00	0.00	0.00
1.33	1176.05	0.15	0.56	0.03	0.26
2.67	1176.13	0.23	0.72	0.04	0.28
4.00	1176.19	0.29	0.84	0.05	0.29
5.33	1176.24	0.34	0.93	0.06	0.29
6.67	1176.29	0.39	1.01	0.07	0.30
8.00	1176.33	0.43	1.07	0.08	0.31
9.33	1176.37	0.47	1.13	0.09	0.31
10.67	1176.41	0.51	1.19	0.10	0.31
12.00	1176.45	0.55	1.23	0.10	0.32
13.33	1176.48	0.58	1.28	0.11	0.32

Tailwater Channel Data - 1261+00 - Culvert 280

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1175.90 ft

Roadway Data for Crossing: 1261+00 - Culvert 280

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1179.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 98.5 cfs

Maximum Flow: 124 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1273+00 - Culvert 285

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 285 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1179.00	0.00	0.00	0.00	1
1180.02	12.40	12.40	0.00	1
1180.61	24.80	24.80	0.00	1
1181.18	37.20	37.20	0.00	1
1181.85	49.60	47.24	2.17	19
1181.94	62.00	48.06	13.74	6
1182.00	74.40	48.86	25.46	5
1182.06	86.80	49.57	37.12	4
1182.11	98.50	50.13	48.32	4
1182.15	111.60	50.70	60.71	3
1182.20	124.00	51.15	72.75	3
1181.81	46.79	46.79	0.00	Overtopping

Rating Curve Plot for Crossing: 1273+00 - Culvert 285

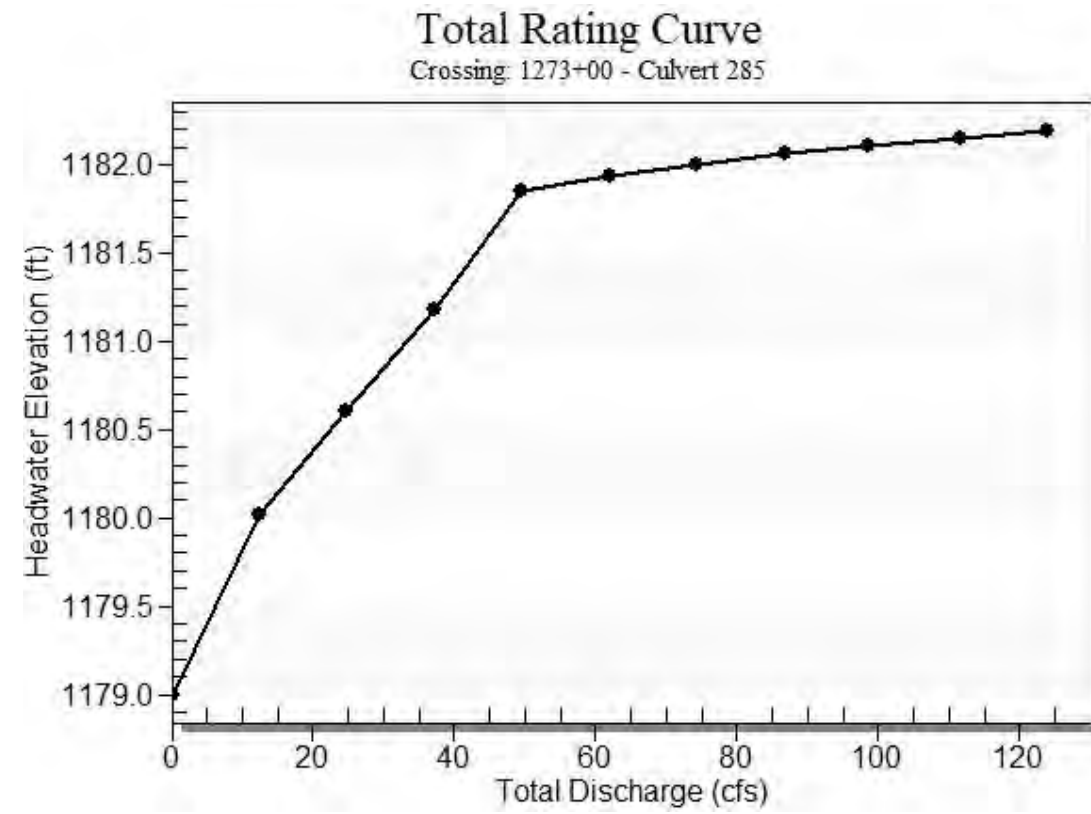
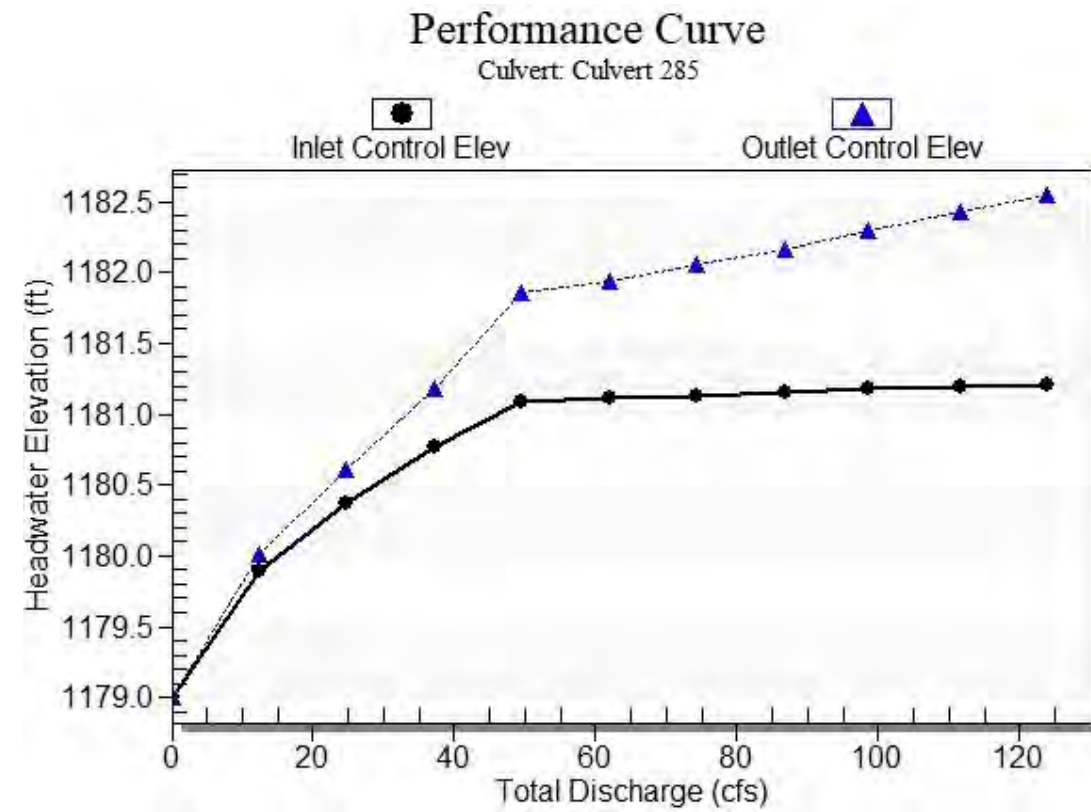


Table 2 - Culvert Summary Table: Culvert 285

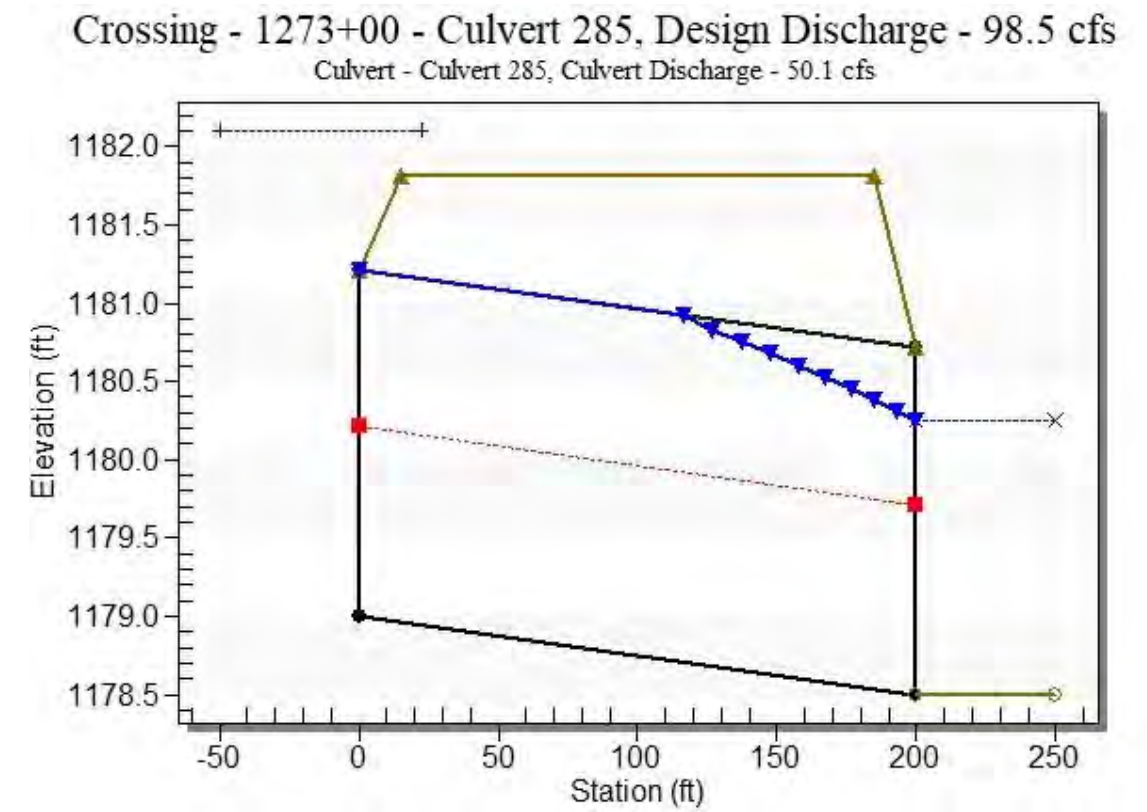
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1179.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
12.40	12.40	1180.02	0.887	1.017	3-M2t	0.875	0.534	0.559	0.559	3.638	1.248
24.80	24.80	1180.61	1.366	1.608	3-M2t	1.472	0.804	0.827	0.827	4.662	1.567
37.20	37.20	1181.18	1.767	2.183	3-M2t	2.217	1.022	1.036	1.036	5.506	1.780
49.60	47.24	1181.85	2.082	2.853	7-M2t	2.217	1.169	1.212	1.212	5.964	1.943
62.00	48.06	1181.94	2.108	2.937	7-M2t	2.217	1.180	1.367	1.367	5.404	2.077
74.40	48.86	1182.00	2.134	3.052	7-M2t	2.217	1.190	1.507	1.507	5.026	2.192
86.80	49.57	1182.06	2.158	3.160	7-M2t	2.217	1.205	1.634	1.634	4.755	2.292
98.50	50.13	1182.11	2.176	3.297	7-M2t	2.217	1.212	1.746	1.746	4.560	2.377
111.60	50.70	1182.15	2.195	3.425	7-M2t	2.217	1.220	1.863	1.863	4.399	2.464
124.00	51.15	1182.20	2.210	3.551	7-M2t	2.217	1.226	1.967	1.967	4.283	2.538

 Straight Culvert
 Inlet Elevation (invert): 1179.00 ft, Outlet Elevation (invert): 1178.50 ft
 Culvert Length: 200.00 ft, Culvert Slope: 0.0025

Culvert Performance Curve Plot: Culvert 285



Water Surface Profile Plot for Culvert: Culvert 285



Site Data - Culvert 285

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1179.00 ft
 Outlet Station: 200.00 ft
 Outlet Elevation: 1178.50 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 285

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 290

Table 3 - Downstream Channel Rating Curve (Crossing: 1273+00 - Culvert 285)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1178.50	0.00	0.00	0.00	0.00
12.40	1179.06	0.56	1.25	0.10	0.32
24.80	1179.33	0.83	1.57	0.15	0.33
37.20	1179.54	1.04	1.78	0.19	0.35
49.60	1179.71	1.21	1.94	0.23	0.35
62.00	1179.87	1.37	2.08	0.26	0.36
74.40	1180.01	1.51	2.19	0.28	0.36
86.80	1180.13	1.63	2.29	0.31	0.37
98.50	1180.25	1.75	2.38	0.33	0.37
111.60	1180.36	1.86	2.46	0.35	0.37
124.00	1180.47	1.97	2.54	0.37	0.38

Tailwater Channel Data - 1273+00 - Culvert 285

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1178.50 ft

Roadway Data for Crossing: 1273+00 - Culvert 285

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1181.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 98.5 cfs

Maximum Flow: 124 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1267+00 - Culvert 290

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 290 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1177.50	0.00	0.00	0.00	1
1178.53	12.40	12.40	0.00	1
1179.13	24.80	24.80	0.00	1
1179.72	37.20	37.20	0.00	1
1180.36	49.60	46.21	3.27	18
1180.45	62.00	47.16	14.72	6
1180.51	74.40	47.86	26.26	4
1180.57	86.80	48.22	38.45	4
1180.61	98.50	48.80	49.40	3
1180.66	111.60	49.39	62.01	3
1180.70	124.00	50.10	73.81	3
1180.31	45.55	45.55	0.00	Overtopping

Rating Curve Plot for Crossing: 1267+00 - Culvert 290

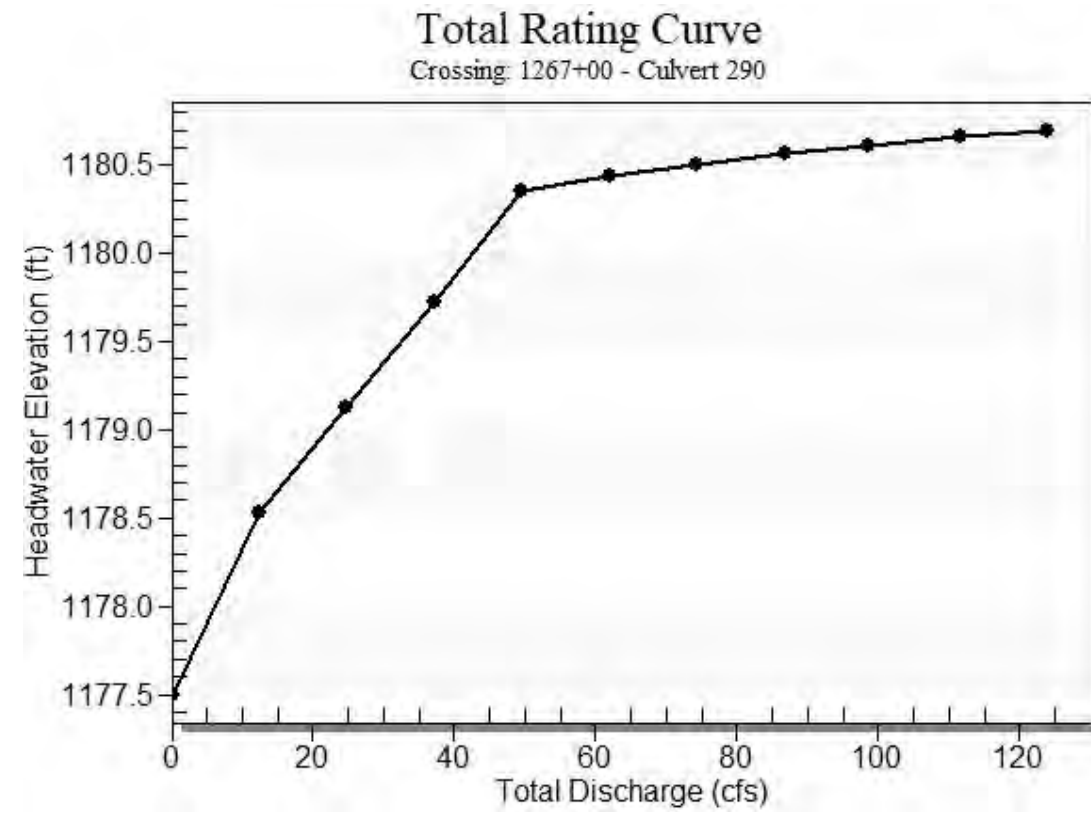
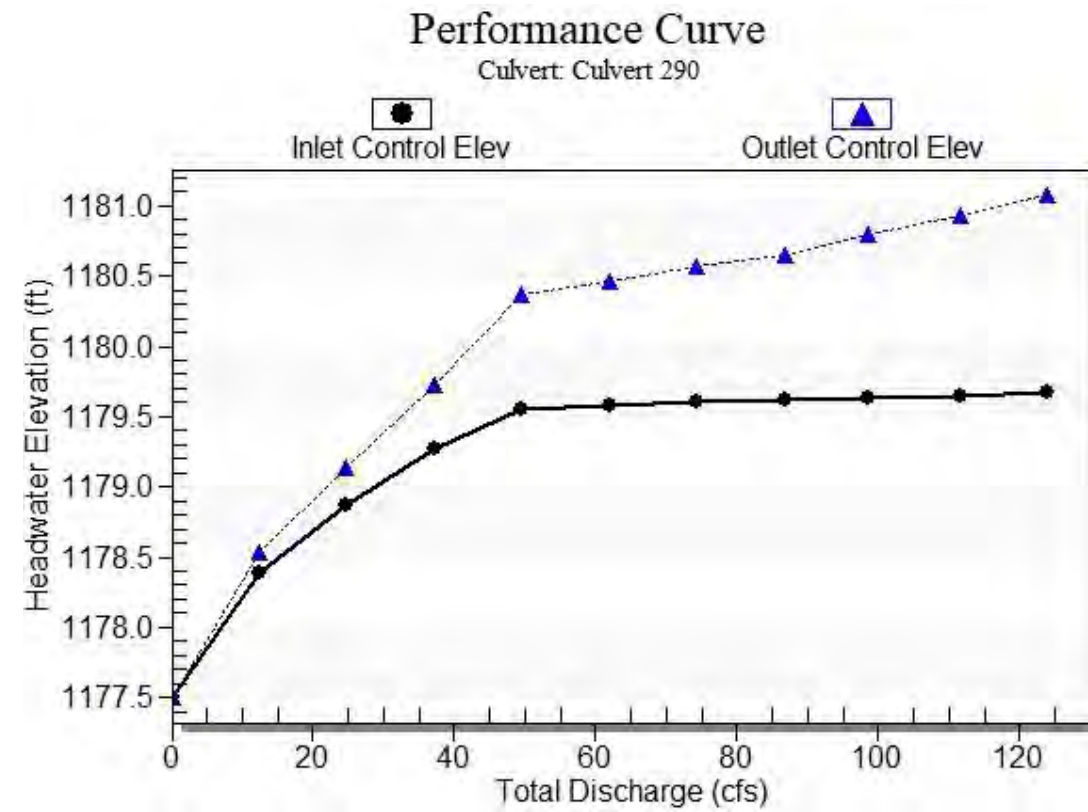


Table 2 - Culvert Summary Table: Culvert 290

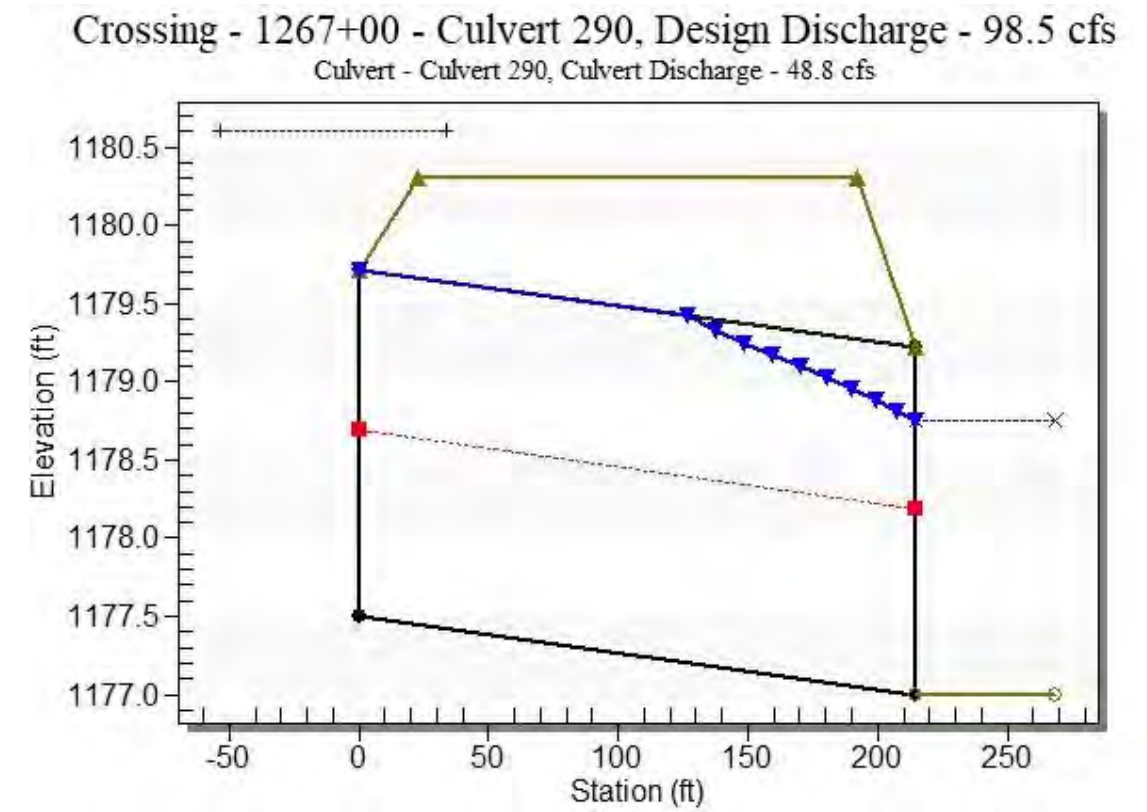
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1177.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
12.40	12.40	1178.53	0.887	1.031	3-M2t	0.896	0.534	0.559	0.559	3.638	1.248
24.80	24.80	1179.13	1.367	1.631	3-M2t	1.524	0.804	0.827	0.827	4.662	1.567
37.20	37.20	1179.72	1.767	2.224	3-M2t	2.217	1.022	1.036	1.036	5.506	1.780
49.60	46.21	1180.36	2.049	2.865	7-M2t	2.217	1.155	1.212	1.212	5.834	1.943
62.00	47.16	1180.45	2.079	2.965	7-M2t	2.217	1.168	1.367	1.367	5.303	2.077
74.40	47.86	1180.51	2.102	3.074	7-M2t	2.217	1.177	1.507	1.507	4.923	2.192
86.80	48.22	1180.57	2.114	3.155	7-M2t	2.217	1.182	1.634	1.634	4.626	2.292
98.50	48.80	1180.61	2.132	3.297	7-M2t	2.217	1.189	1.746	1.746	4.439	2.377
111.60	49.39	1180.66	2.152	3.430	7-M2t	2.217	1.202	1.863	1.863	4.285	2.464
124.00	50.10	1180.70	2.175	3.581	7-M2t	2.217	1.212	1.967	1.967	4.196	2.538

 Straight Culvert
 Inlet Elevation (invert): 1177.50 ft, Outlet Elevation (invert): 1177.00 ft
 Culvert Length: 215.00 ft, Culvert Slope: 0.0023

Culvert Performance Curve Plot: Culvert 290



Water Surface Profile Plot for Culvert: Culvert 290



Site Data - Culvert 290

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 1177.50 ft
Outlet Station: 215.00 ft
Outlet Elevation: 1177.00 ft
Number of Barrels: 2

Culvert Data Summary - Culvert 290

Barrel Shape: Pipe Arch
Barrel Span: 43.30 in
Barrel Rise: 26.60 in
Barrel Material: Steel or Aluminum
Embedment: 0.00 in
Barrel Manning's n: 0.0250
Culvert Type: Straight
Inlet Configuration: Projecting
Inlet Depression: None

HY-8 Culvert Analysis Report Structure 295

Table 3 - Downstream Channel Rating Curve (Crossing: 1267+00 - Culvert 290)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1177.00	0.00	0.00	0.00	0.00
12.40	1177.56	0.56	1.25	0.10	0.32
24.80	1177.83	0.83	1.57	0.15	0.33
37.20	1178.04	1.04	1.78	0.19	0.35
49.60	1178.21	1.21	1.94	0.23	0.35
62.00	1178.37	1.37	2.08	0.26	0.36
74.40	1178.51	1.51	2.19	0.28	0.36
86.80	1178.63	1.63	2.29	0.31	0.37
98.50	1178.75	1.75	2.38	0.33	0.37
111.60	1178.86	1.86	2.46	0.35	0.37
124.00	1178.97	1.97	2.54	0.37	0.38

Tailwater Channel Data - 1267+00 - Culvert 290

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1177.00 ft

Roadway Data for Crossing: 1267+00 - Culvert 290

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1180.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 13 cfs

Maximum Flow: 15.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1279+00 - Culvert 295

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 295 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1180.50	0.00	0.00	0.00	1
1180.81	1.55	1.55	0.00	1
1180.95	3.10	3.10	0.00	1
1181.07	4.65	4.65	0.00	1
1181.17	6.20	6.20	0.00	1
1181.26	7.75	7.75	0.00	1
1181.36	9.30	9.30	0.00	1
1181.44	10.85	10.85	0.00	1
1181.53	12.40	12.40	0.00	1
1181.56	13.00	13.00	0.00	1
1181.69	15.50	15.50	0.00	1
1183.31	45.99	45.99	0.00	Overtopping

Rating Curve Plot for Crossing: 1279+00 - Culvert 295

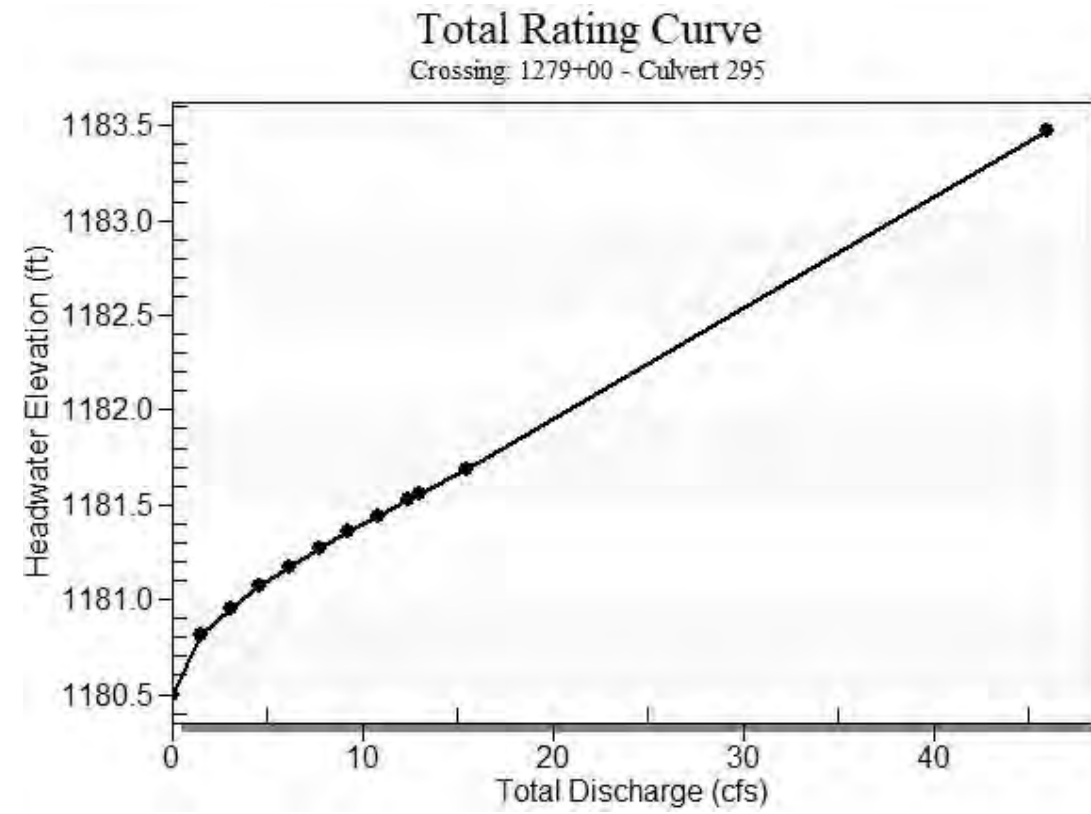
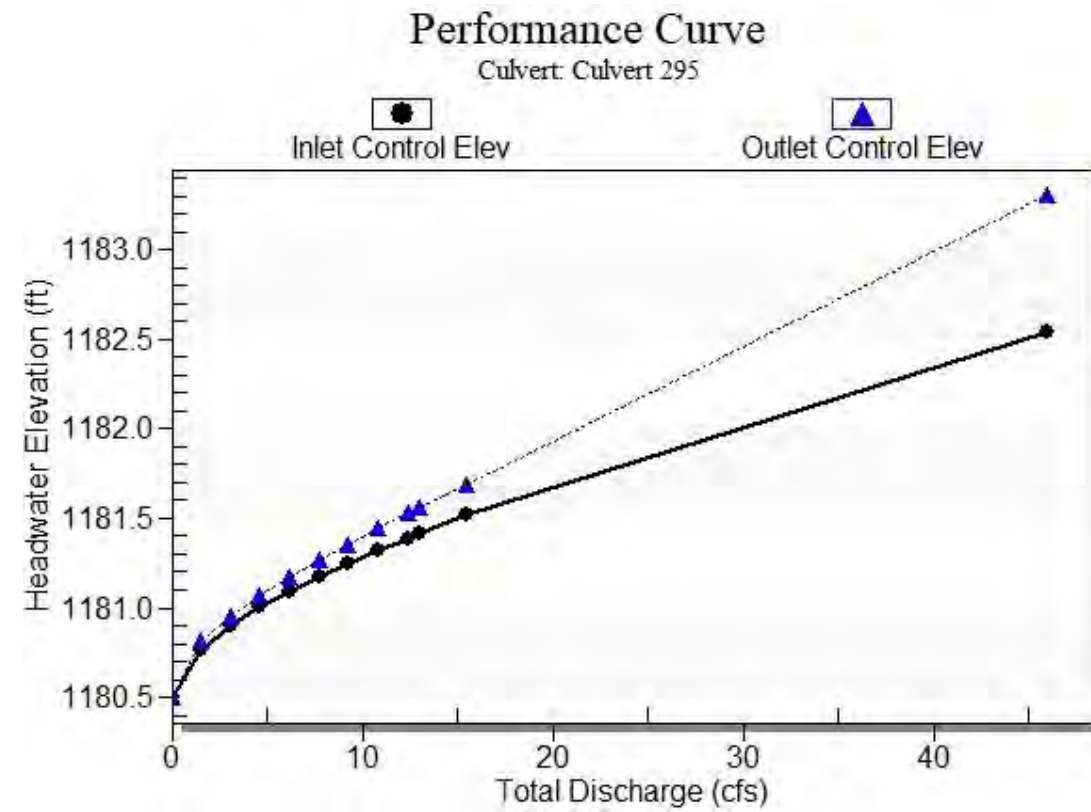


Table 2 - Culvert Summary Table: Culvert 295

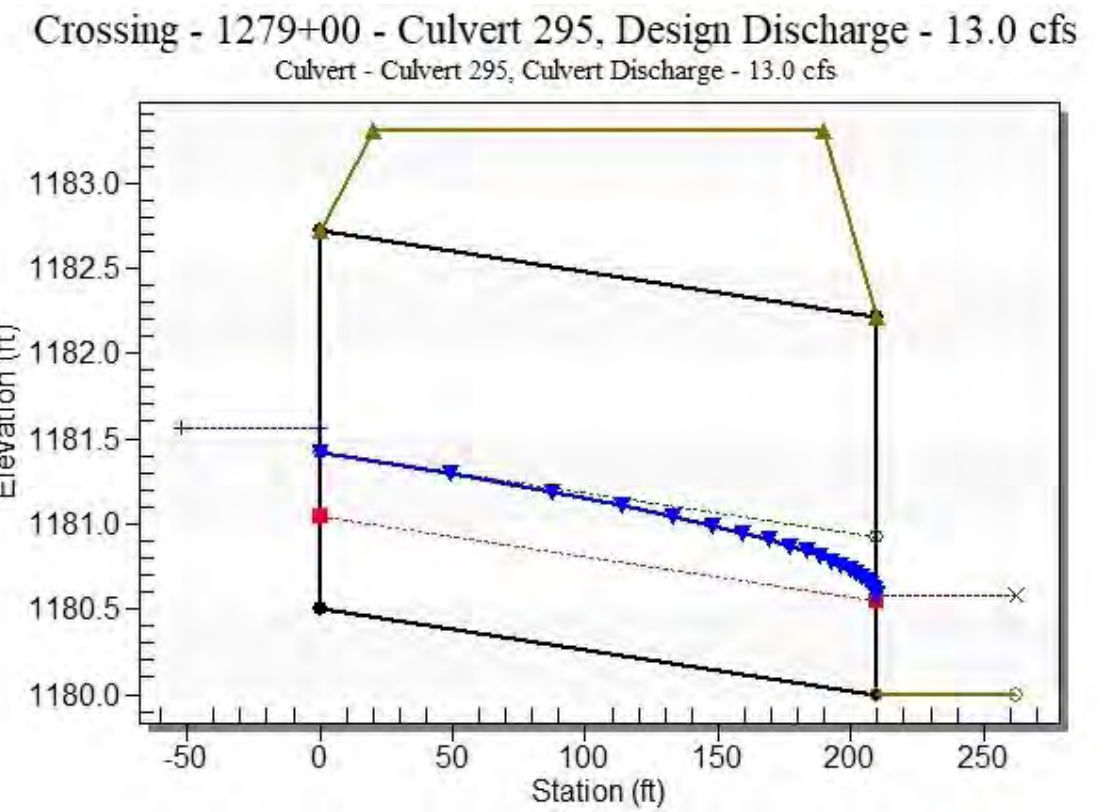
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1180.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.55	1.55	1180.81	0.268	0.314	2-M2c	0.280	0.175	0.175	0.165	2.043	0.592
3.10	3.10	1180.95	0.401	0.454	3-M2t	0.399	0.248	0.249	0.249	2.511	0.766
4.65	4.65	1181.07	0.502	0.568	3-M2t	0.495	0.309	0.316	0.316	2.753	0.887
6.20	6.20	1181.17	0.591	0.670	3-M2t	0.581	0.362	0.374	0.374	2.966	0.982
7.75	7.75	1181.26	0.674	0.765	3-M2t	0.662	0.406	0.426	0.426	3.155	1.062
9.30	9.30	1181.36	0.749	0.855	3-M2t	0.740	0.452	0.473	0.473	3.328	1.132
10.85	10.85	1181.44	0.820	0.942	3-M2t	0.815	0.494	0.517	0.517	3.488	1.193
12.40	12.40	1181.53	0.887	1.026	3-M2t	0.889	0.534	0.559	0.559	3.638	1.248
13.00	13.00	1181.56	0.915	1.061	3-M2t	0.917	0.545	0.574	0.574	3.694	1.268
15.50	15.50	1181.69	1.016	1.186	3-M2t	1.035	0.604	0.634	0.634	3.919	1.344

 Straight Culvert
 Inlet Elevation (invert): 1180.50 ft, Outlet Elevation (invert): 1180.00 ft
 Culvert Length: 210.00 ft, Culvert Slope: 0.0024

Culvert Performance Curve Plot: Culvert 295



Water Surface Profile Plot for Culvert: Culvert 295



Site Data - Culvert 295

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1180.50 ft
 Outlet Station: 210.00 ft
 Outlet Elevation: 1180.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 295

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 300

Table 3 - Downstream Channel Rating Curve (Crossing: 1279+00 - Culvert 295)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1180.00	0.00	0.00	0.00	0.00
1.55	1180.17	0.17	0.59	0.03	0.26
3.10	1180.25	0.25	0.77	0.05	0.28
4.65	1180.32	0.32	0.89	0.06	0.29
6.20	1180.37	0.37	0.98	0.07	0.30
7.75	1180.43	0.43	1.06	0.08	0.30
9.30	1180.47	0.47	1.13	0.09	0.31
10.85	1180.52	0.52	1.19	0.10	0.31
12.40	1180.56	0.56	1.25	0.10	0.32
13.00	1180.57	0.57	1.27	0.11	0.32
15.50	1180.63	0.63	1.34	0.12	0.32

Tailwater Channel Data - 1279+00 - Culvert 295

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1180.00 ft

Roadway Data for Crossing: 1279+00 - Culvert 295

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1183.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 13 cfs

Maximum Flow: 15.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1285+00 - Culvert 300

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 300 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1182.00	0.00	0.00	0.00	1
1182.31	1.55	1.55	0.00	1
1182.45	3.10	3.10	0.00	1
1182.57	4.65	4.65	0.00	1
1182.67	6.20	6.20	0.00	1
1182.76	7.75	7.75	0.00	1
1182.86	9.30	9.30	0.00	1
1182.94	10.85	10.85	0.00	1
1183.03	12.40	12.40	0.00	1
1183.06	13.00	13.00	0.00	1
1183.19	15.50	15.50	0.00	1
1184.31	39.08	39.08	0.00	Overtopping

Rating Curve Plot for Crossing: 1285+00 - Culvert 300

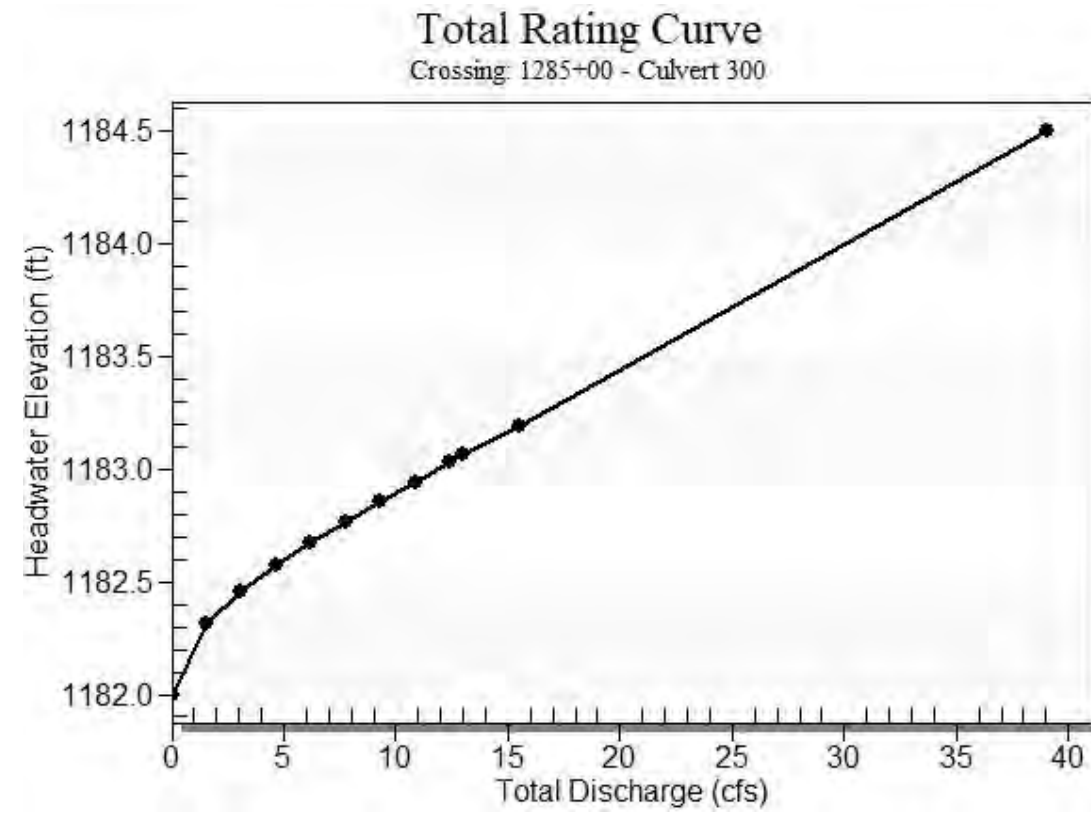
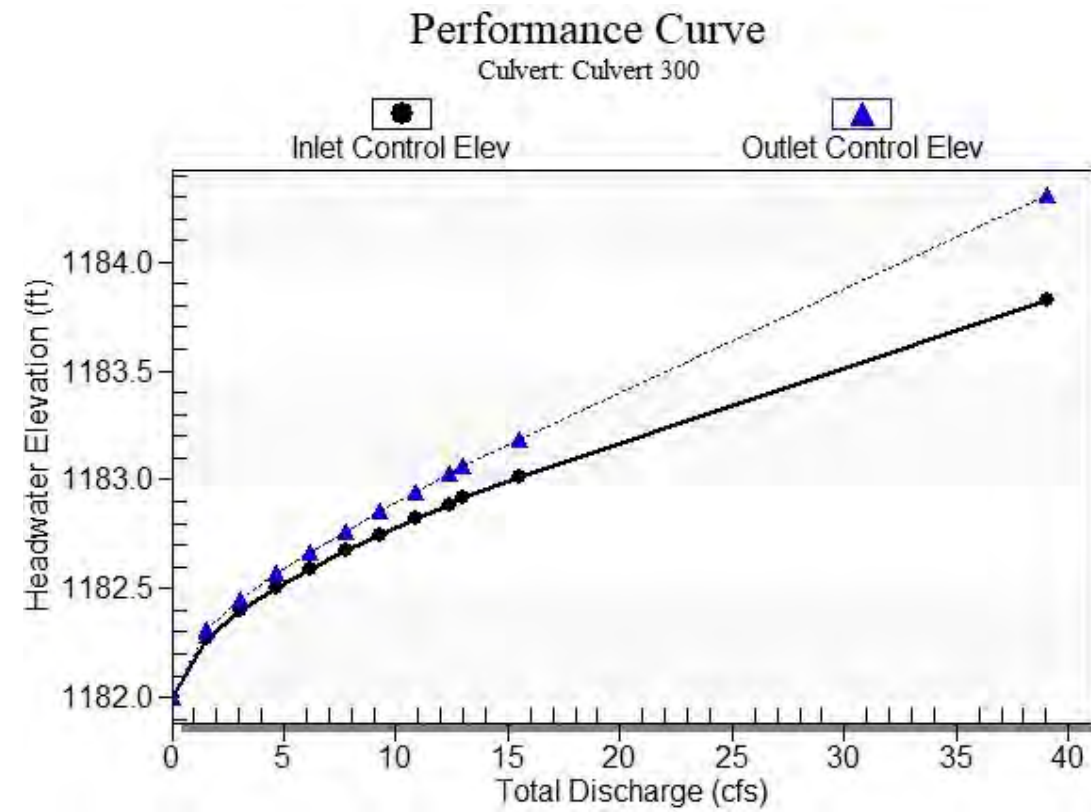


Table 2 - Culvert Summary Table: Culvert 300

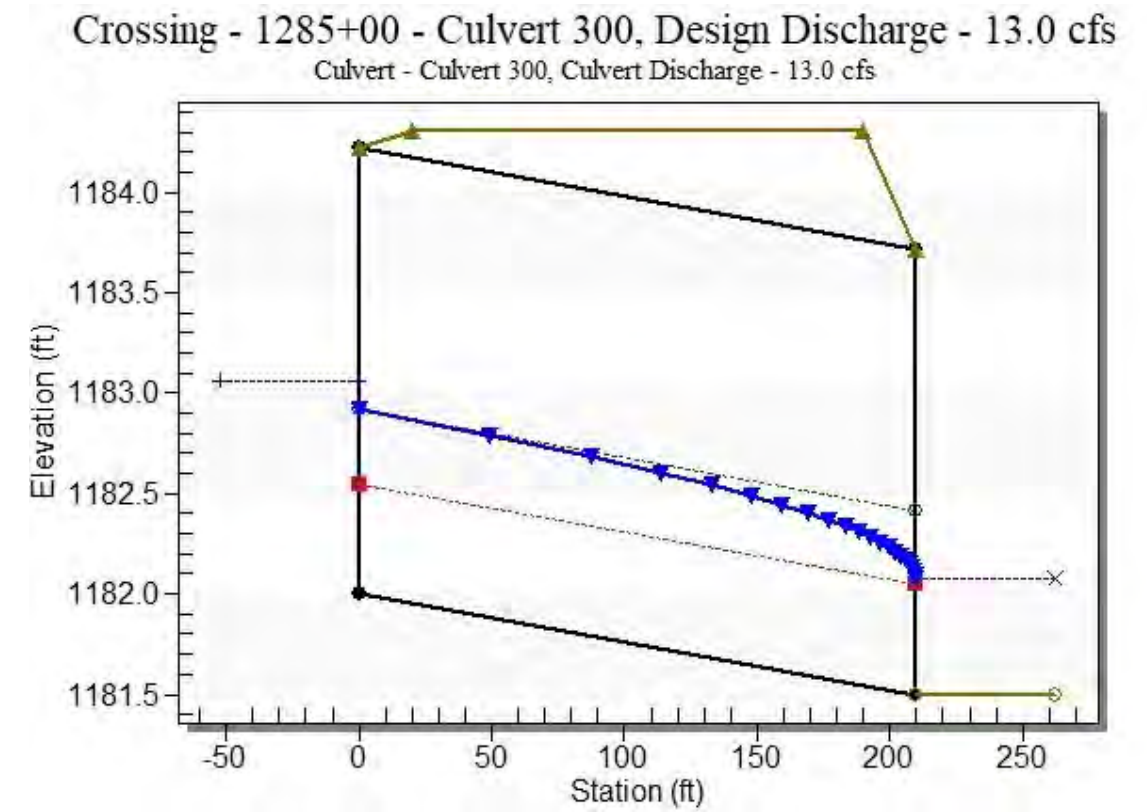
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1182.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.55	1.55	1182.31	0.268	0.314	2-M2c	0.280	0.175	0.175	0.165	2.043	0.592
3.10	3.10	1182.45	0.401	0.454	3-M2t	0.399	0.248	0.249	0.249	2.511	0.766
4.65	4.65	1182.57	0.502	0.568	3-M2t	0.495	0.309	0.316	0.316	2.753	0.887
6.20	6.20	1182.67	0.591	0.670	3-M2t	0.581	0.362	0.374	0.374	2.966	0.982
7.75	7.75	1182.76	0.674	0.765	3-M2t	0.662	0.406	0.426	0.426	3.155	1.062
9.30	9.30	1182.86	0.749	0.855	3-M2t	0.740	0.452	0.473	0.473	3.328	1.132
10.85	10.85	1182.94	0.820	0.942	3-M2t	0.815	0.494	0.517	0.517	3.488	1.193
12.40	12.40	1183.03	0.887	1.026	3-M2t	0.889	0.534	0.559	0.559	3.638	1.248
13.00	13.00	1183.06	0.915	1.061	3-M2t	0.917	0.545	0.574	0.574	3.694	1.268
15.50	15.50	1183.19	1.016	1.186	3-M2t	1.035	0.604	0.634	0.634	3.919	1.344

 Straight Culvert
 Inlet Elevation (invert): 1182.00 ft, Outlet Elevation (invert): 1181.50 ft
 Culvert Length: 210.00 ft, Culvert Slope: 0.0024

Culvert Performance Curve Plot: Culvert 300



Water Surface Profile Plot for Culvert: Culvert 300



Site Data - Culvert 300

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1182.00 ft
 Outlet Station: 210.00 ft
 Outlet Elevation: 1181.50 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 300

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 305

Table 3 - Downstream Channel Rating Curve (Crossing: 1285+00 - Culvert 300)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1181.50	0.00	0.00	0.00	0.00
1.55	1181.67	0.17	0.59	0.03	0.26
3.10	1181.75	0.25	0.77	0.05	0.28
4.65	1181.82	0.32	0.89	0.06	0.29
6.20	1181.87	0.37	0.98	0.07	0.30
7.75	1181.93	0.43	1.06	0.08	0.30
9.30	1181.97	0.47	1.13	0.09	0.31
10.85	1182.02	0.52	1.19	0.10	0.31
12.40	1182.06	0.56	1.25	0.10	0.32
13.00	1182.07	0.57	1.27	0.11	0.32
15.50	1182.13	0.63	1.34	0.12	0.32

Tailwater Channel Data - 1285+00 - Culvert 300

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1181.50 ft

Roadway Data for Crossing: 1285+00 - Culvert 300

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1184.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 29 cfs

Maximum Flow: 35 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1291+00 - Culvert 305

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 305 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1183.20	0.00	0.00	0.00	1
1183.68	3.50	3.50	0.00	1
1183.91	7.00	7.00	0.00	1
1184.11	10.50	10.50	0.00	1
1184.30	14.00	14.00	0.00	1
1184.47	17.50	17.50	0.00	1
1184.63	21.00	21.00	0.00	1
1184.79	24.50	24.50	0.00	1
1184.94	28.00	28.00	0.00	1
1184.99	29.00	29.00	0.00	1
1185.26	35.00	35.00	0.00	1
1186.31	50.61	50.61	0.00	Overtopping

Rating Curve Plot for Crossing: 1291+00 - Culvert 305

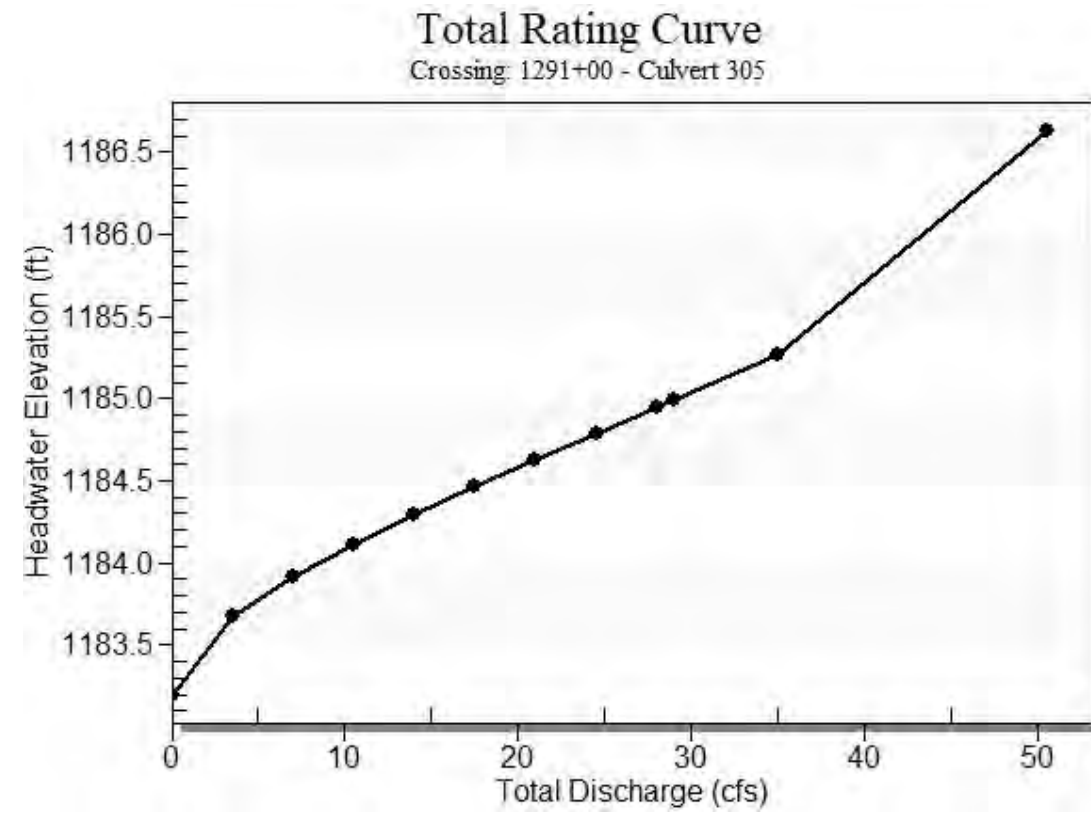
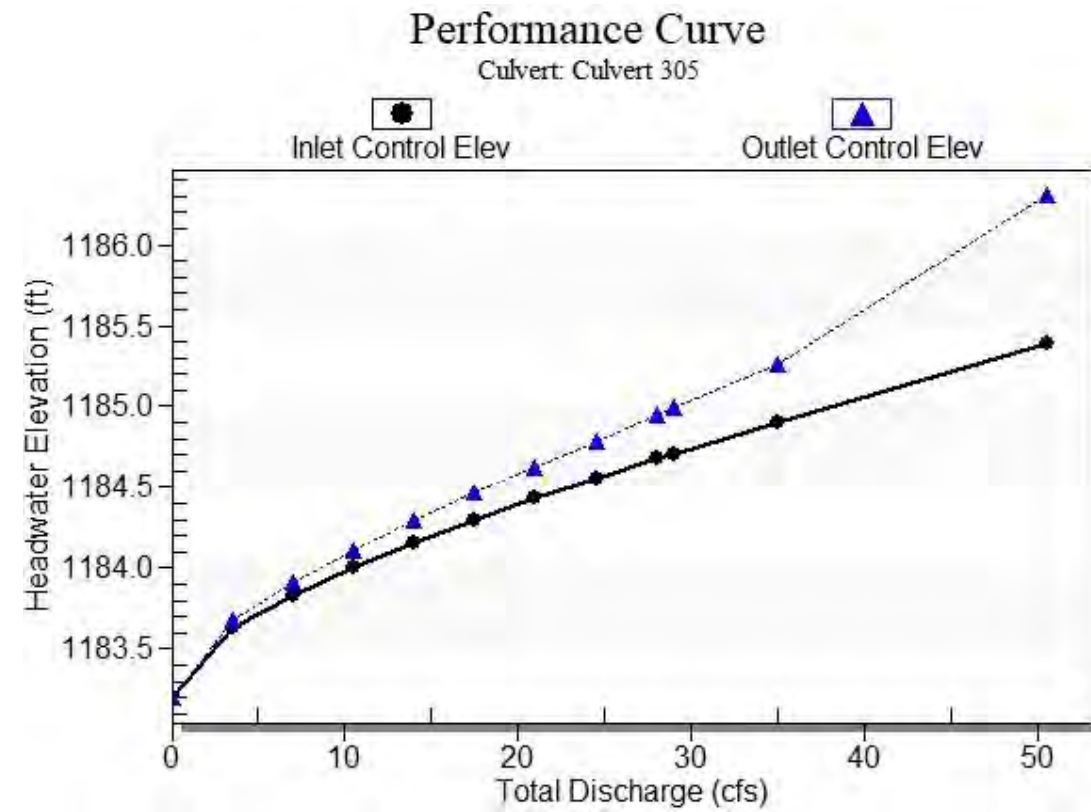


Table 2 - Culvert Summary Table: Culvert 305

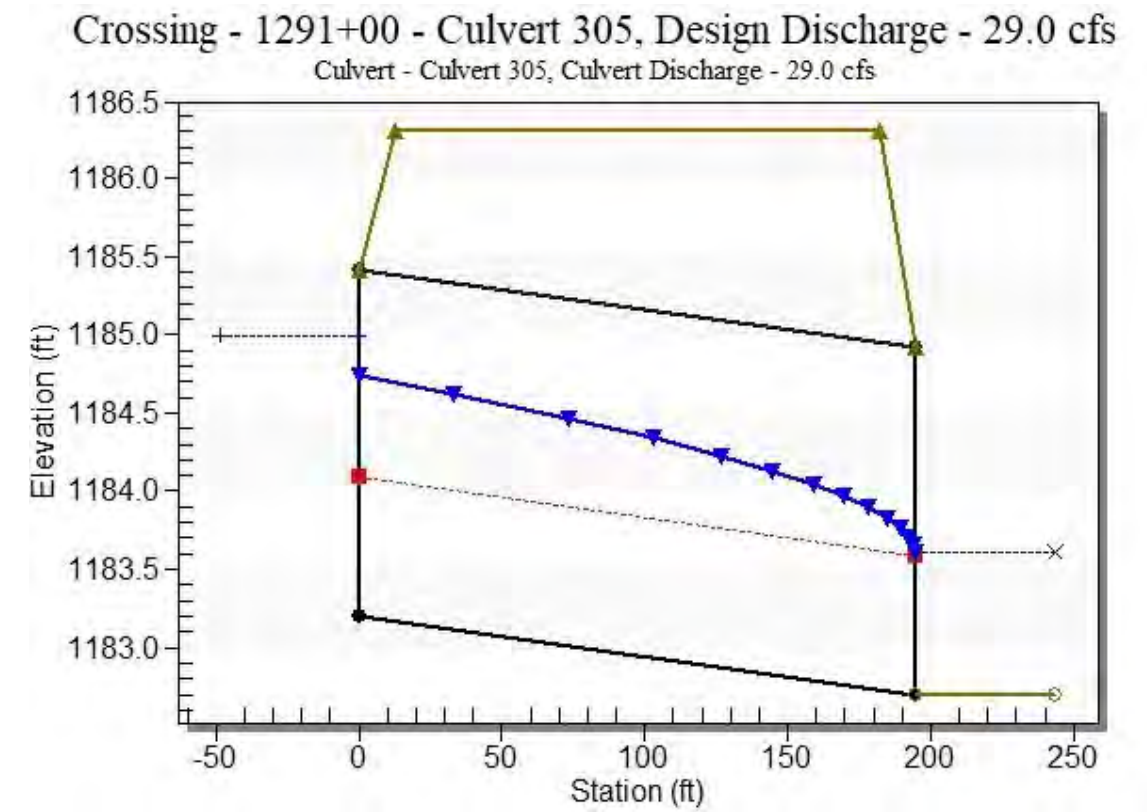
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1183.20	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.50	3.50	1183.68	0.430	0.480	3-M2t	0.416	0.264	0.268	0.268	2.577	0.800
7.00	7.00	1183.91	0.634	0.711	3-M2t	0.610	0.388	0.402	0.402	3.065	1.025
10.50	10.50	1184.11	0.804	0.911	3-M2t	0.780	0.485	0.508	0.508	3.452	1.179
14.00	14.00	1184.30	0.955	1.098	3-M2t	0.940	0.570	0.599	0.599	3.784	1.300
17.50	17.50	1184.47	1.096	1.267	3-M2t	1.099	0.648	0.680	0.680	4.091	1.399
21.00	21.00	1184.63	1.230	1.427	3-M2t	1.262	0.726	0.754	0.754	4.374	1.485
24.50	24.50	1184.79	1.356	1.587	3-M2t	1.439	0.798	0.822	0.822	4.640	1.560
28.00	28.00	1184.94	1.475	1.744	3-M2t	1.647	0.866	0.885	0.885	4.892	1.628
29.00	29.00	1184.99	1.507	1.789	3-M2t	2.217	0.884	0.903	0.903	4.962	1.646
35.00	35.00	1185.26	1.698	2.064	3-M2t	2.217	0.987	1.002	1.002	5.364	1.746

 Straight Culvert
 Inlet Elevation (invert): 1183.20 ft, Outlet Elevation (invert): 1182.70 ft
 Culvert Length: 195.00 ft, Culvert Slope: 0.0026

Culvert Performance Curve Plot: Culvert 305



Water Surface Profile Plot for Culvert: Culvert 305



Site Data - Culvert 305

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1183.20 ft
 Outlet Station: 195.00 ft
 Outlet Elevation: 1182.70 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 305

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 315

Table 3 - Downstream Channel Rating Curve (Crossing: 1291+00 - Culvert 305)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1182.70	0.00	0.00	0.00	0.00
3.50	1182.97	0.27	0.80	0.05	0.28
7.00	1183.10	0.40	1.02	0.08	0.30
10.50	1183.21	0.51	1.18	0.10	0.31
14.00	1183.30	0.60	1.30	0.11	0.32
17.50	1183.38	0.68	1.40	0.13	0.33
21.00	1183.45	0.75	1.49	0.14	0.33
24.50	1183.52	0.82	1.56	0.15	0.33
28.00	1183.59	0.89	1.63	0.17	0.34
29.00	1183.60	0.90	1.65	0.17	0.34
35.00	1183.70	1.00	1.75	0.19	0.34

Tailwater Channel Data - 1291+00 - Culvert 305

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1182.70 ft

Roadway Data for Crossing: 1291+00 - Culvert 305

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1186.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 75 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1297+00 - Culvert 315

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 315 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1184.50	0.00	0.00	0.00	1
1185.23	7.50	7.50	0.00	1
1185.63	15.00	15.00	0.00	1
1185.97	22.50	22.50	0.00	1
1186.31	30.00	30.00	0.00	1
1186.64	37.50	37.50	0.00	1
1187.04	45.00	45.00	0.00	1
1187.36	52.50	48.94	3.43	14
1187.42	60.00	49.70	10.17	5
1187.46	67.50	50.25	17.11	4
1187.50	75.00	50.70	24.23	4
1187.31	48.21	48.21	0.00	Overtopping

Rating Curve Plot for Crossing: 1297+00 - Culvert 315

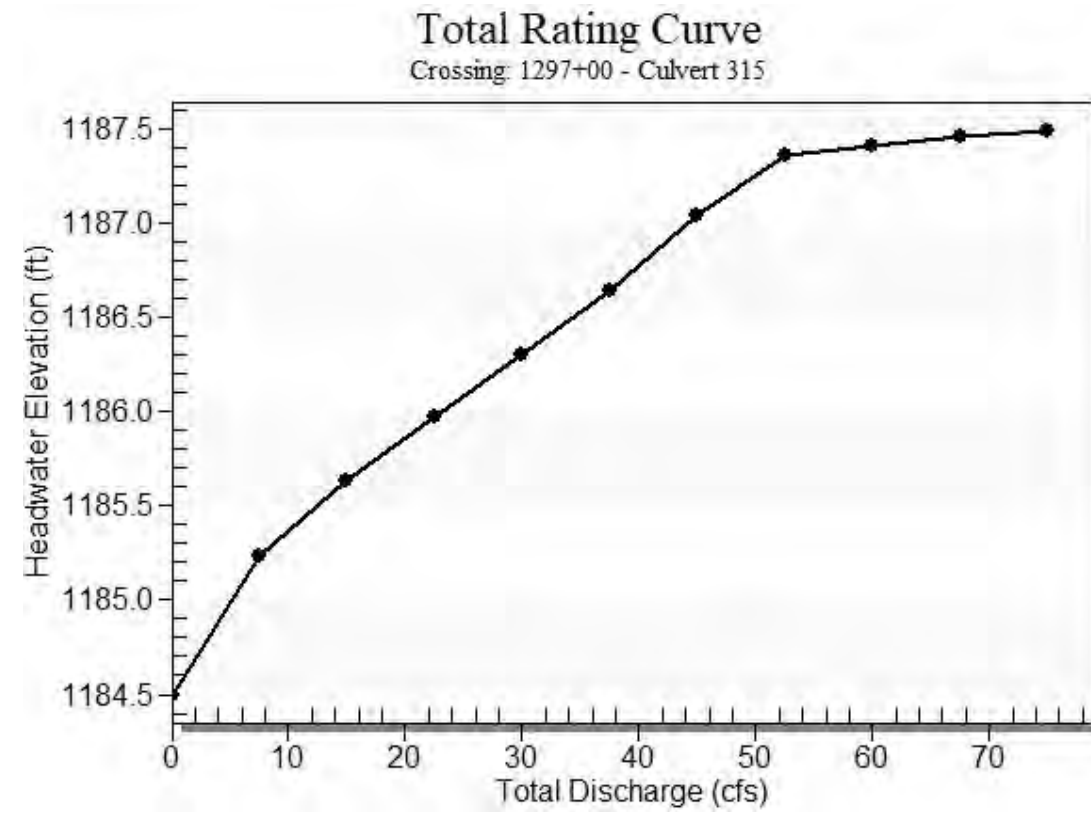
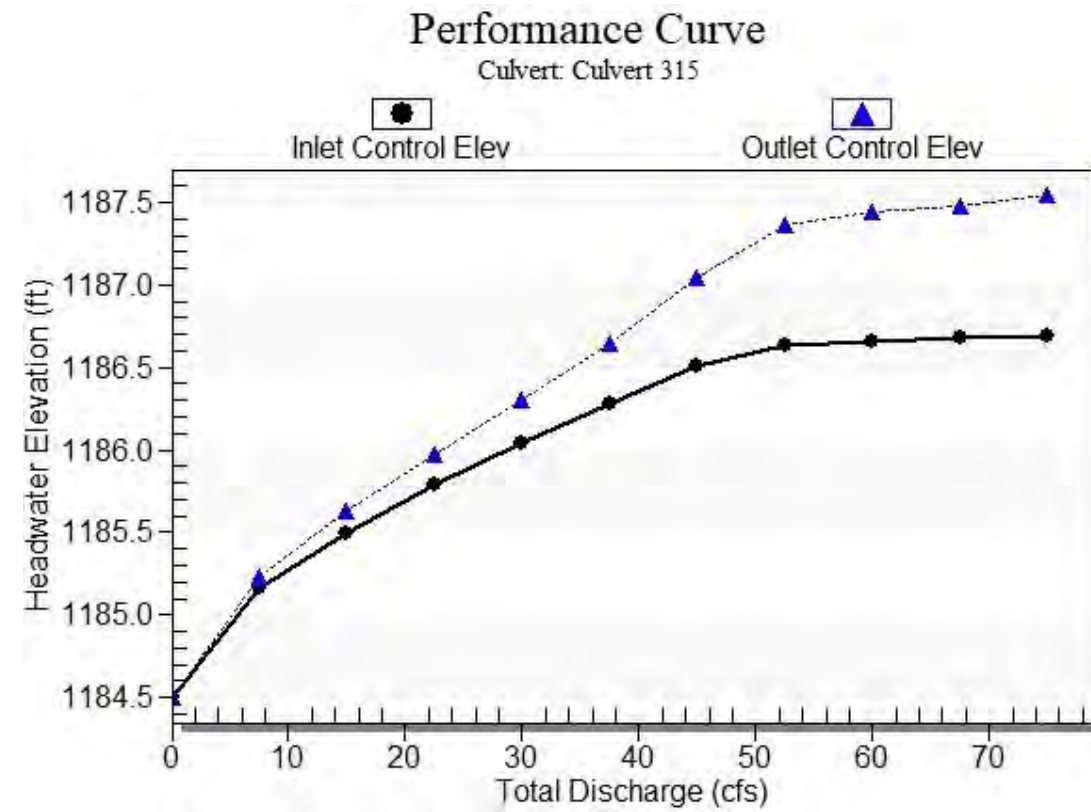


Table 2 - Culvert Summary Table: Culvert 315

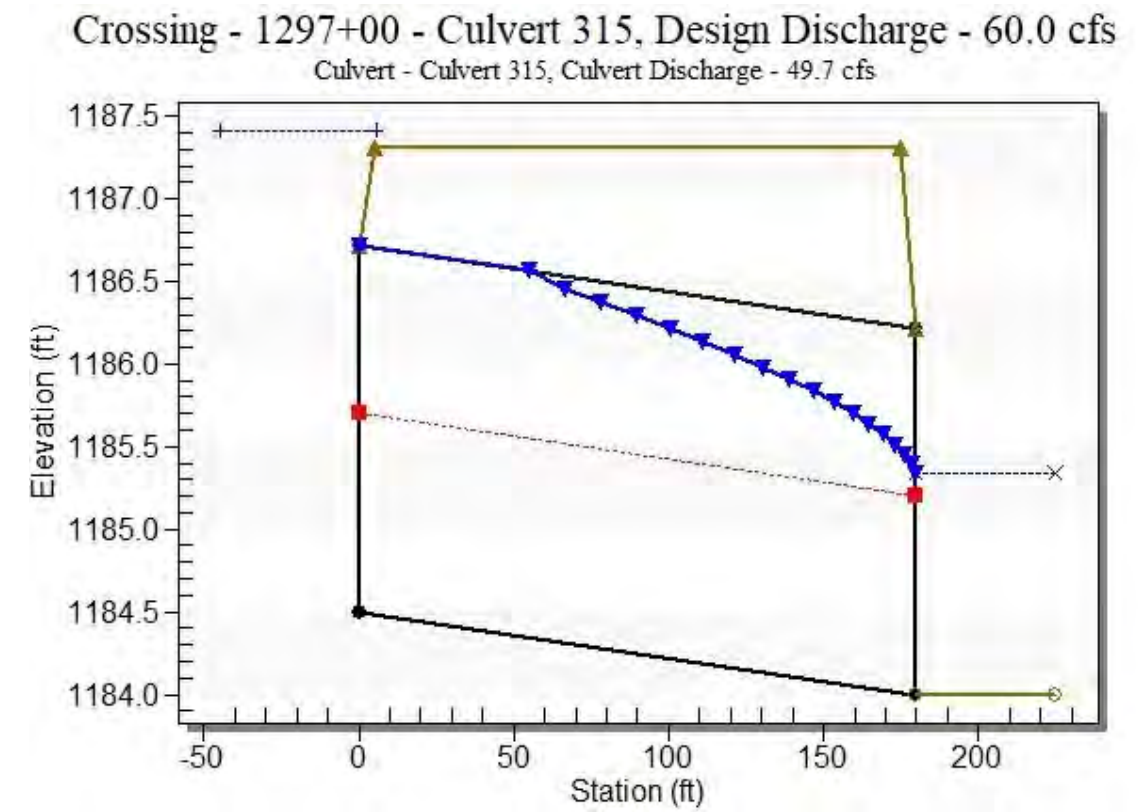
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1184.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.50	7.50	1185.23	0.661	0.732	3-M2t	0.620	0.399	0.418	0.418	3.126	1.050
15.00	15.00	1185.63	0.996	1.130	3-M2t	0.959	0.593	0.623	0.623	3.874	1.330
22.50	22.50	1185.97	1.285	1.475	3-M2t	1.292	0.758	0.783	0.783	4.490	1.518
30.00	30.00	1186.31	1.540	1.806	3-M2t	1.707	0.898	0.920	0.920	5.031	1.664
37.50	37.50	1186.64	1.776	2.144	3-M2t	2.217	1.027	1.041	1.041	5.525	1.784
45.00	45.00	1187.04	2.010	2.540	3-M2t	2.217	1.138	1.150	1.150	5.988	1.886
52.50	48.94	1187.36	2.137	2.866	7-M2t	2.217	1.196	1.250	1.250	5.996	1.977
60.00	49.70	1187.42	2.162	2.945	7-M2t	2.217	1.206	1.343	1.343	5.682	2.057
67.50	50.25	1187.46	2.180	2.983	7-M2t	2.217	1.214	1.431	1.431	5.417	2.130
75.00	50.70	1187.50	2.195	3.047	7-M2t	2.217	1.220	1.513	1.513	5.197	2.197

 Straight Culvert
 Inlet Elevation (invert): 1184.50 ft, Outlet Elevation (invert): 1184.00 ft
 Culvert Length: 180.00 ft, Culvert Slope: 0.0028

Culvert Performance Curve Plot: Culvert 315



Water Surface Profile Plot for Culvert: Culvert 315



Site Data - Culvert 315

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1184.50 ft
 Outlet Station: 180.00 ft
 Outlet Elevation: 1184.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 315

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 320

Table 3 - Downstream Channel Rating Curve (Crossing: 1297+00 - Culvert 315)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1184.00	0.00	0.00	0.00	0.00
7.50	1184.42	0.42	1.05	0.08	0.30
15.00	1184.62	0.62	1.33	0.12	0.32
22.50	1184.78	0.78	1.52	0.15	0.33
30.00	1184.92	0.92	1.66	0.17	0.34
37.50	1185.04	1.04	1.78	0.19	0.35
45.00	1185.15	1.15	1.89	0.22	0.35
52.50	1185.25	1.25	1.98	0.23	0.35
60.00	1185.34	1.34	2.06	0.25	0.36
67.50	1185.43	1.43	2.13	0.27	0.36
75.00	1185.51	1.51	2.20	0.28	0.36

Tailwater Channel Data - 1297+00 - Culvert 315

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1184.00 ft

Roadway Data for Crossing: 1297+00 - Culvert 315

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1187.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1305+20 - Culvert 320

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 320 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1185.80	0.00	0.00	0.00	1
1186.68	11.07	11.07	0.00	1
1187.15	22.14	22.14	0.00	1
1187.55	33.21	33.21	0.00	1
1187.94	44.28	44.28	0.00	1
1188.32	55.35	55.35	0.00	1
1188.51	66.42	60.37	5.88	9
1188.58	77.49	62.02	15.33	5
1188.63	88.56	63.34	25.05	4
1188.63	88.60	63.34	25.07	2
1188.72	110.70	65.48	45.14	4
1188.44	58.44	58.44	0.00	Overtopping

Rating Curve Plot for Crossing: 1305+20 - Culvert 320

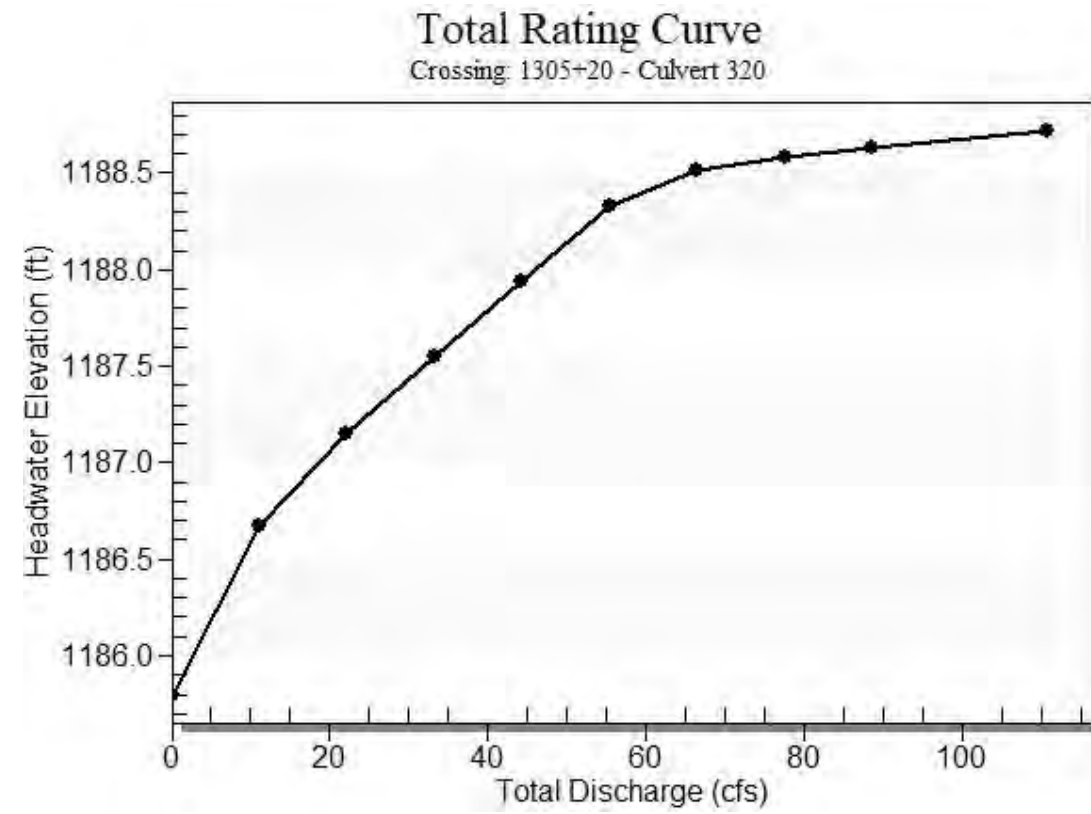
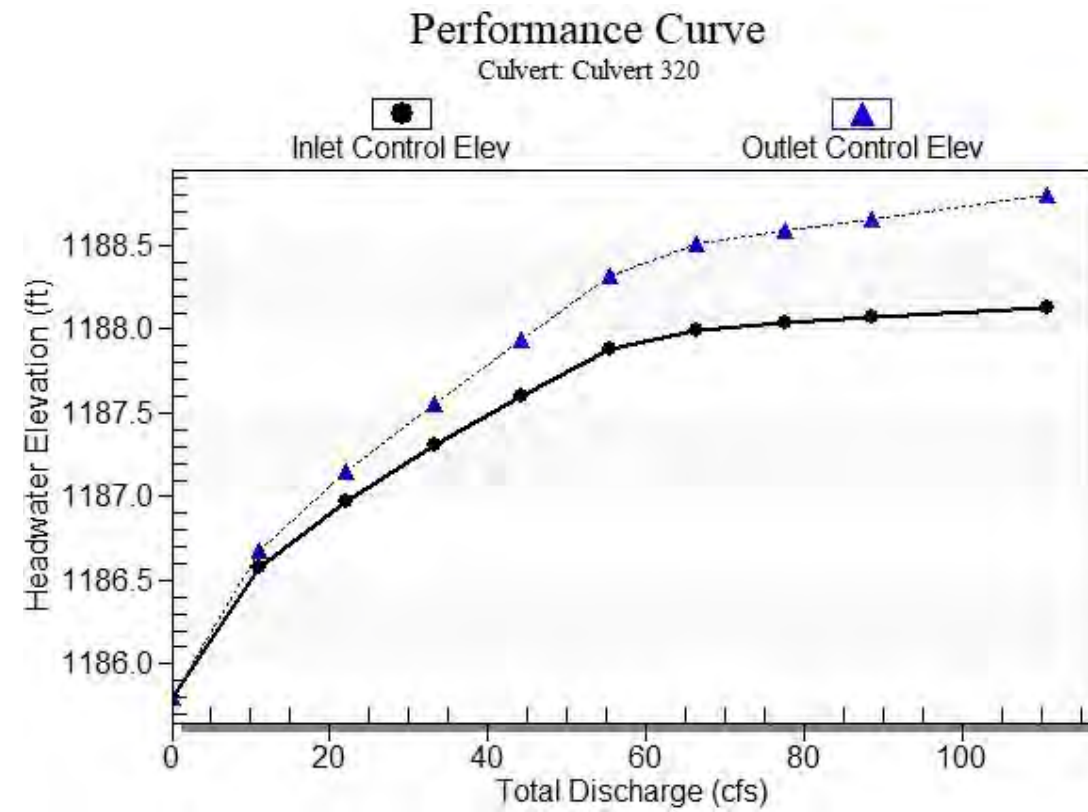


Table 2 - Culvert Summary Table: Culvert 320

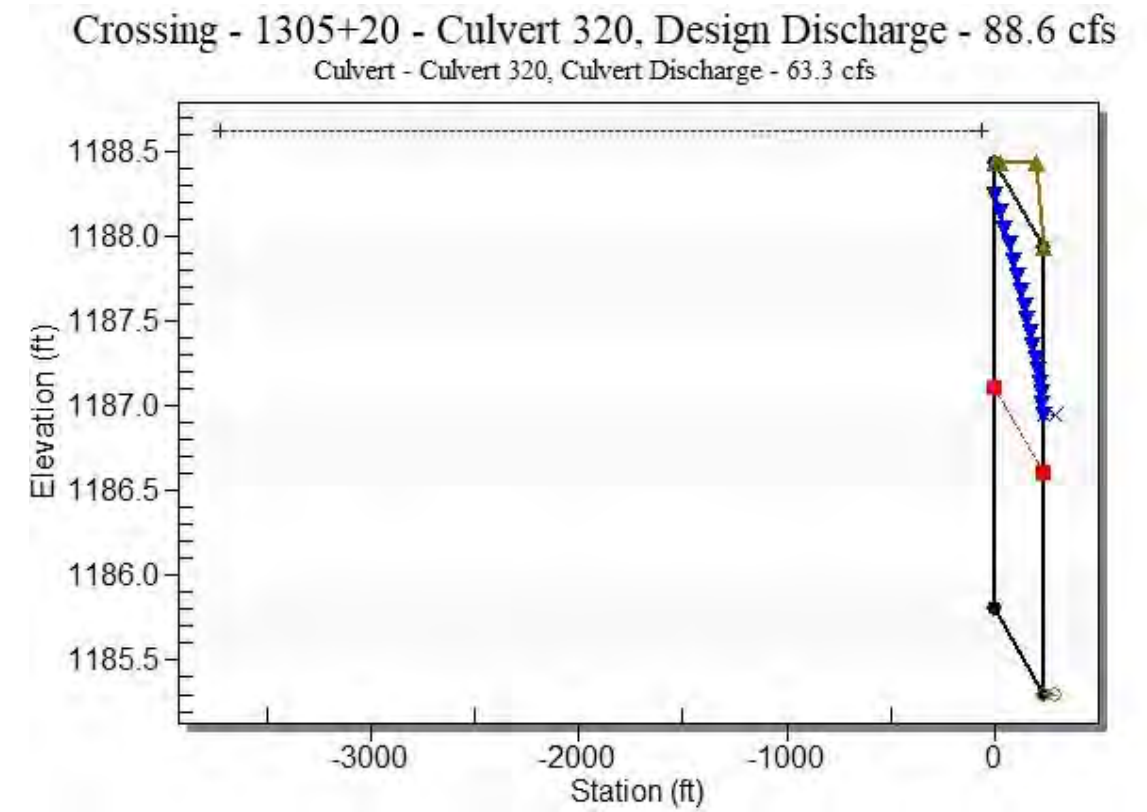
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1185.80	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1186.68	0.773	0.877	3-M2t	0.758	0.476	0.523	0.523	3.140	1.201
22.14	22.14	1187.15	1.166	1.348	3-M2t	1.175	0.695	0.776	0.776	3.912	1.511
33.21	33.21	1187.55	1.504	1.751	3-M2t	1.590	0.889	0.973	0.973	4.557	1.718
44.28	44.28	1187.94	1.802	2.135	3-M2t	2.642	1.053	1.140	1.140	5.125	1.877
55.35	55.35	1188.32	2.077	2.525	3-M2t	2.642	1.206	1.286	1.286	5.646	2.008
66.42	60.37	1188.51	2.199	2.717	3-M2t	2.642	1.267	1.418	1.418	5.577	2.120
77.49	62.02	1188.58	2.239	2.791	3-M2t	2.642	1.286	1.539	1.539	5.287	2.218
88.56	63.34	1188.63	2.271	2.859	3-M2t	2.642	1.301	1.651	1.651	5.049	2.306
88.60	63.34	1188.63	2.271	2.859	3-M2t	2.642	1.302	1.652	1.652	5.048	2.306
110.70	65.48	1188.72	2.323	3.005	3-M2t	2.642	1.325	1.855	1.855	4.698	2.458

 Straight Culvert
 Inlet Elevation (invert): 1185.80 ft, Outlet Elevation (invert): 1185.30 ft
 Culvert Length: 235.00 ft, Culvert Slope: 0.0021

Culvert Performance Curve Plot: Culvert 320



Water Surface Profile Plot for Culvert: Culvert 320



Site Data - Culvert 320

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 1185.80 ft
Outlet Station: 235.00 ft
Outlet Elevation: 1185.30 ft
Number of Barrels: 2

Culvert Data Summary - Culvert 320

Barrel Shape: Pipe Arch
Barrel Span: 50.60 in
Barrel Rise: 31.70 in
Barrel Material: Steel or Aluminum
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Projecting
Inlet Depression: None

HY-8 Culvert Analysis Report Structure 325

Table 3 - Downstream Channel Rating Curve (Crossing: 1305+20 - Culvert 320)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1185.30	0.00	0.00	0.00	0.00
11.07	1185.82	0.52	1.20	0.10	0.31
22.14	1186.08	0.78	1.51	0.15	0.33
33.21	1186.27	0.97	1.72	0.18	0.34
44.28	1186.44	1.14	1.88	0.21	0.35
55.35	1186.59	1.29	2.01	0.24	0.36
66.42	1186.72	1.42	2.12	0.27	0.36
77.49	1186.84	1.54	2.22	0.29	0.36
88.56	1186.95	1.65	2.31	0.31	0.37
88.60	1186.95	1.65	2.31	0.31	0.37
110.70	1187.16	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1305+20 - Culvert 320

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1185.30 ft

Roadway Data for Crossing: 1305+20 - Culvert 320

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1188.44 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1311+00 - Culvert 325

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 325 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1186.00	0.00	0.00	0.00	1
1186.94	11.07	11.07	0.00	1
1187.48	22.14	22.14	0.00	1
1187.98	33.21	33.21	0.00	1
1188.57	44.28	44.28	0.00	1
1189.57	55.35	55.35	0.00	1
1189.90	66.42	58.63	7.60	11
1189.97	77.49	59.29	18.06	5
1190.02	88.56	59.61	28.77	4
1190.02	88.60	59.61	28.80	2
1190.11	110.70	60.60	50.03	4
1189.81	57.77	57.77	0.00	Overtopping

Rating Curve Plot for Crossing: 1311+00 - Culvert 325

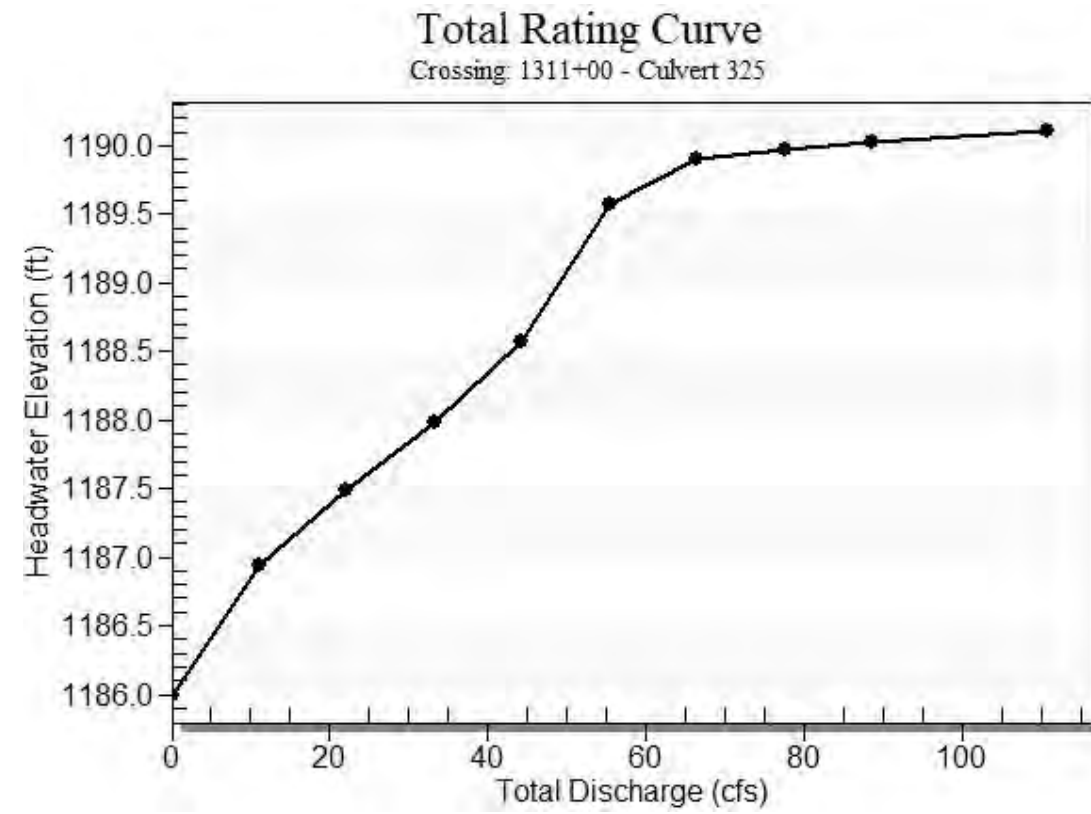
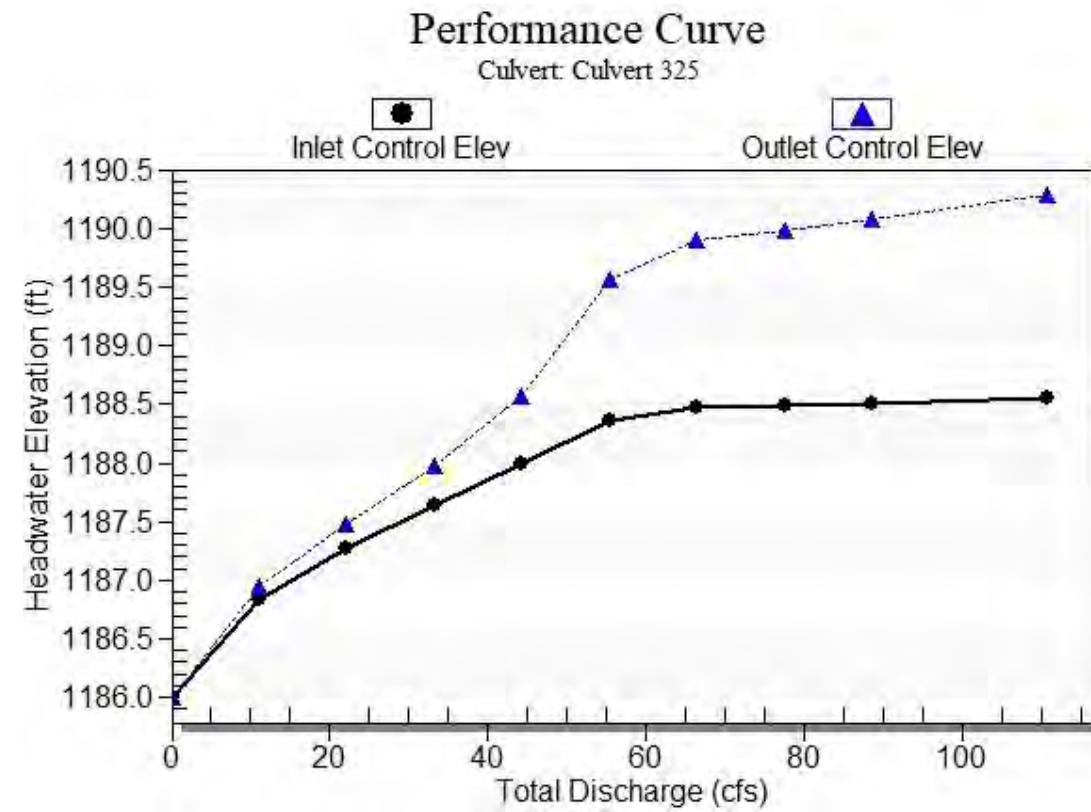


Table 2 - Culvert Summary Table: Culvert 325

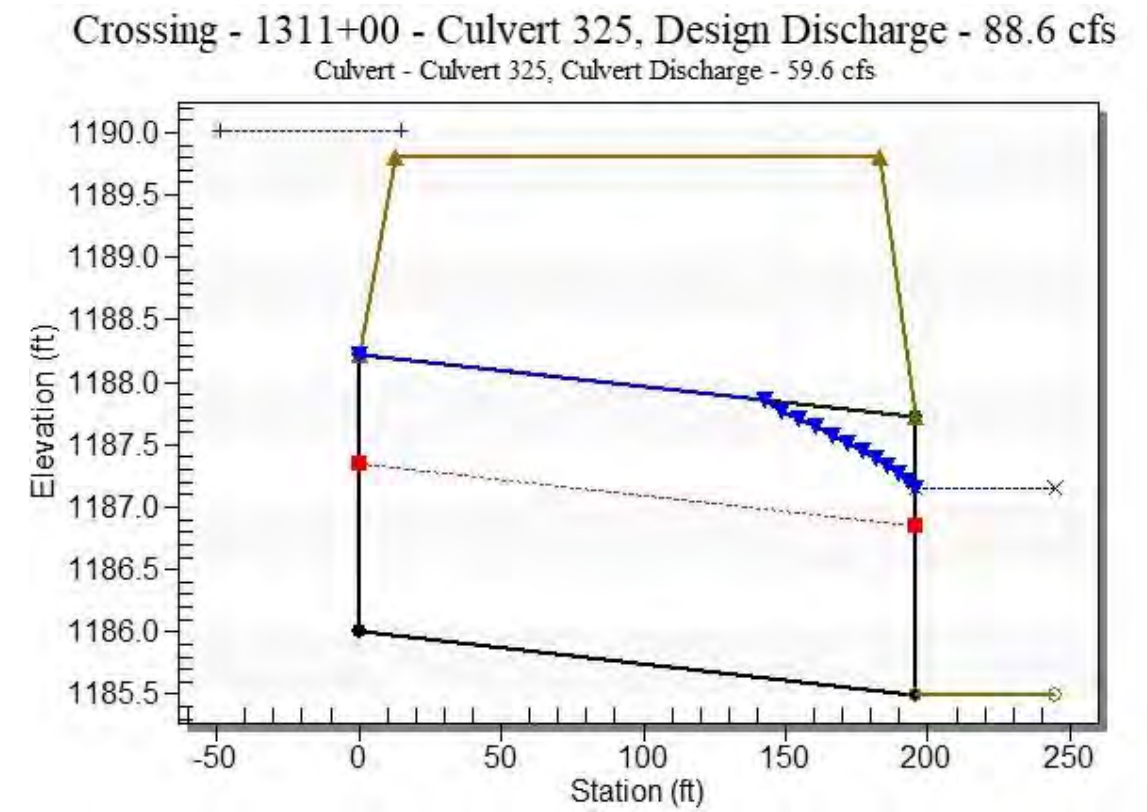
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1186.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1186.94	0.830	0.942	3-M2t	0.807	0.500	0.523	0.523	3.510	1.201
22.14	22.14	1187.48	1.272	1.483	3-M2t	1.321	0.750	0.776	0.776	4.463	1.511
33.21	33.21	1187.98	1.642	1.982	3-M2t	2.217	0.958	0.973	0.973	5.247	1.718
44.28	44.28	1188.57	1.987	2.574	3-M2t	2.217	1.128	1.140	1.140	5.945	1.877
55.35	55.35	1189.57	2.354	3.566	7-M2c	2.217	1.287	1.287	1.286	6.589	2.008
66.42	58.63	1189.90	2.473	3.902	7-M2t	2.217	1.331	1.418	1.418	6.371	2.120
77.49	59.29	1189.97	2.497	3.991	7-M2t	2.217	1.340	1.539	1.539	5.985	2.218
88.56	59.61	1190.02	2.509	4.078	7-M2t	2.217	1.344	1.651	1.651	5.669	2.306
88.60	59.61	1190.02	2.509	4.078	7-M2t	2.217	1.344	1.652	1.652	5.668	2.306
110.70	60.60	1190.11	2.547	4.290	7-M2t	2.217	1.357	1.855	1.855	5.272	2.458

 Straight Culvert
 Inlet Elevation (invert): 1186.00 ft, Outlet Elevation (invert): 1185.50 ft
 Culvert Length: 196.00 ft, Culvert Slope: 0.0026

Culvert Performance Curve Plot: Culvert 325



Water Surface Profile Plot for Culvert: Culvert 325



Site Data - Culvert 325

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1186.00 ft
 Outlet Station: 196.00 ft
 Outlet Elevation: 1185.50 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 325

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 330

Table 3 - Downstream Channel Rating Curve (Crossing: 1311+00 - Culvert 325)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1185.50	0.00	0.00	0.00	0.00
11.07	1186.02	0.52	1.20	0.10	0.31
22.14	1186.28	0.78	1.51	0.15	0.33
33.21	1186.47	0.97	1.72	0.18	0.34
44.28	1186.64	1.14	1.88	0.21	0.35
55.35	1186.79	1.29	2.01	0.24	0.36
66.42	1186.92	1.42	2.12	0.27	0.36
77.49	1187.04	1.54	2.22	0.29	0.36
88.56	1187.15	1.65	2.31	0.31	0.37
88.60	1187.15	1.65	2.31	0.31	0.37
110.70	1187.36	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1311+00 - Culvert 325

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1185.50 ft

Roadway Data for Crossing: 1311+00 - Culvert 325

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1189.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1317+00 - Culvert 330

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 330 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1187.50	0.00	0.00	0.00	1
1188.44	11.07	11.07	0.00	1
1188.98	22.14	22.14	0.00	1
1189.48	33.21	33.21	0.00	1
1190.06	44.28	44.28	0.00	1
1190.39	55.35	48.06	7.11	12
1190.46	66.42	48.97	17.32	5
1190.52	77.49	49.69	27.63	4
1190.56	88.56	50.28	38.21	4
1190.56	88.60	50.28	38.24	2
1190.65	110.70	51.21	59.22	3
1190.31	47.36	47.36	0.00	Overtopping

Rating Curve Plot for Crossing: 1317+00 - Culvert 330

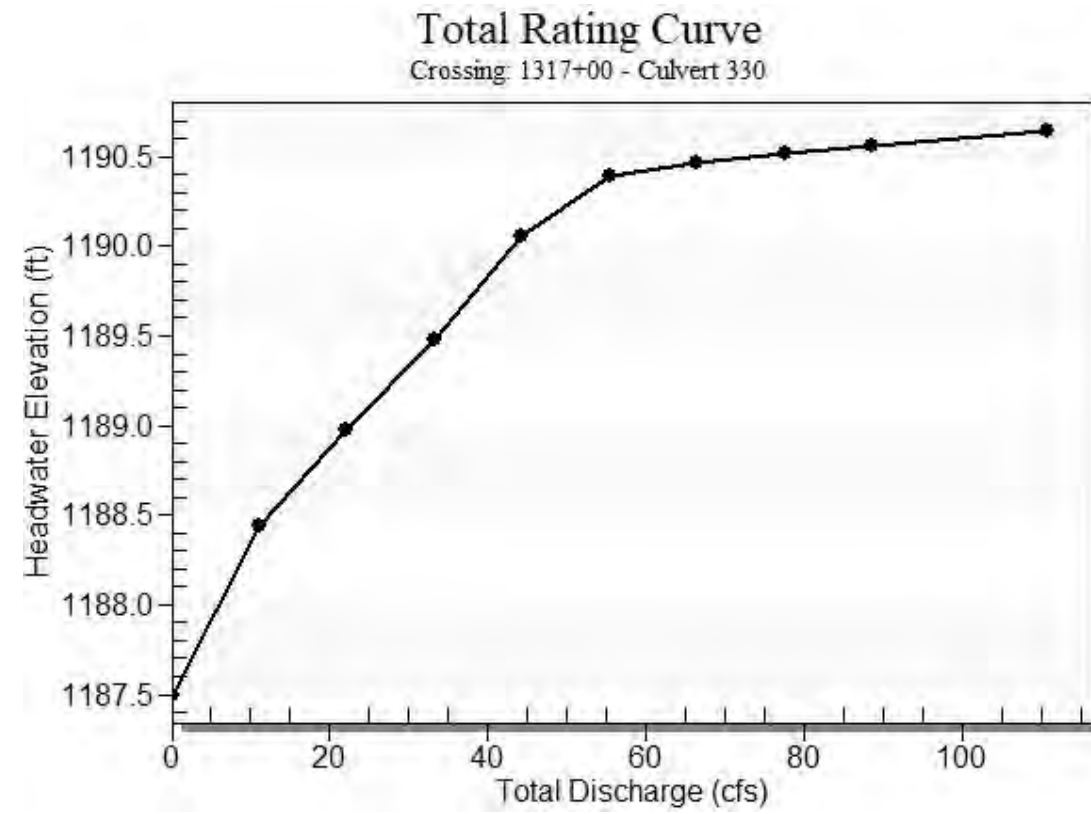
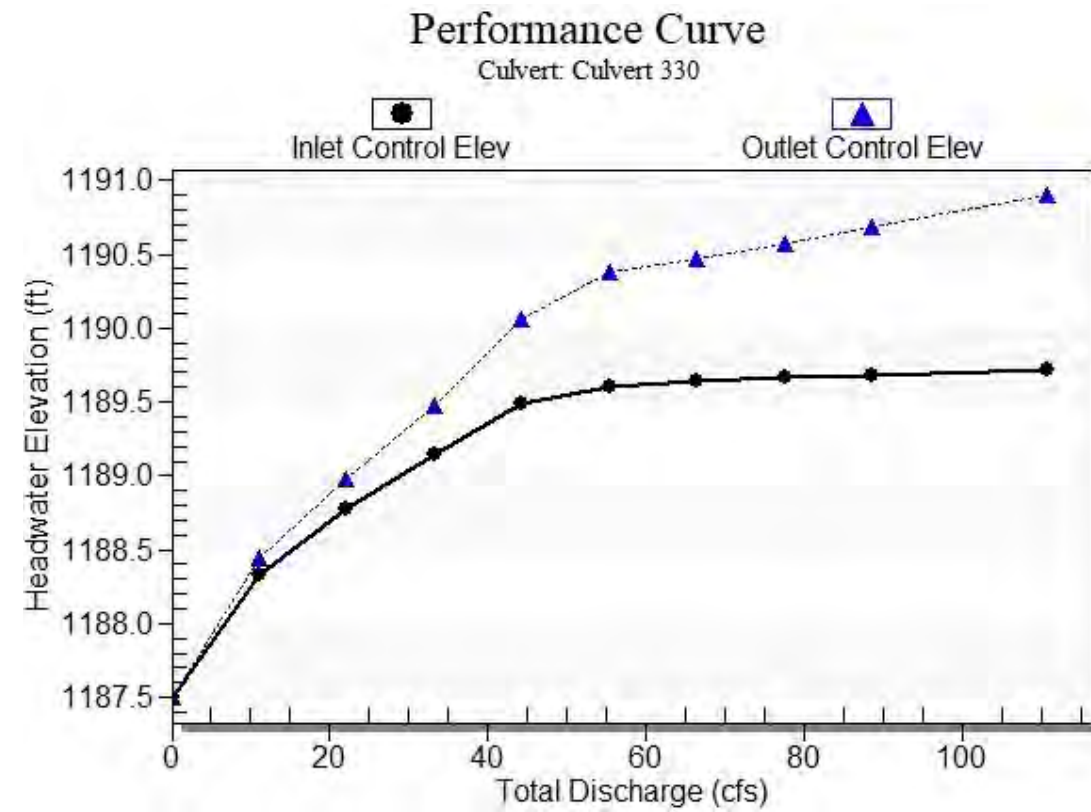


Table 2 - Culvert Summary Table: Culvert 330

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1187.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1188.44	0.830	0.940	3-M2t	0.804	0.500	0.523	0.523	3.510	1.201
22.14	22.14	1188.98	1.272	1.478	3-M2t	1.312	0.750	0.776	0.776	4.463	1.511
33.21	33.21	1189.48	1.642	1.976	3-M2t	2.217	0.958	0.973	0.973	5.247	1.718
44.28	44.28	1190.06	1.987	2.557	3-M2t	2.217	1.128	1.140	1.140	5.945	1.877
55.35	48.06	1190.39	2.108	2.874	7-M2t	2.217	1.180	1.286	1.286	5.727	2.008
66.42	48.97	1190.46	2.138	2.973	7-M2t	2.217	1.196	1.418	1.418	5.320	2.120
77.49	49.69	1190.52	2.161	3.071	7-M2t	2.217	1.206	1.539	1.539	5.016	2.218
88.56	50.28	1190.56	2.181	3.189	7-M2t	2.217	1.214	1.651	1.651	4.781	2.306
88.60	50.28	1190.56	2.181	3.189	7-M2t	2.217	1.214	1.652	1.652	4.780	2.306
110.70	51.21	1190.65	2.212	3.404	7-M2t	2.217	1.227	1.855	1.855	4.455	2.458

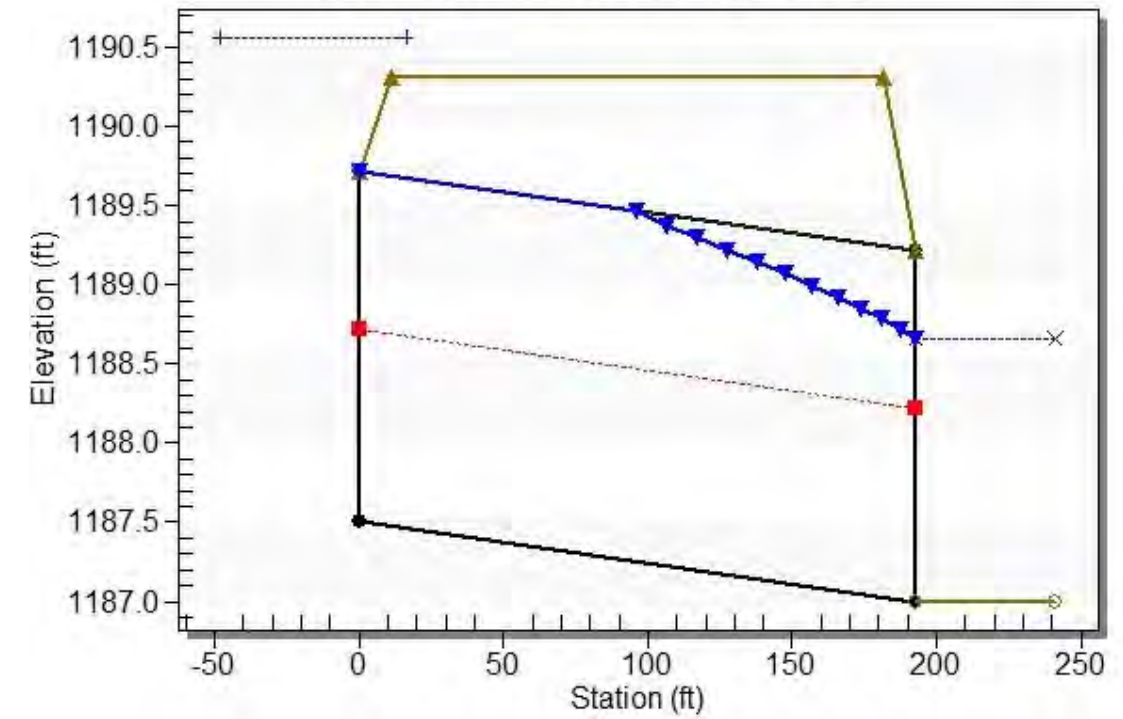
 Straight Culvert
 Inlet Elevation (invert): 1187.50 ft, Outlet Elevation (invert): 1187.00 ft
 Culvert Length: 193.00 ft, Culvert Slope: 0.0026

Culvert Performance Curve Plot: Culvert 330



Water Surface Profile Plot for Culvert: Culvert 330

Crossing - 1317+00 - Culvert 330, Design Discharge - 88.6 cfs
Culvert - Culvert 330, Culvert Discharge - 50.3 cfs



Site Data - Culvert 330

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1187.50 ft
 Outlet Station: 193.00 ft
 Outlet Elevation: 1187.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 330

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 335

Table 3 - Downstream Channel Rating Curve (Crossing: 1317+00 - Culvert 330)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1187.00	0.00	0.00	0.00	0.00
11.07	1187.52	0.52	1.20	0.10	0.31
22.14	1187.78	0.78	1.51	0.15	0.33
33.21	1187.97	0.97	1.72	0.18	0.34
44.28	1188.14	1.14	1.88	0.21	0.35
55.35	1188.29	1.29	2.01	0.24	0.36
66.42	1188.42	1.42	2.12	0.27	0.36
77.49	1188.54	1.54	2.22	0.29	0.36
88.56	1188.65	1.65	2.31	0.31	0.37
88.60	1188.65	1.65	2.31	0.31	0.37
110.70	1188.86	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1317+00 - Culvert 330

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1187.00 ft

Roadway Data for Crossing: 1317+00 - Culvert 330

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1190.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1323+00 - Culvert 335

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 335 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1188.50	0.00	0.00	0.00	1
1189.44	11.07	11.07	0.00	1
1189.97	22.14	22.14	0.00	1
1190.47	33.21	33.21	0.00	1
1191.03	44.28	44.28	0.00	1
1191.39	55.35	48.51	6.66	12
1191.46	66.42	49.44	16.84	5
1191.51	77.49	50.14	27.17	4
1191.56	88.56	50.70	37.77	4
1191.56	88.60	50.70	37.81	2
1191.65	110.70	51.65	58.76	3
1191.31	47.79	47.79	0.00	Overtopping

Rating Curve Plot for Crossing: 1323+00 - Culvert 335

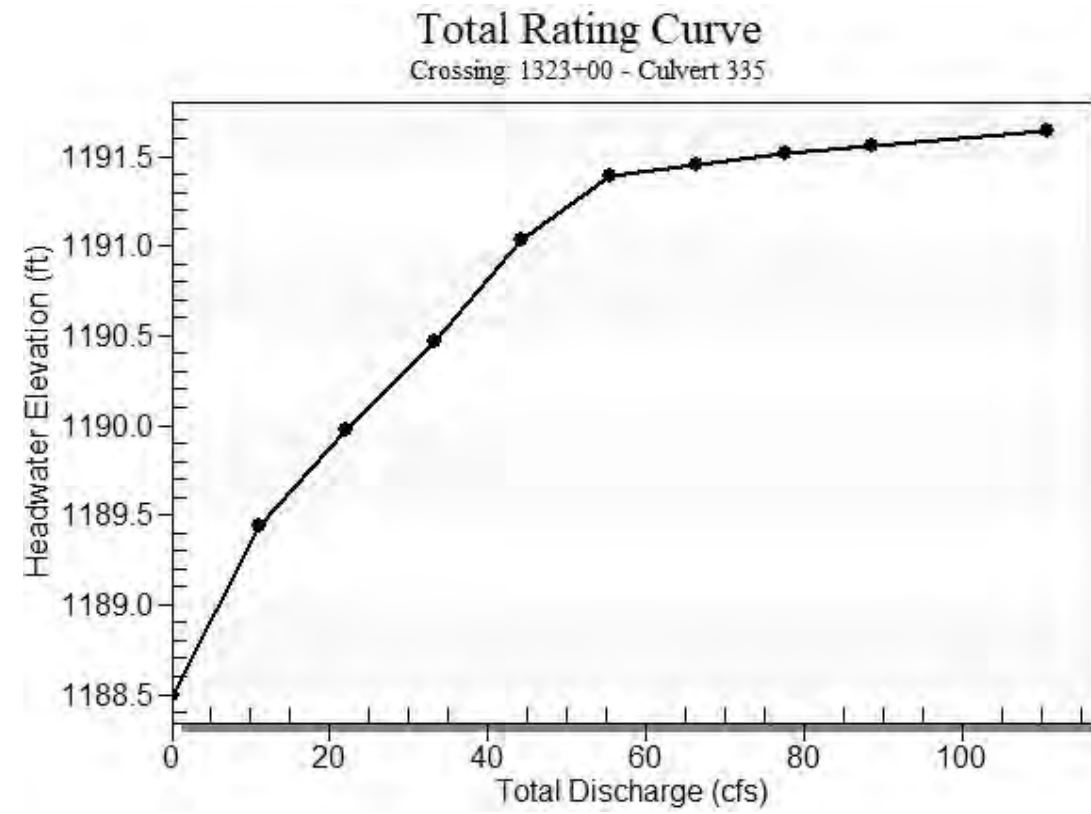
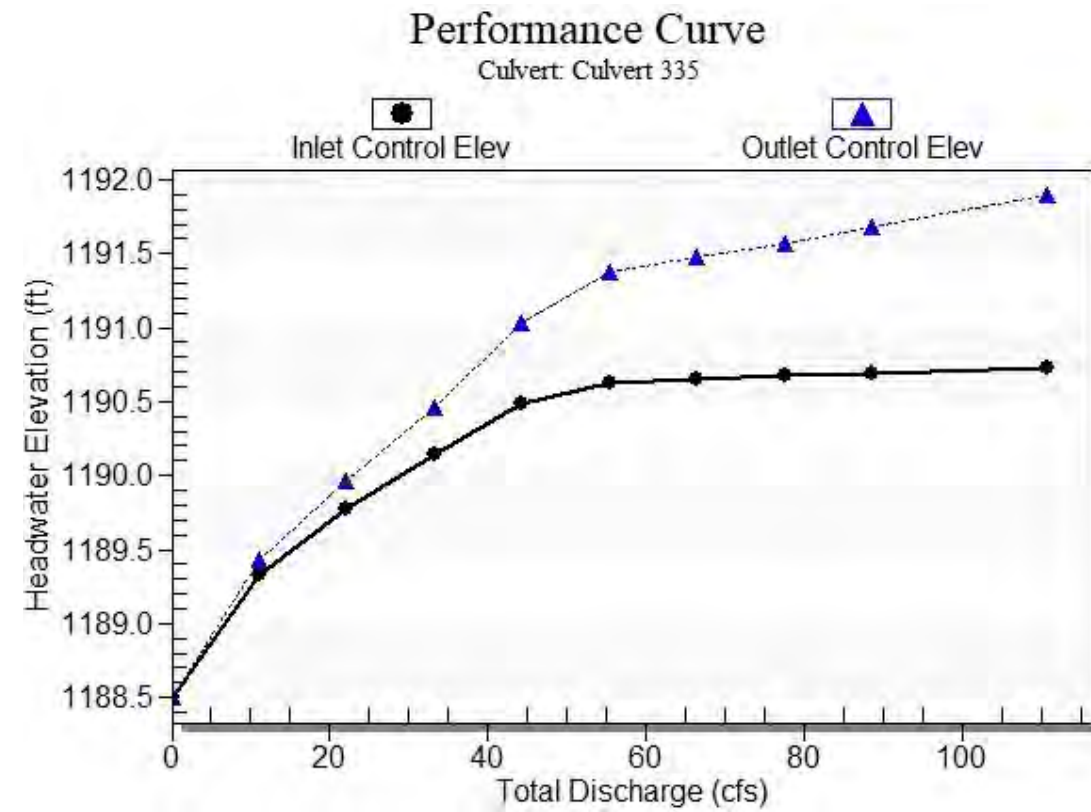


Table 2 - Culvert Summary Table: Culvert 335

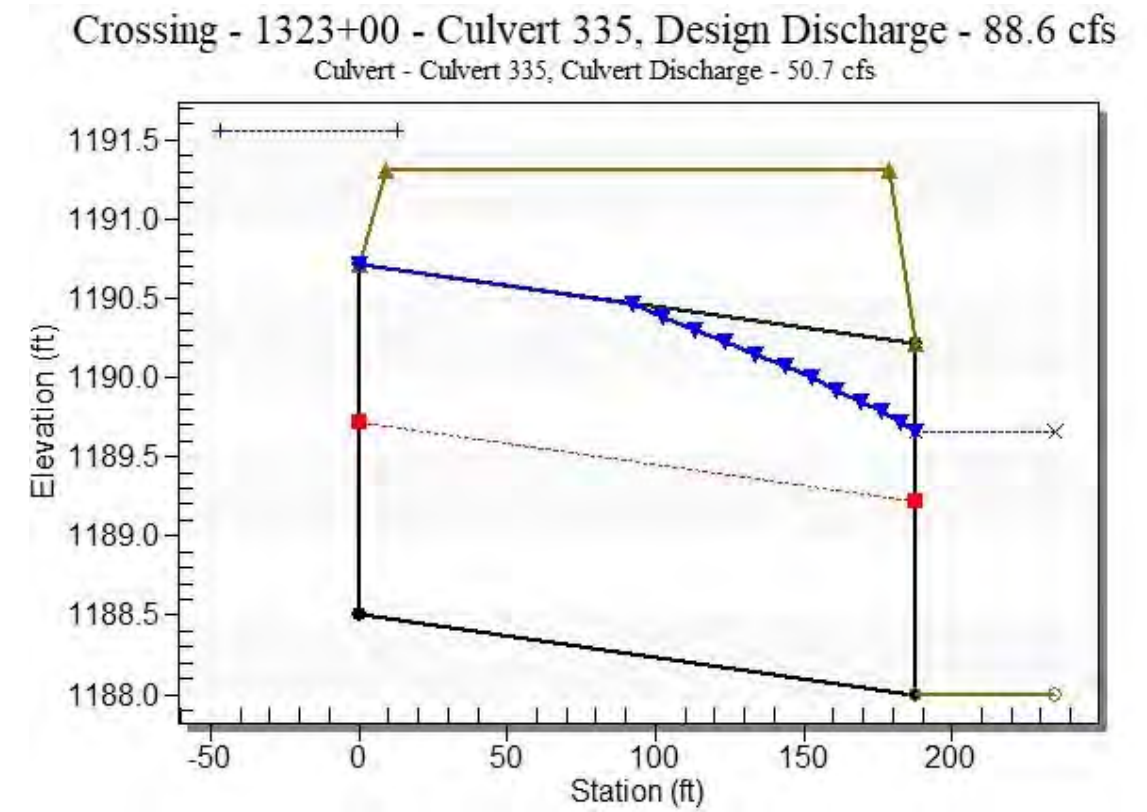
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1188.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1189.44	0.830	0.936	3-M2t	0.797	0.500	0.523	0.523	3.510	1.201
22.14	22.14	1189.97	1.272	1.470	3-M2t	1.298	0.750	0.776	0.776	4.463	1.511
33.21	33.21	1190.47	1.642	1.966	3-M2t	2.217	0.958	0.973	0.973	5.247	1.718
44.28	44.28	1191.03	1.987	2.533	3-M2t	2.217	1.128	1.140	1.140	5.945	1.877
55.35	48.51	1191.39	2.122	2.875	7-M2t	2.217	1.185	1.286	1.286	5.780	2.008
66.42	49.44	1191.46	2.153	2.975	7-M2t	2.217	1.203	1.418	1.418	5.372	2.120
77.49	50.14	1191.51	2.176	3.070	7-M2t	2.217	1.212	1.539	1.539	5.062	2.218
88.56	50.70	1191.56	2.195	3.185	7-M2t	2.217	1.220	1.651	1.651	4.822	2.306
88.60	50.70	1191.56	2.195	3.185	7-M2t	2.217	1.220	1.652	1.652	4.821	2.306
110.70	51.65	1191.65	2.227	3.399	7-M2t	2.217	1.233	1.855	1.855	4.494	2.458

 Straight Culvert
 Inlet Elevation (invert): 1188.50 ft, Outlet Elevation (invert): 1188.00 ft
 Culvert Length: 188.00 ft, Culvert Slope: 0.0027

Culvert Performance Curve Plot: Culvert 335



Water Surface Profile Plot for Culvert: Culvert 335



Site Data - Culvert 335

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1188.50 ft
 Outlet Station: 188.00 ft
 Outlet Elevation: 1188.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 335

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 340

Table 3 - Downstream Channel Rating Curve (Crossing: 1323+00 - Culvert 335)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1188.00	0.00	0.00	0.00	0.00
11.07	1188.52	0.52	1.20	0.10	0.31
22.14	1188.78	0.78	1.51	0.15	0.33
33.21	1188.97	0.97	1.72	0.18	0.34
44.28	1189.14	1.14	1.88	0.21	0.35
55.35	1189.29	1.29	2.01	0.24	0.36
66.42	1189.42	1.42	2.12	0.27	0.36
77.49	1189.54	1.54	2.22	0.29	0.36
88.56	1189.65	1.65	2.31	0.31	0.37
88.60	1189.65	1.65	2.31	0.31	0.37
110.70	1189.86	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1323+00 - Culvert 335

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1188.00 ft

Roadway Data for Crossing: 1323+00 - Culvert 335

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1191.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1329+00 - Culvert 340

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 340 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1188.70	0.00	0.00	0.00	1
1189.63	11.07	11.07	0.00	1
1190.16	22.14	22.14	0.00	1
1190.65	33.21	33.21	0.00	1
1191.20	44.28	44.28	0.00	1
1191.86	55.35	52.09	3.06	18
1191.94	66.42	53.10	13.06	5
1191.99	77.49	53.83	23.39	4
1192.05	88.56	54.40	34.04	4
1192.05	88.60	54.41	34.07	2
1192.13	110.70	55.63	55.30	4
1191.81	51.79	51.79	0.00	Overtopping

Rating Curve Plot for Crossing: 1329+00 - Culvert 340

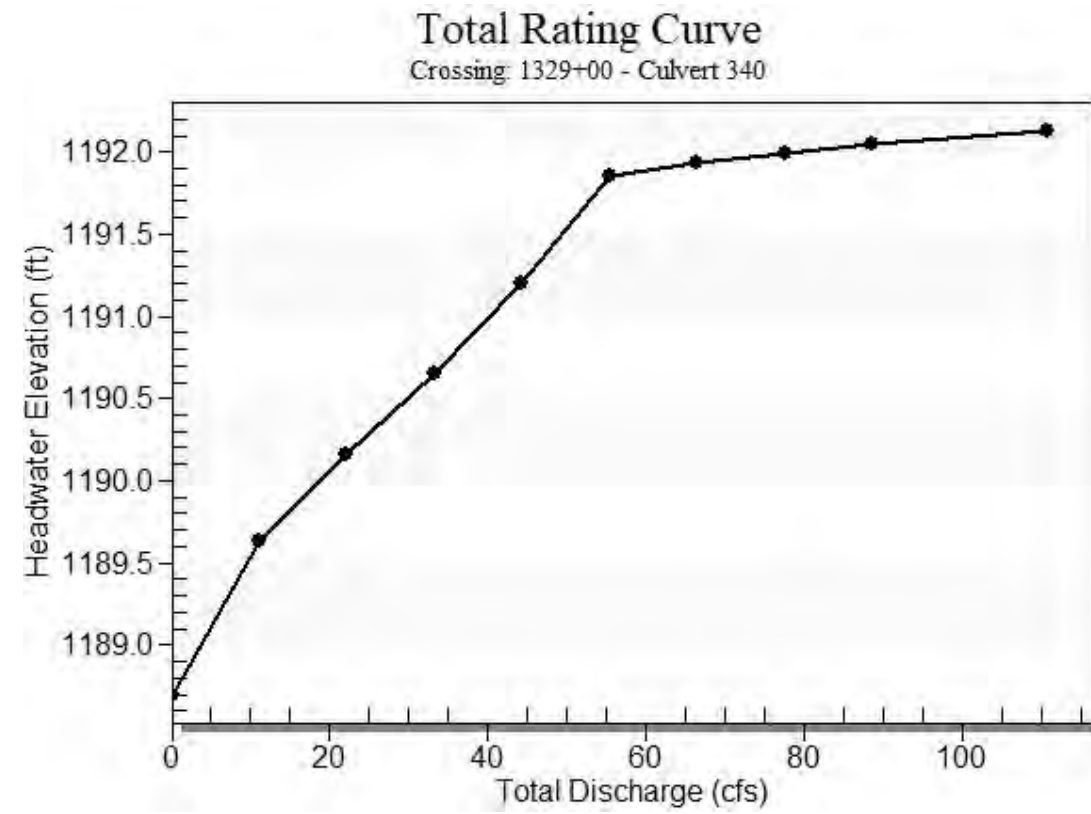
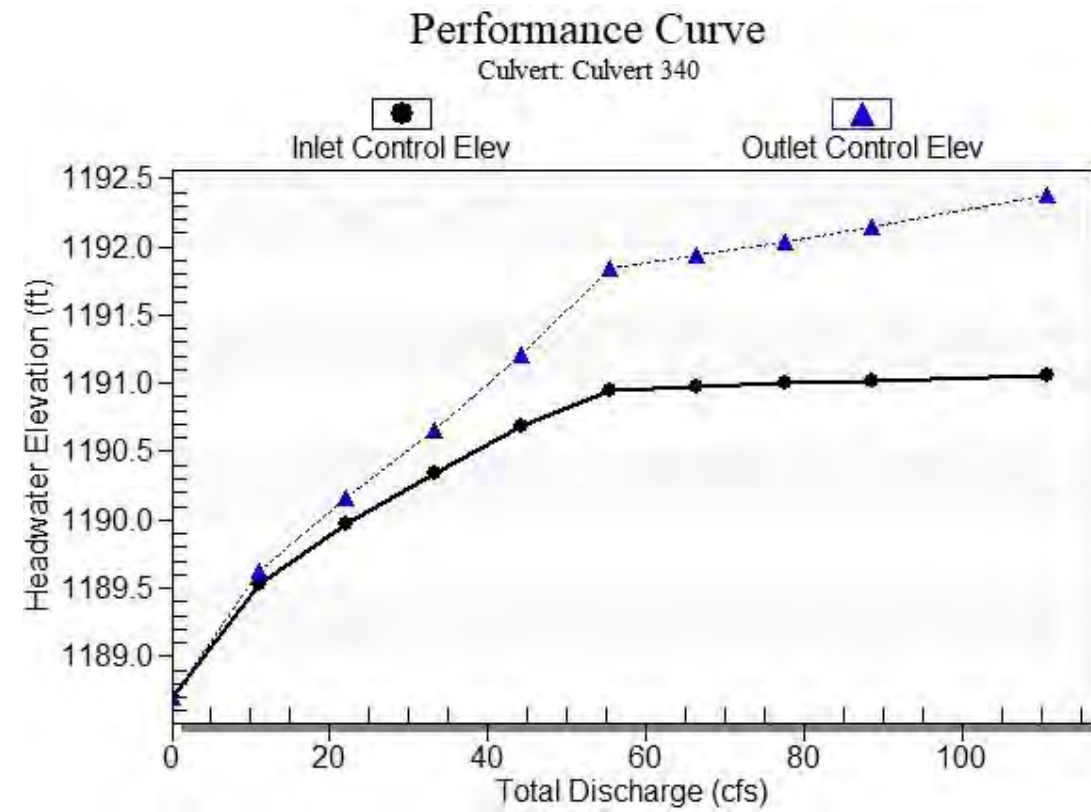


Table 2 - Culvert Summary Table: Culvert 340

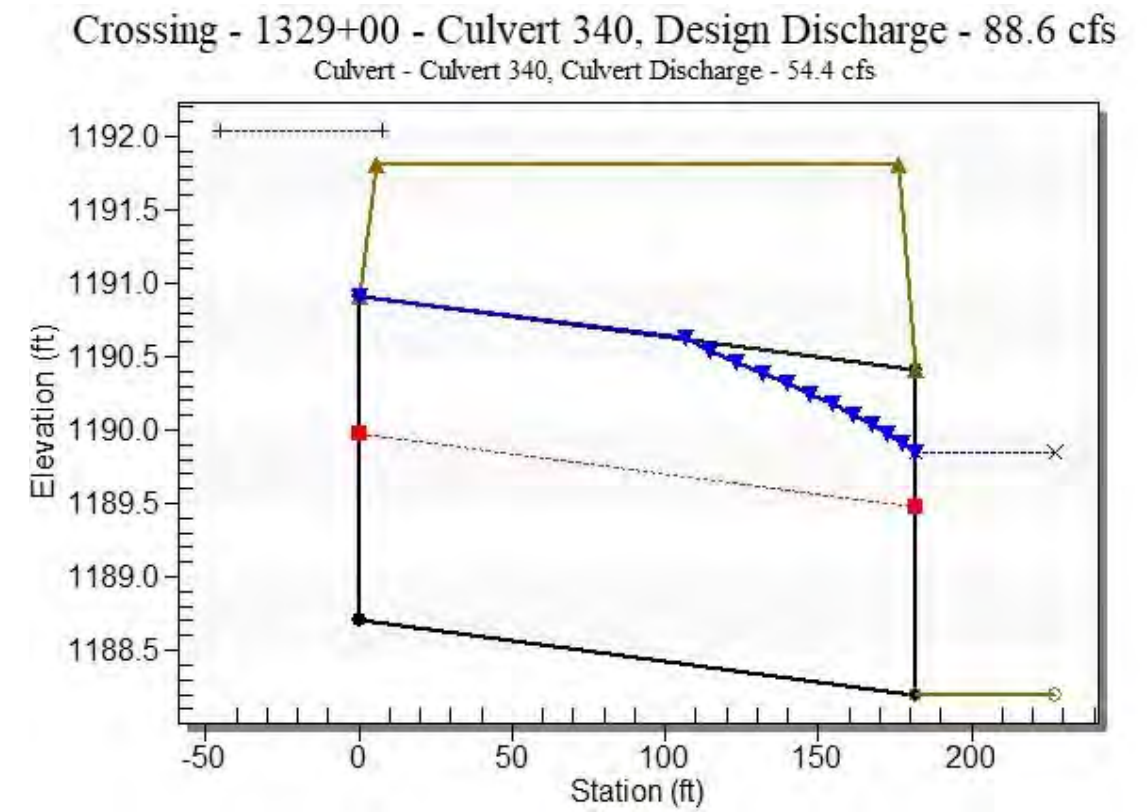
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1188.70	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1189.63	0.830	0.931	3-M2t	0.789	0.500	0.523	0.523	3.510	1.201
22.14	22.14	1190.16	1.272	1.462	3-M2t	1.281	0.750	0.776	0.776	4.463	1.511
33.21	33.21	1190.65	1.642	1.952	3-M2t	2.217	0.958	0.973	0.973	5.247	1.718
44.28	44.28	1191.20	1.987	2.504	3-M2t	2.217	1.128	1.140	1.140	5.945	1.877
55.35	52.09	1191.86	2.241	3.137	7-M2t	2.217	1.239	1.286	1.286	6.207	2.008
66.42	53.10	1191.94	2.276	3.241	7-M2t	2.217	1.253	1.418	1.418	5.770	2.120
77.49	53.83	1191.99	2.301	3.336	7-M2t	2.217	1.262	1.539	1.539	5.434	2.218
88.56	54.40	1192.05	2.321	3.449	7-M2t	2.217	1.270	1.651	1.651	5.174	2.306
88.60	54.41	1192.05	2.321	3.449	7-M2t	2.217	1.270	1.652	1.652	5.173	2.306
110.70	55.63	1192.13	2.364	3.682	7-M2t	2.217	1.291	1.855	1.855	4.840	2.458

 Straight Culvert
 Inlet Elevation (invert): 1188.70 ft, Outlet Elevation (invert): 1188.20 ft
 Culvert Length: 182.00 ft, Culvert Slope: 0.0027

Culvert Performance Curve Plot: Culvert 340



Water Surface Profile Plot for Culvert: Culvert 340



Site Data - Culvert 340

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1188.70 ft
 Outlet Station: 182.00 ft
 Outlet Elevation: 1188.20 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 340

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 345

Table 3 - Downstream Channel Rating Curve (Crossing: 1329+00 - Culvert 340)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1188.20	0.00	0.00	0.00	0.00
11.07	1188.72	0.52	1.20	0.10	0.31
22.14	1188.98	0.78	1.51	0.15	0.33
33.21	1189.17	0.97	1.72	0.18	0.34
44.28	1189.34	1.14	1.88	0.21	0.35
55.35	1189.49	1.29	2.01	0.24	0.36
66.42	1189.62	1.42	2.12	0.27	0.36
77.49	1189.74	1.54	2.22	0.29	0.36
88.56	1189.85	1.65	2.31	0.31	0.37
88.60	1189.85	1.65	2.31	0.31	0.37
110.70	1190.06	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1329+00 - Culvert 340

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1188.20 ft

Roadway Data for Crossing: 1329+00 - Culvert 340

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1191.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1335+05 - Culvert 345

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 345 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1189.50	0.00	0.00	0.00	1
1190.23	11.07	11.07	0.00	1
1190.62	22.14	22.14	0.00	1
1190.97	33.21	33.21	0.00	1
1191.30	44.28	44.28	0.00	1
1191.64	55.35	55.35	0.00	1
1192.04	66.42	66.42	0.00	1
1192.37	77.49	72.55	4.80	13
1192.45	88.56	73.45	14.91	5
1192.45	88.60	73.45	14.94	2
1192.55	110.70	75.54	34.96	4
1192.31	71.40	71.40	0.00	Overtopping

Rating Curve Plot for Crossing: 1335+05 - Culvert 345

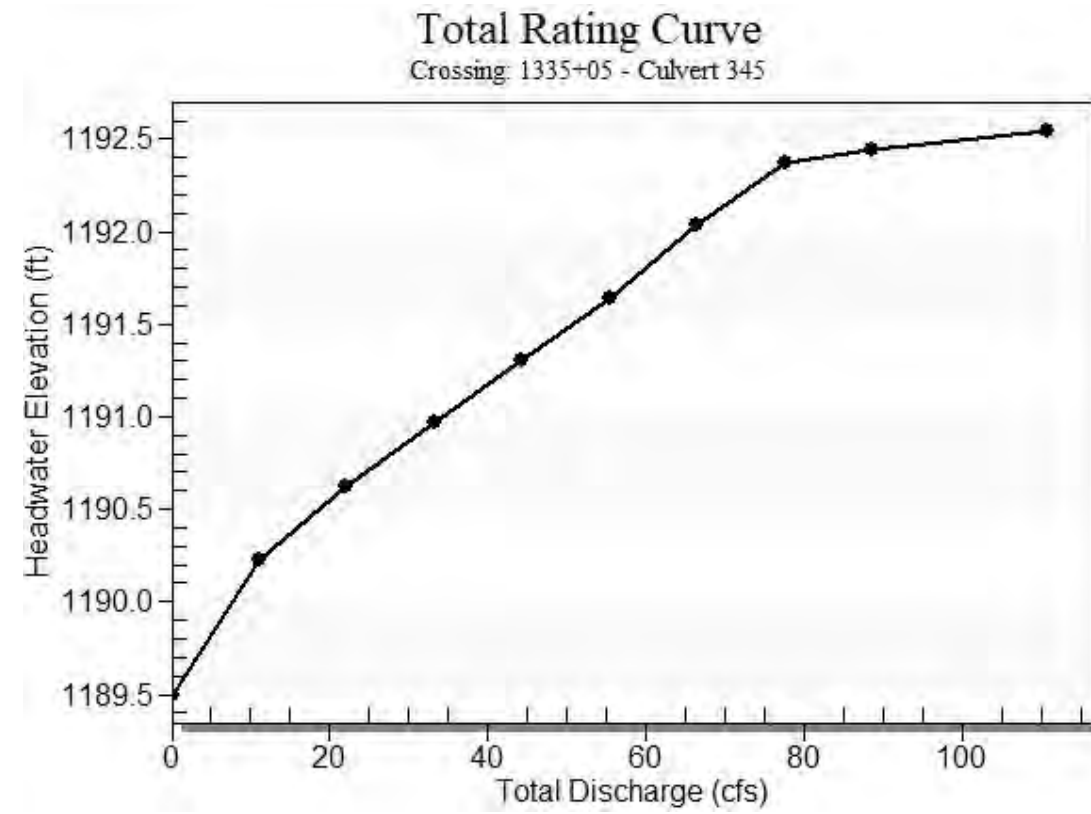
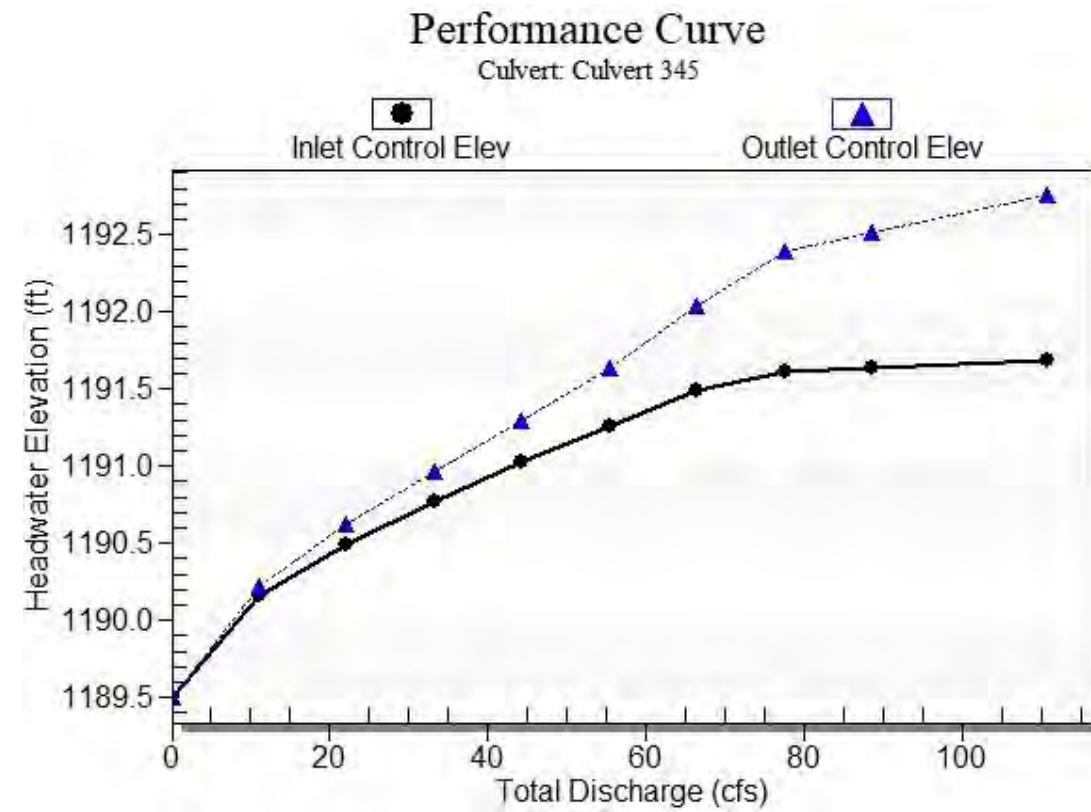


Table 2 - Culvert Summary Table: Culvert 345

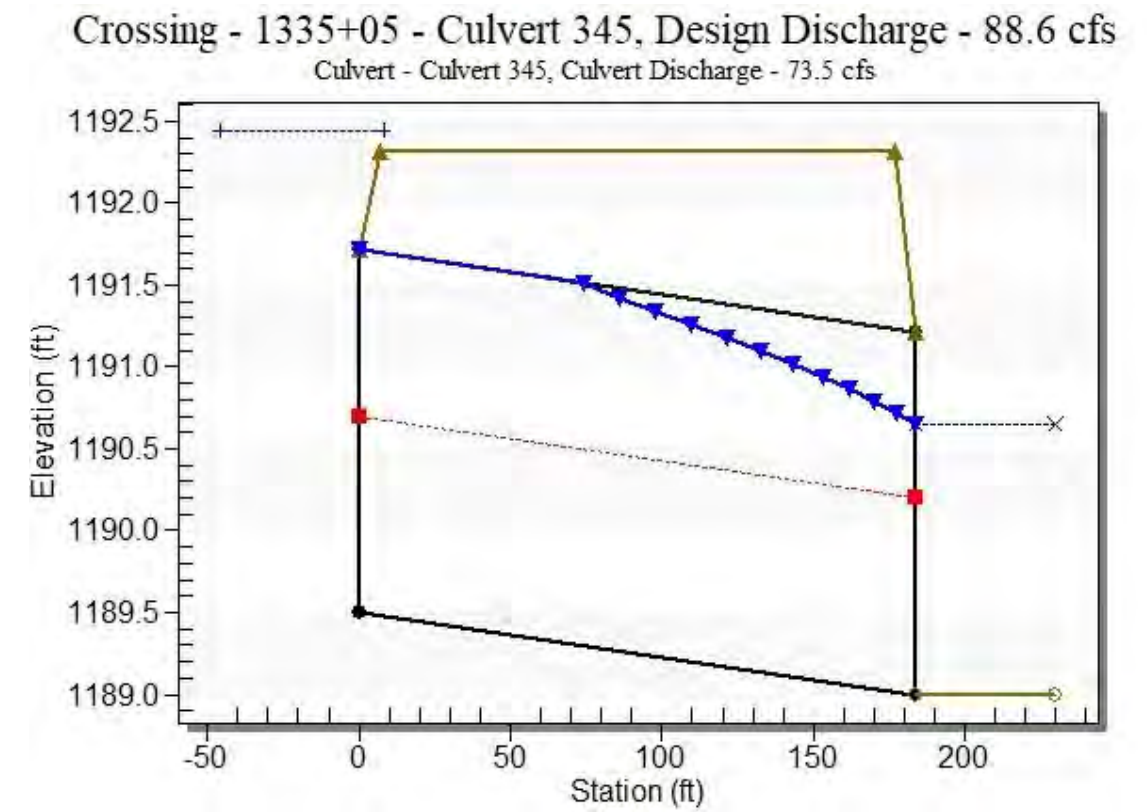
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1189.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1190.23	0.655	0.727	3-M2t	0.618	0.395	0.523	0.523	2.340	1.201
22.14	22.14	1190.62	0.986	1.122	3-M2t	0.956	0.588	0.776	0.776	2.975	1.511
33.21	33.21	1190.97	1.272	1.471	3-M2t	1.287	0.750	0.973	0.973	3.498	1.718
44.28	44.28	1191.30	1.524	1.800	3-M2t	1.696	0.889	1.140	1.140	3.963	1.877
55.35	55.35	1191.64	1.757	2.140	3-M2t	2.217	1.018	1.286	1.286	4.397	2.008
66.42	66.42	1192.04	1.987	2.541	3-M2t	2.217	1.128	1.418	1.418	4.811	2.120
77.49	72.55	1192.37	2.118	2.894	7-M2t	2.217	1.184	1.539	1.539	4.882	2.218
88.56	73.45	1192.45	2.137	3.011	7-M2t	2.217	1.196	1.651	1.651	4.657	2.306
88.60	73.45	1192.45	2.138	3.011	7-M2t	2.217	1.196	1.652	1.652	4.656	2.306
110.70	75.54	1192.55	2.183	3.261	7-M2t	2.217	1.215	1.855	1.855	4.381	2.458

 Straight Culvert
 Inlet Elevation (invert): 1189.50 ft, Outlet Elevation (invert): 1189.00 ft
 Culvert Length: 184.00 ft, Culvert Slope: 0.0027

Culvert Performance Curve Plot: Culvert 345



Water Surface Profile Plot for Culvert: Culvert 345



Site Data - Culvert 345

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1189.50 ft
 Outlet Station: 184.00 ft
 Outlet Elevation: 1189.00 ft
 Number of Barrels: 3

Culvert Data Summary - Culvert 345

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 350

Table 3 - Downstream Channel Rating Curve (Crossing: 1335+05 - Culvert 345)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1189.00	0.00	0.00	0.00	0.00
11.07	1189.52	0.52	1.20	0.10	0.31
22.14	1189.78	0.78	1.51	0.15	0.33
33.21	1189.97	0.97	1.72	0.18	0.34
44.28	1190.14	1.14	1.88	0.21	0.35
55.35	1190.29	1.29	2.01	0.24	0.36
66.42	1190.42	1.42	2.12	0.27	0.36
77.49	1190.54	1.54	2.22	0.29	0.36
88.56	1190.65	1.65	2.31	0.31	0.37
88.60	1190.65	1.65	2.31	0.31	0.37
110.70	1190.86	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1335+05 - Culvert 345

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1189.00 ft

Roadway Data for Crossing: 1335+05 - Culvert 345

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1192.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1341+00 - Culvert 350

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 350 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1190.50	0.00	0.00	0.00	1
1191.43	11.07	11.07	0.00	1
1191.96	22.14	22.14	0.00	1
1192.45	33.21	33.21	0.00	1
1193.01	44.28	44.28	0.00	1
1193.39	55.35	48.98	6.24	13
1193.46	66.42	49.92	16.35	5
1193.51	77.49	50.57	26.72	4
1193.56	88.56	51.14	37.33	4
1193.56	88.60	51.14	37.36	2
1193.65	110.70	51.86	58.78	4
1193.31	48.06	48.06	0.00	Overtopping

Rating Curve Plot for Crossing: 1341+00 - Culvert 350

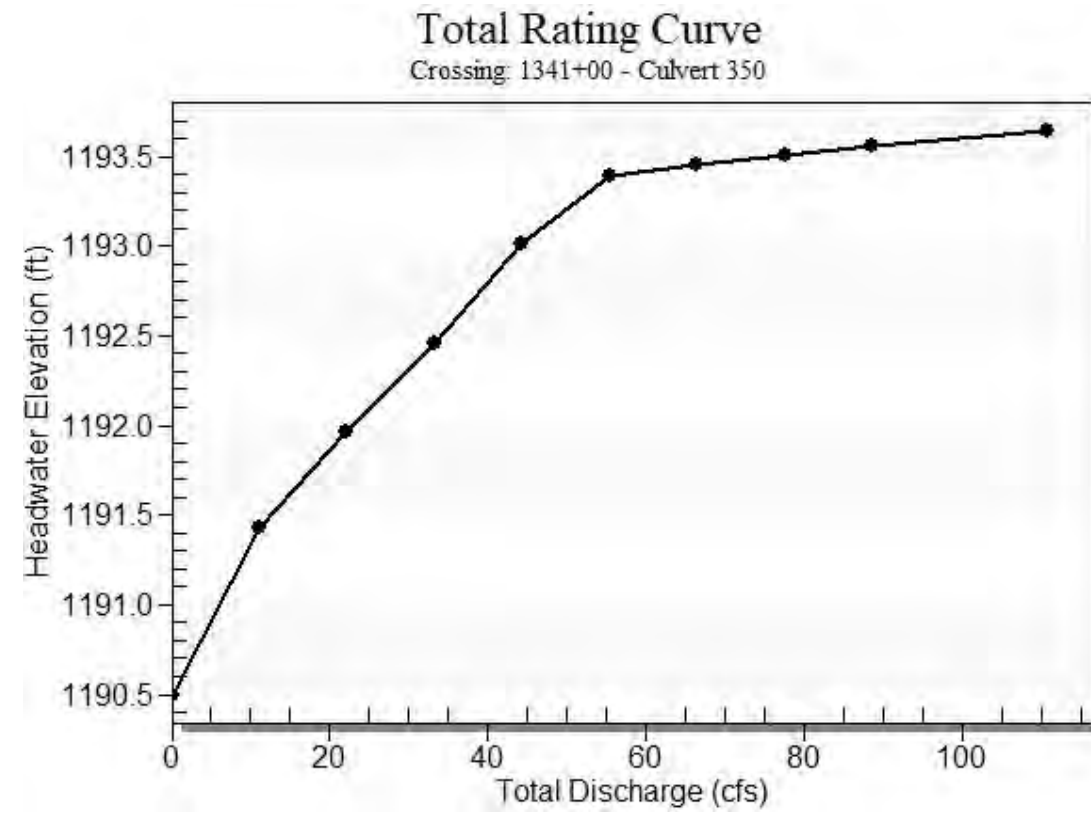
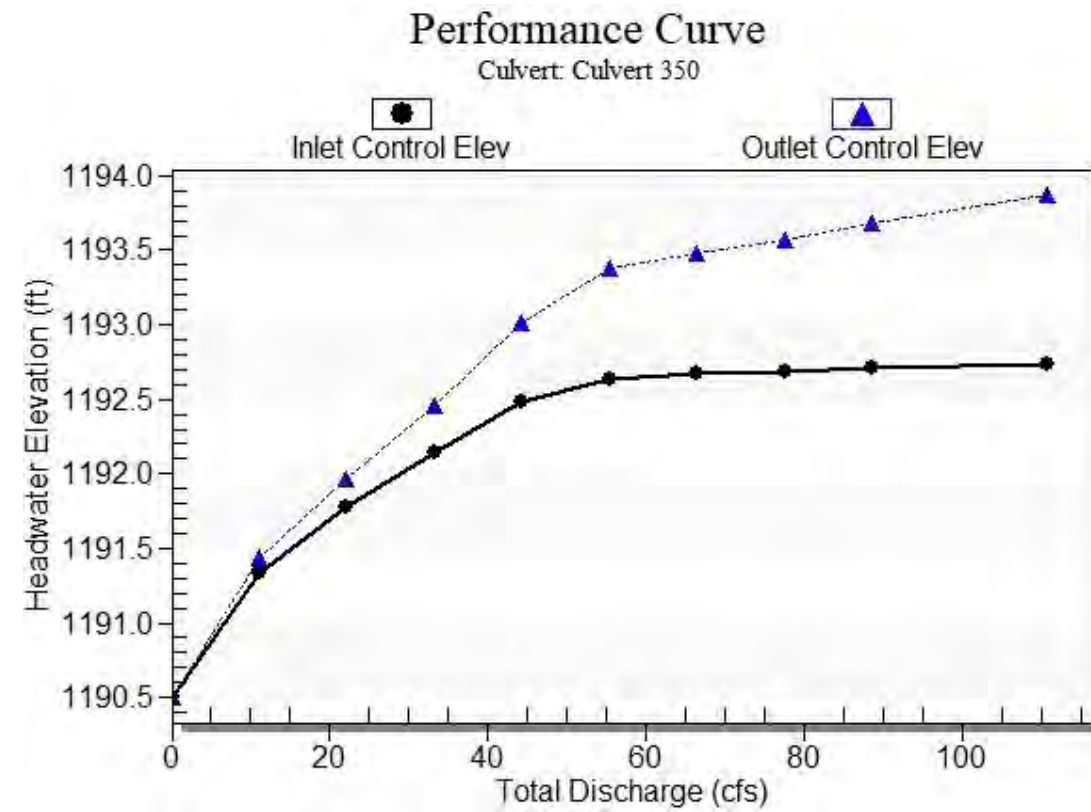


Table 2 - Culvert Summary Table: Culvert 350

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1190.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1191.43	0.830	0.931	3-M2t	0.790	0.500	0.523	0.523	3.510	1.201
22.14	22.14	1191.96	1.272	1.463	3-M2t	1.284	0.750	0.776	0.776	4.463	1.511
33.21	33.21	1192.45	1.642	1.955	3-M2t	2.217	0.958	0.973	0.973	5.247	1.718
44.28	44.28	1193.01	1.987	2.509	3-M2t	2.217	1.128	1.140	1.140	5.945	1.877
55.35	48.98	1193.39	2.138	2.877	7-M2t	2.217	1.196	1.286	1.286	5.836	2.008
66.42	49.92	1193.46	2.169	2.976	7-M2t	2.217	1.209	1.418	1.418	5.424	2.120
77.49	50.57	1193.51	2.190	3.066	7-M2t	2.217	1.218	1.539	1.539	5.105	2.218
88.56	51.14	1193.56	2.210	3.180	7-M2t	2.217	1.226	1.651	1.651	4.863	2.306
88.60	51.14	1193.56	2.210	3.180	7-M2t	2.217	1.226	1.652	1.652	4.863	2.306
110.70	51.86	1193.65	2.234	3.374	7-M2t	2.217	1.236	1.855	1.855	4.512	2.458

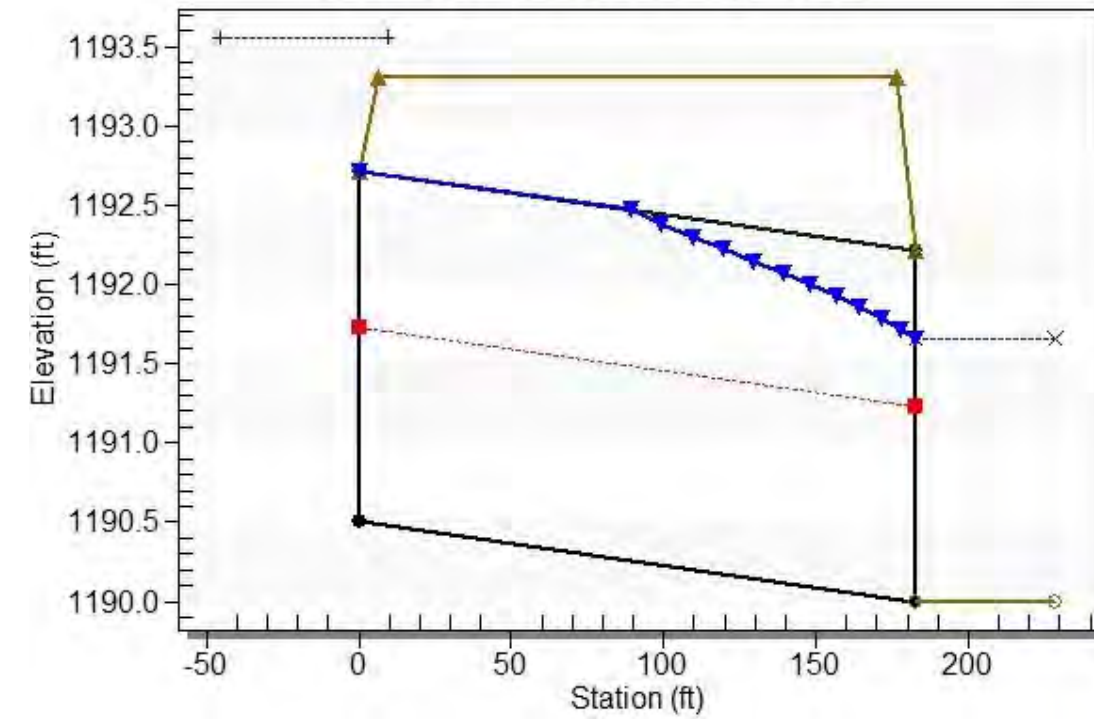
 Straight Culvert
 Inlet Elevation (invert): 1190.50 ft, Outlet Elevation (invert): 1190.00 ft
 Culvert Length: 183.00 ft, Culvert Slope: 0.0027

Culvert Performance Curve Plot: Culvert 350



Water Surface Profile Plot for Culvert: Culvert 350

Crossing - 1341+00 - Culvert 350, Design Discharge - 88.6 cfs
Culvert - Culvert 350, Culvert Discharge - 51.1 cfs



Site Data - Culvert 350

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1190.50 ft
 Outlet Station: 183.00 ft
 Outlet Elevation: 1190.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 350

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 355

Table 3 - Downstream Channel Rating Curve (Crossing: 1341+00 - Culvert 350)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1190.00	0.00	0.00	0.00	0.00
11.07	1190.52	0.52	1.20	0.10	0.31
22.14	1190.78	0.78	1.51	0.15	0.33
33.21	1190.97	0.97	1.72	0.18	0.34
44.28	1191.14	1.14	1.88	0.21	0.35
55.35	1191.29	1.29	2.01	0.24	0.36
66.42	1191.42	1.42	2.12	0.27	0.36
77.49	1191.54	1.54	2.22	0.29	0.36
88.56	1191.65	1.65	2.31	0.31	0.37
88.60	1191.65	1.65	2.31	0.31	0.37
110.70	1191.86	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1341+00 - Culvert 350

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1190.00 ft

Roadway Data for Crossing: 1341+00 - Culvert 350

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1193.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1347+00 - Culvert 355

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 355 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1191.10	0.00	0.00	0.00	1
1192.11	11.07	11.07	0.00	1
1192.65	22.14	22.14	0.00	1
1193.16	33.21	33.21	0.00	1
1193.81	44.28	44.28	0.00	1
1193.91	55.35	45.52	9.72	7
1193.98	66.42	46.41	19.92	5
1194.03	77.49	47.06	30.29	4
1194.08	88.56	47.64	40.85	4
1194.08	88.60	47.64	40.89	2
1194.16	110.70	48.39	62.04	3
1193.81	44.32	44.32	0.00	Overtopping

Rating Curve Plot for Crossing: 1347+00 - Culvert 355

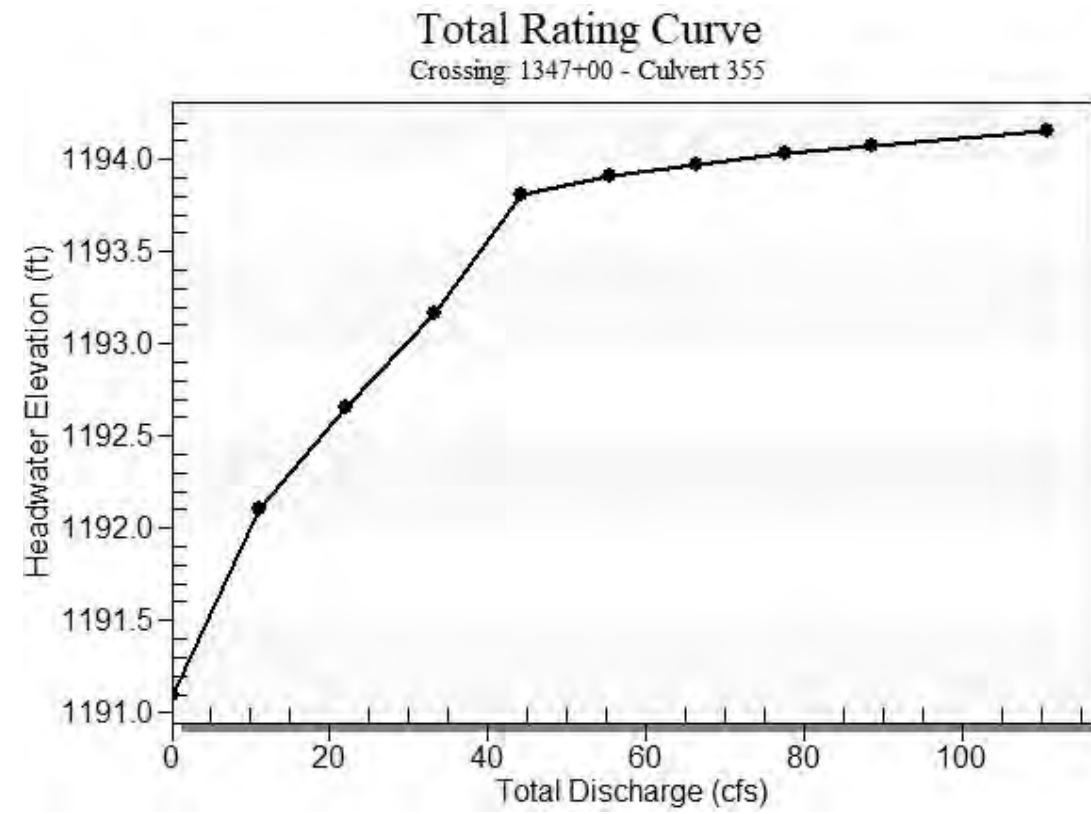
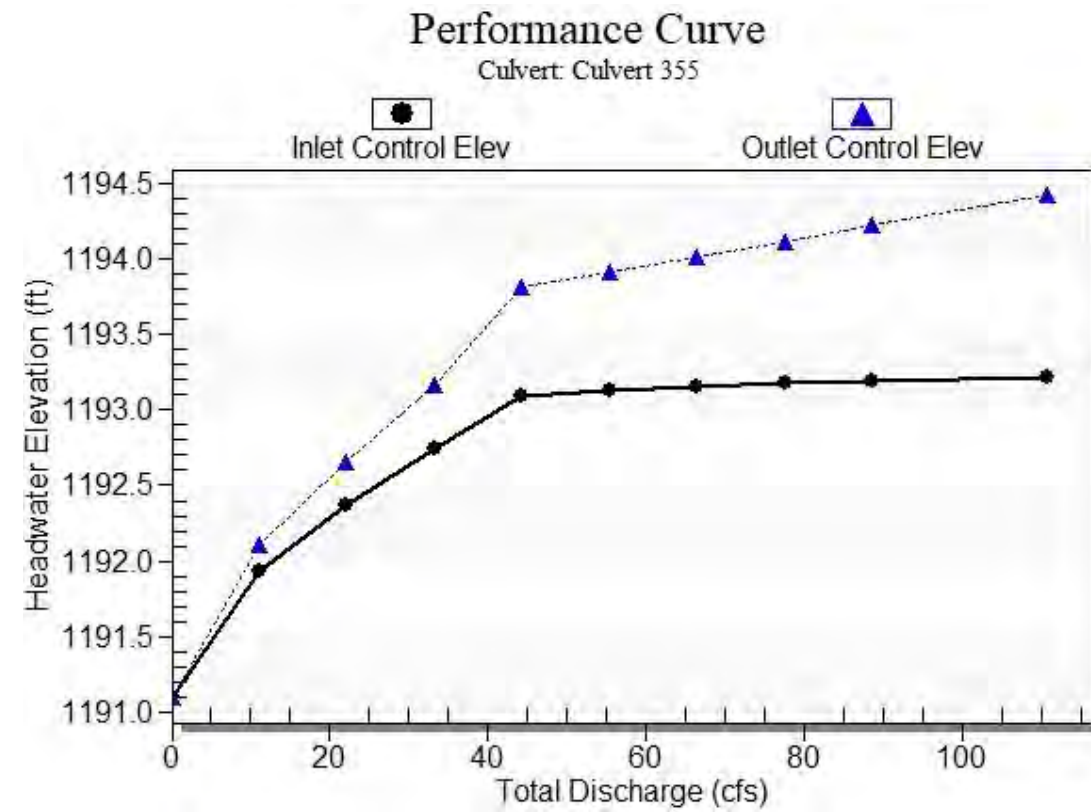


Table 2 - Culvert Summary Table: Culvert 355

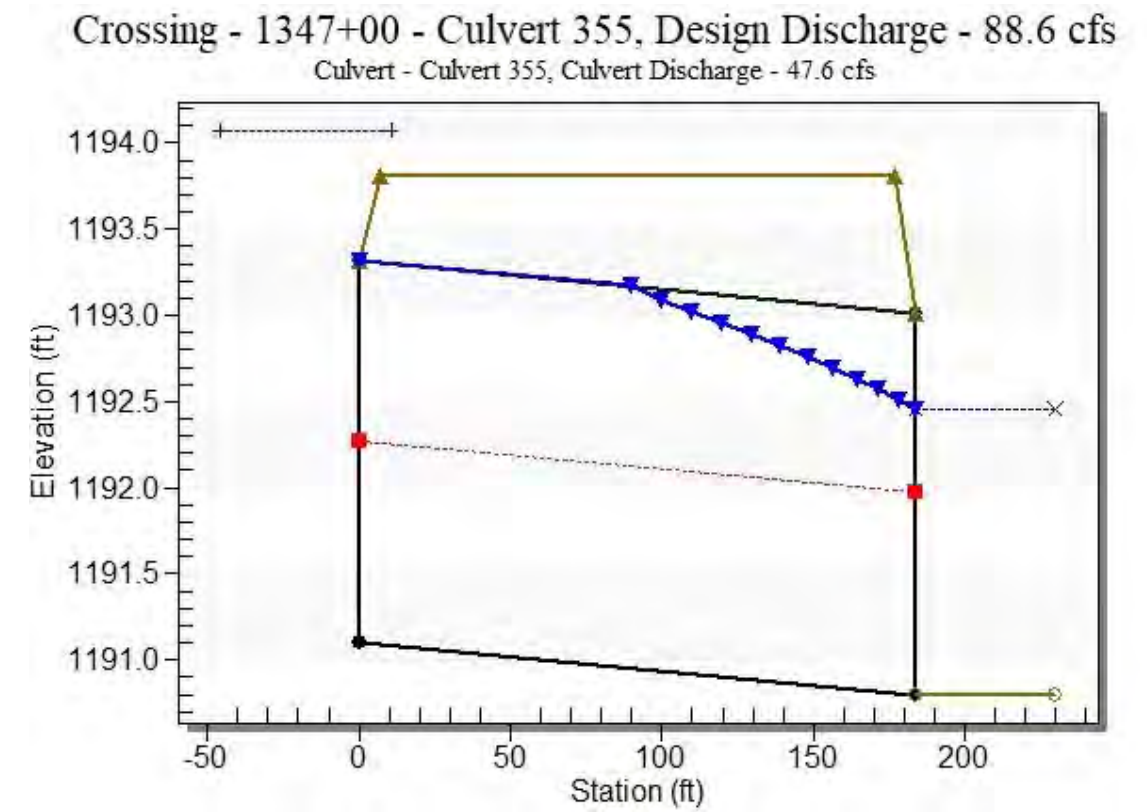
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1191.10	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1192.11	0.830	1.006	3-M2t	0.935	0.500	0.523	0.523	3.510	1.201
22.14	22.14	1192.65	1.273	1.553	3-M2t	1.631	0.750	0.776	0.776	4.463	1.511
33.21	33.21	1193.16	1.643	2.065	3-M2t	2.217	0.958	0.973	0.973	5.247	1.718
44.28	44.28	1193.81	1.988	2.707	7-M2t	2.217	1.128	1.140	1.140	5.945	1.877
55.35	45.52	1193.91	2.027	2.813	7-M2t	2.217	1.145	1.286	1.286	5.424	2.008
66.42	46.41	1193.98	2.056	2.910	7-M2t	2.217	1.157	1.418	1.418	5.042	2.120
77.49	47.06	1194.03	2.077	3.004	7-M2t	2.217	1.166	1.539	1.539	4.751	2.218
88.56	47.64	1194.08	2.096	3.122	7-M2t	2.217	1.174	1.651	1.651	4.531	2.306
88.60	47.64	1194.08	2.096	3.122	7-M2t	2.217	1.174	1.652	1.652	4.530	2.306
110.70	48.39	1194.16	2.120	3.322	7-M2t	2.217	1.184	1.855	1.855	4.210	2.458

 Straight Culvert
 Inlet Elevation (invert): 1191.10 ft, Outlet Elevation (invert): 1190.80 ft
 Culvert Length: 184.00 ft, Culvert Slope: 0.0016

Culvert Performance Curve Plot: Culvert 355



Water Surface Profile Plot for Culvert: Culvert 355



Site Data - Culvert 355

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1191.10 ft
 Outlet Station: 184.00 ft
 Outlet Elevation: 1190.80 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 355

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 360

Table 3 - Downstream Channel Rating Curve (Crossing: 1347+00 - Culvert 355)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1190.80	0.00	0.00	0.00	0.00
11.07	1191.32	0.52	1.20	0.10	0.31
22.14	1191.58	0.78	1.51	0.15	0.33
33.21	1191.77	0.97	1.72	0.18	0.34
44.28	1191.94	1.14	1.88	0.21	0.35
55.35	1192.09	1.29	2.01	0.24	0.36
66.42	1192.22	1.42	2.12	0.27	0.36
77.49	1192.34	1.54	2.22	0.29	0.36
88.56	1192.45	1.65	2.31	0.31	0.37
88.60	1192.45	1.65	2.31	0.31	0.37
110.70	1192.66	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1347+00 - Culvert 355

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1190.80 ft

Roadway Data for Crossing: 1347+00 - Culvert 355

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1193.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1353+00 - Culvert 360

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 360 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1191.10	0.00	0.00	0.00	1
1192.11	11.07	11.07	0.00	1
1192.66	22.14	22.14	0.00	1
1193.18	33.21	33.21	0.00	1
1193.86	44.28	44.28	0.00	1
1194.37	55.35	50.42	4.74	16
1194.45	66.42	51.22	14.99	5
1194.50	77.49	51.86	25.41	4
1194.56	88.56	52.20	36.26	4
1194.56	88.60	52.21	36.29	2
1194.64	110.70	53.26	57.14	3
1194.31	49.65	49.65	0.00	Overtopping

Rating Curve Plot for Crossing: 1353+00 - Culvert 360

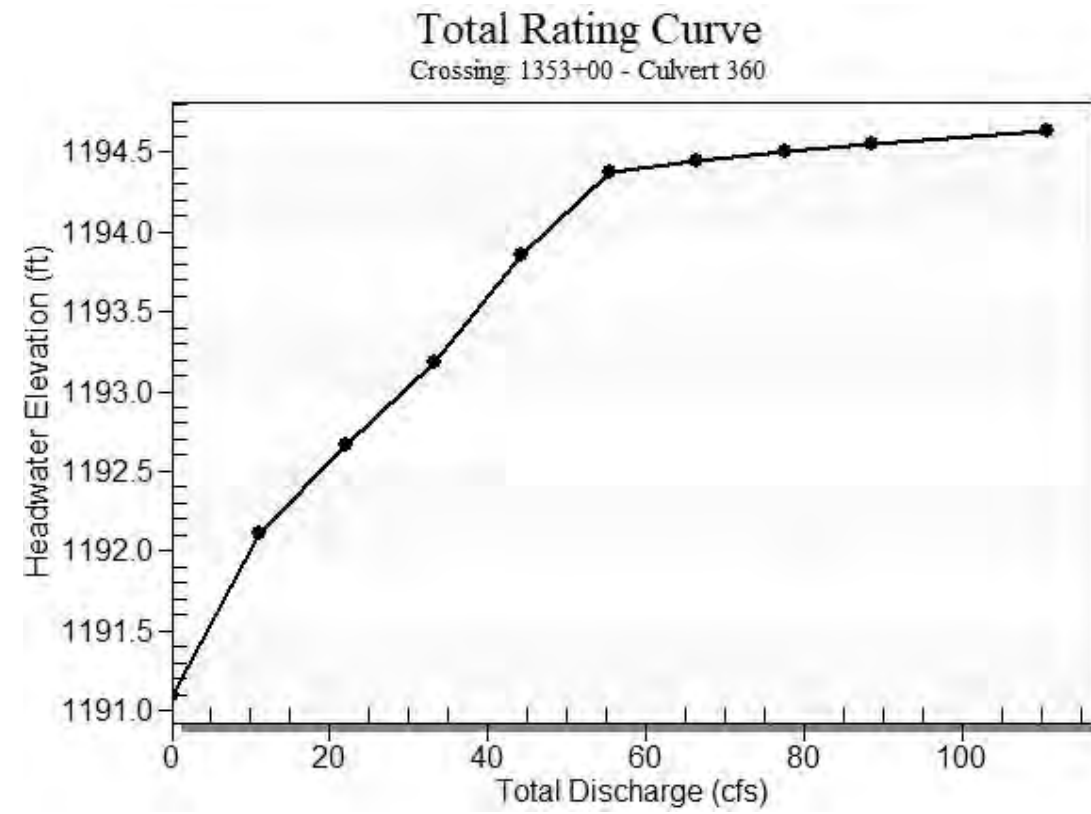
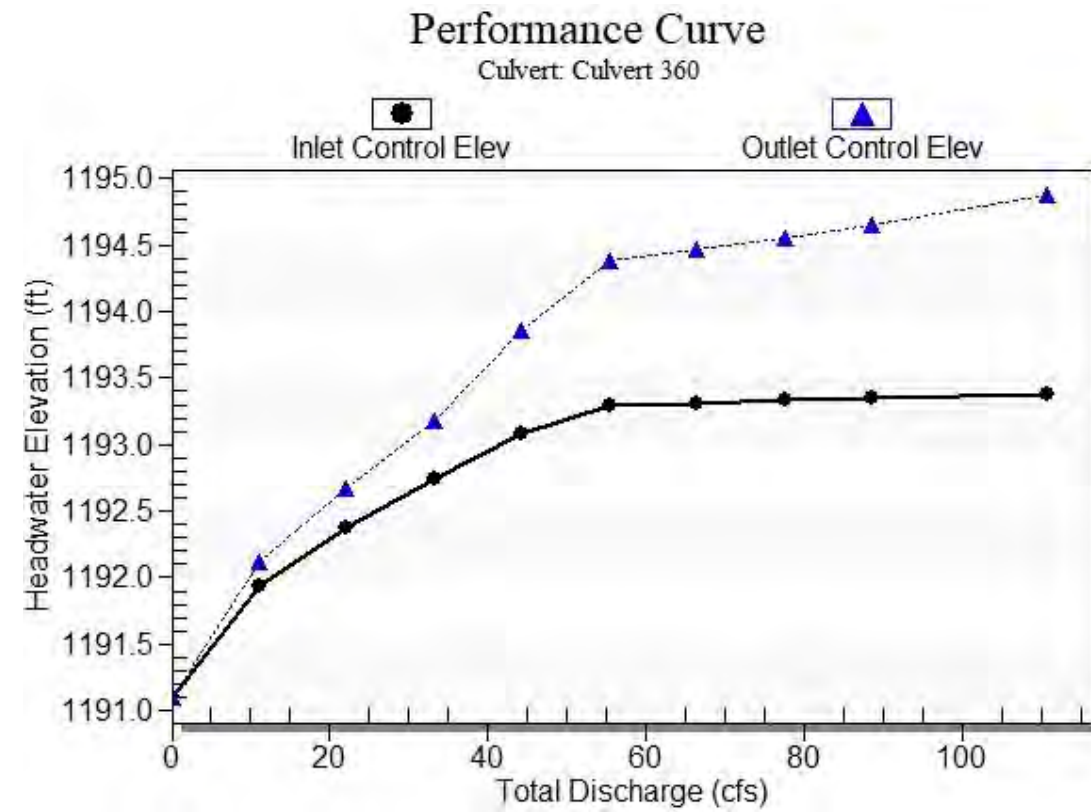


Table 2 - Culvert Summary Table: Culvert 360

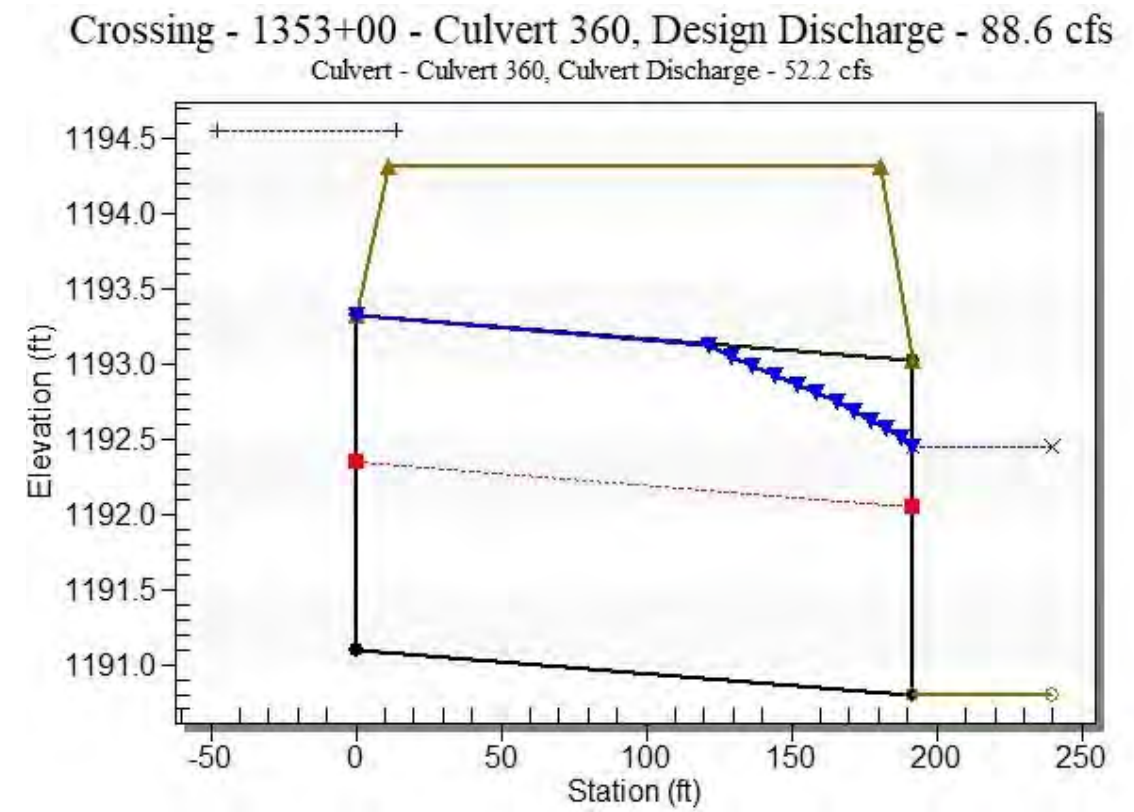
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1191.10	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1192.11	0.830	1.013	3-M2t	0.948	0.500	0.523	0.523	3.510	1.201
22.14	22.14	1192.66	1.273	1.565	3-M2t	1.673	0.750	0.776	0.776	4.463	1.511
33.21	33.21	1193.18	1.643	2.084	3-M2t	2.217	0.958	0.973	0.973	5.247	1.718
44.28	44.28	1193.86	1.988	2.755	7-M2t	2.217	1.128	1.140	1.140	5.945	1.877
55.35	50.42	1194.37	2.187	3.276	7-M2t	2.217	1.216	1.286	1.286	6.007	2.008
66.42	51.22	1194.45	2.214	3.367	7-M2t	2.217	1.227	1.418	1.418	5.566	2.120
77.49	51.86	1194.50	2.235	3.459	7-M2t	2.217	1.236	1.539	1.539	5.235	2.218
88.56	52.20	1194.56	2.247	3.556	7-M2t	2.217	1.241	1.651	1.651	4.964	2.306
88.60	52.21	1194.56	2.247	3.557	7-M2t	2.217	1.241	1.652	1.652	4.964	2.306
110.70	53.26	1194.64	2.283	3.779	7-M2t	2.217	1.255	1.855	1.855	4.633	2.458

 Straight Culvert
 Inlet Elevation (invert): 1191.10 ft, Outlet Elevation (invert): 1190.80 ft
 Culvert Length: 192.00 ft, Culvert Slope: 0.0016

Culvert Performance Curve Plot: Culvert 360



Water Surface Profile Plot for Culvert: Culvert 360



Site Data - Culvert 360

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1191.10 ft
 Outlet Station: 192.00 ft
 Outlet Elevation: 1190.80 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 360

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 365

Table 3 - Downstream Channel Rating Curve (Crossing: 1353+00 - Culvert 360)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1190.80	0.00	0.00	0.00	0.00
11.07	1191.32	0.52	1.20	0.10	0.31
22.14	1191.58	0.78	1.51	0.15	0.33
33.21	1191.77	0.97	1.72	0.18	0.34
44.28	1191.94	1.14	1.88	0.21	0.35
55.35	1192.09	1.29	2.01	0.24	0.36
66.42	1192.22	1.42	2.12	0.27	0.36
77.49	1192.34	1.54	2.22	0.29	0.36
88.56	1192.45	1.65	2.31	0.31	0.37
88.60	1192.45	1.65	2.31	0.31	0.37
110.70	1192.66	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1353+00 - Culvert 360

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1190.80 ft

Roadway Data for Crossing: 1353+00 - Culvert 360

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1194.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 88.6 cfs

Maximum Flow: 110.7 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1359+00 - Culvert 365

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 365 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1191.10	0.00	0.00	0.00	1
1192.13	11.07	11.07	0.00	1
1192.68	22.14	22.14	0.00	1
1193.21	33.21	33.21	0.00	1
1193.92	44.28	44.28	0.00	1
1194.94	55.35	55.35	0.00	1
1195.39	66.42	59.50	6.79	14
1195.46	77.49	60.22	17.13	5
1195.52	88.56	60.79	27.59	4
1195.52	88.60	60.79	27.62	2
1195.61	110.70	61.70	48.92	4
1195.31	58.95	58.95	0.00	Overtopping

Rating Curve Plot for Crossing: 1359+00 - Culvert 365

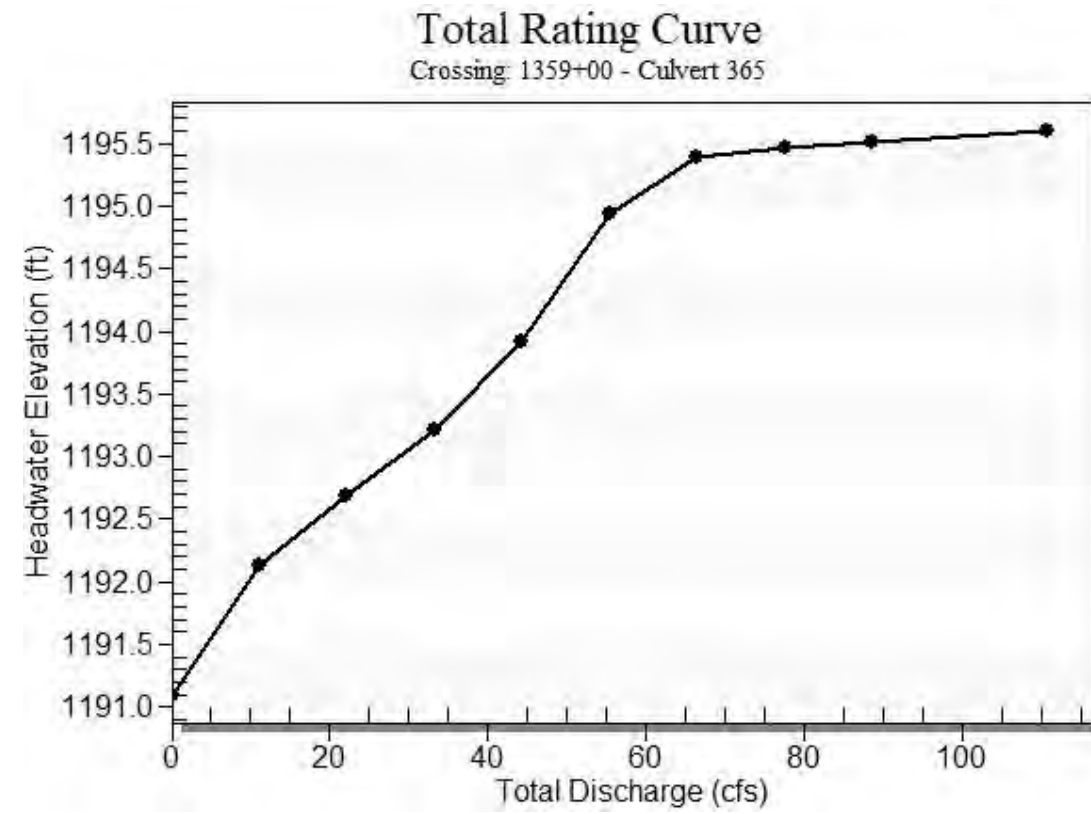
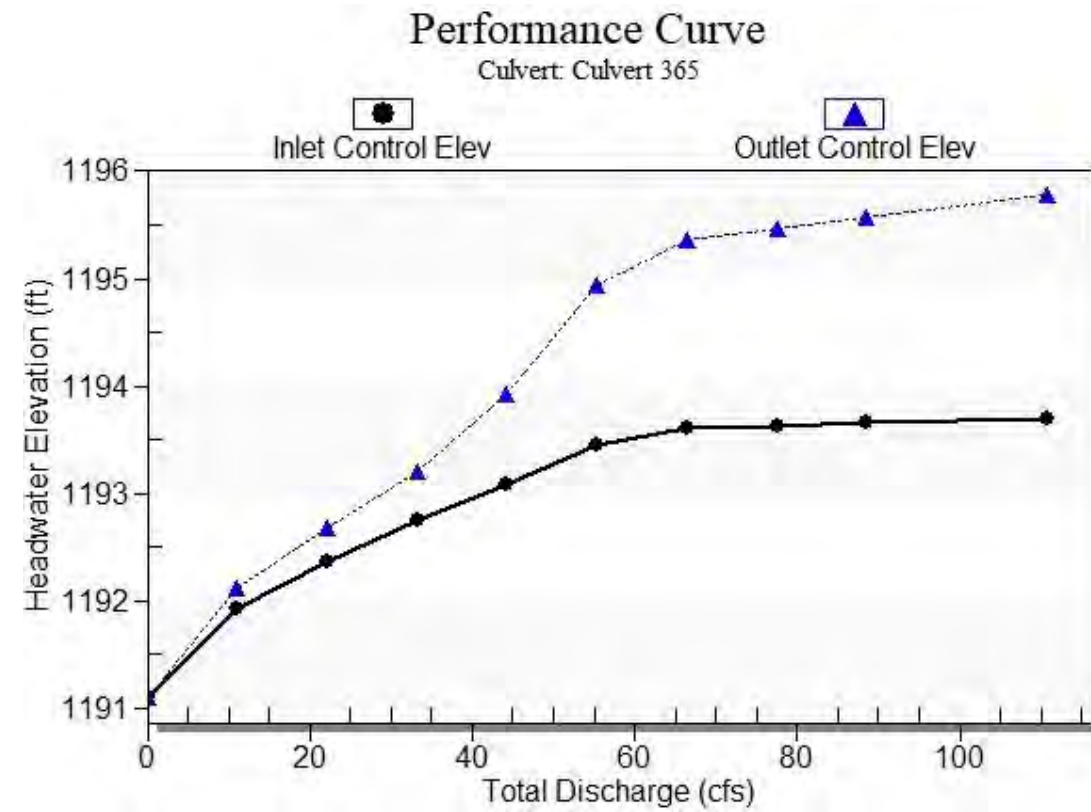


Table 2 - Culvert Summary Table: Culvert 365

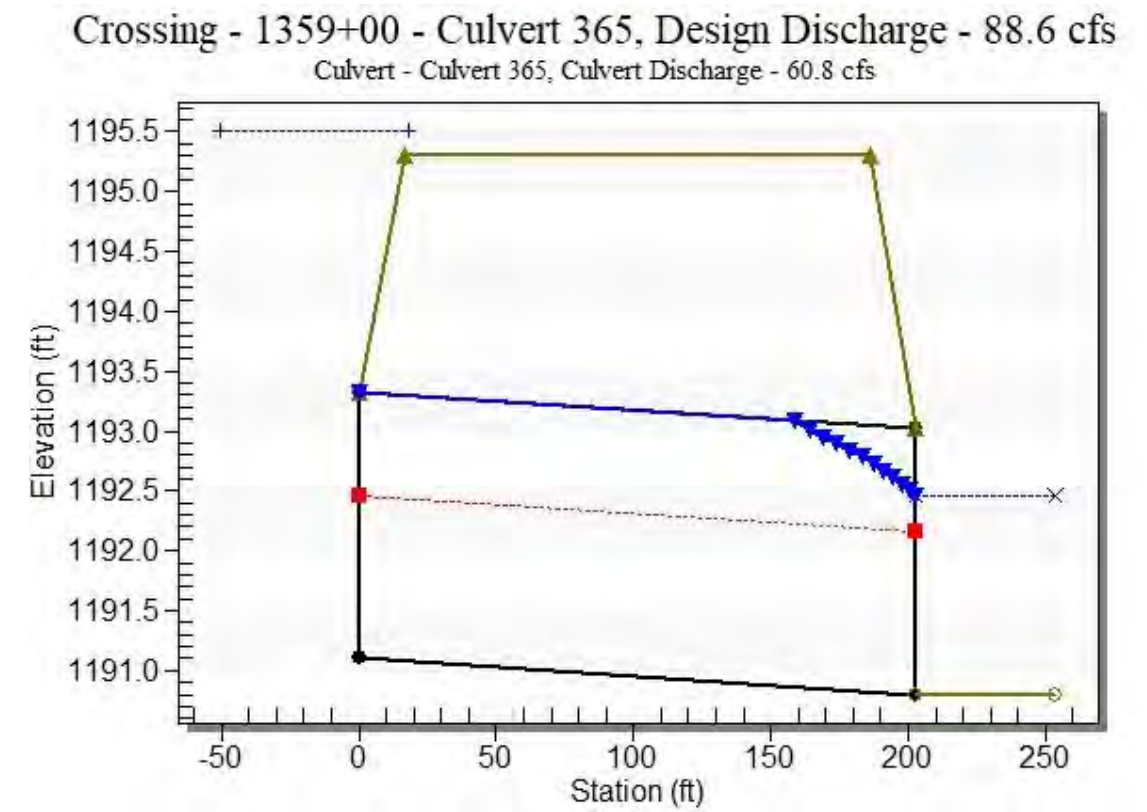
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1191.10	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.07	11.07	1192.13	0.831	1.025	3-M2t	0.967	0.500	0.523	0.523	3.510	1.201
22.14	22.14	1192.68	1.273	1.581	3-M2t	2.217	0.750	0.776	0.776	4.463	1.511
33.21	33.21	1193.21	1.643	2.111	3-M2t	2.217	0.958	0.973	0.973	5.247	1.718
44.28	44.28	1193.92	1.988	2.822	7-M2t	2.217	1.128	1.140	1.140	5.945	1.877
55.35	55.35	1194.94	2.356	3.837	7-M2c	2.217	1.287	1.287	1.286	6.589	2.008
66.42	59.50	1195.39	2.506	4.272	7-M2t	2.217	1.343	1.418	1.418	6.465	2.120
77.49	60.22	1195.46	2.533	4.369	7-M2t	2.217	1.352	1.539	1.539	6.079	2.218
88.56	60.79	1195.52	2.555	4.483	7-M2t	2.217	1.359	1.651	1.651	5.781	2.306
88.60	60.79	1195.52	2.555	4.483	7-M2t	2.217	1.359	1.652	1.652	5.780	2.306
110.70	61.70	1195.61	2.590	4.688	7-M2t	2.217	1.371	1.855	1.855	5.368	2.458

 Straight Culvert
 Inlet Elevation (invert): 1191.10 ft, Outlet Elevation (invert): 1190.80 ft
 Culvert Length: 203.00 ft, Culvert Slope: 0.0015

Culvert Performance Curve Plot: Culvert 365



Water Surface Profile Plot for Culvert: Culvert 365



Site Data - Culvert 365

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1191.10 ft
 Outlet Station: 203.00 ft
 Outlet Elevation: 1190.80 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 365

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 370

Table 3 - Downstream Channel Rating Curve (Crossing: 1359+00 - Culvert 365)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1190.80	0.00	0.00	0.00	0.00
11.07	1191.32	0.52	1.20	0.10	0.31
22.14	1191.58	0.78	1.51	0.15	0.33
33.21	1191.77	0.97	1.72	0.18	0.34
44.28	1191.94	1.14	1.88	0.21	0.35
55.35	1192.09	1.29	2.01	0.24	0.36
66.42	1192.22	1.42	2.12	0.27	0.36
77.49	1192.34	1.54	2.22	0.29	0.36
88.56	1192.45	1.65	2.31	0.31	0.37
88.60	1192.45	1.65	2.31	0.31	0.37
110.70	1192.66	1.86	2.46	0.35	0.37

Tailwater Channel Data - 1359+00 - Culvert 365

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1190.80 ft

Roadway Data for Crossing: 1359+00 - Culvert 365

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1195.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1371+00 - Culvert 370

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 370 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1189.50	0.00	0.00	0.00	1
1190.13	7.99	7.99	0.00	1
1190.44	15.98	15.98	0.00	1
1190.69	23.97	23.97	0.00	1
1190.92	31.96	31.96	0.00	1
1191.14	39.94	39.94	0.00	1
1191.34	47.93	47.93	0.00	1
1191.54	55.92	55.92	0.00	1
1191.73	63.91	63.91	0.00	1
1191.74	64.11	64.11	0.00	1
1192.13	79.89	79.89	0.00	1
1193.31	119.90	119.90	0.00	Overtopping

Rating Curve Plot for Crossing: 1371+00 - Culvert 370

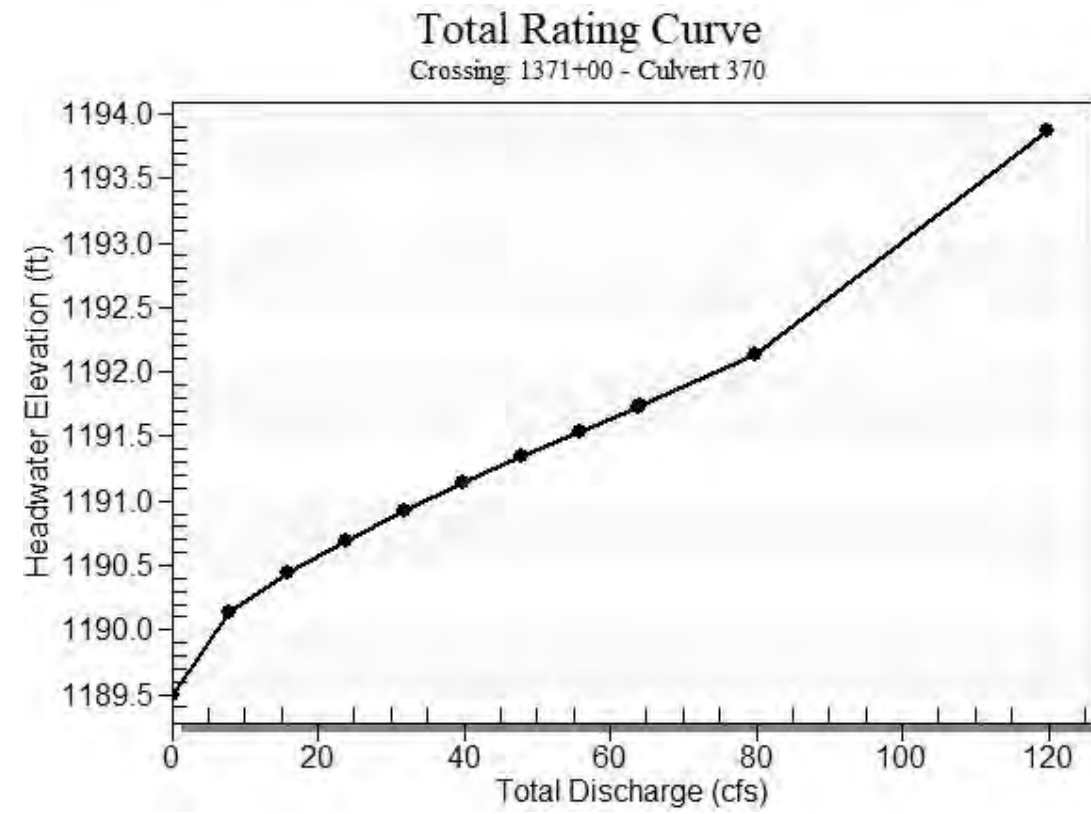
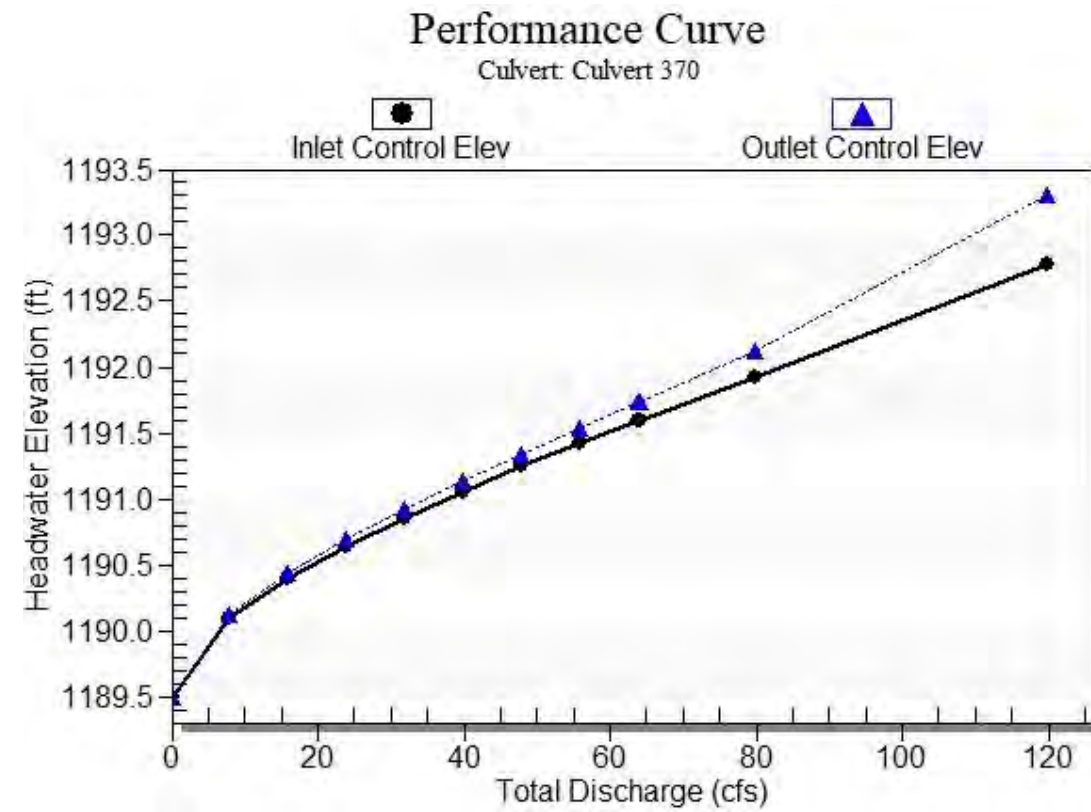


Table 2 - Culvert Summary Table: Culvert 370

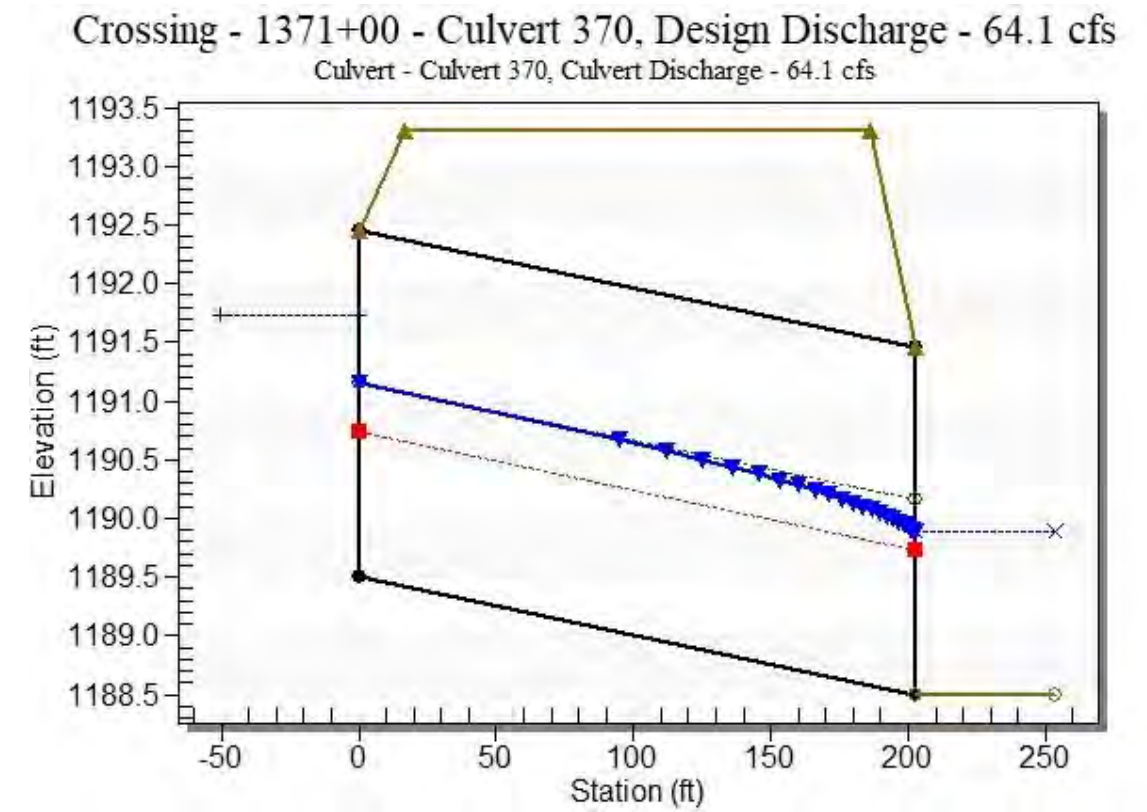
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1189.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1190.13	0.606	0.633	3-M2t	0.476	0.378	0.434	0.434	2.600	1.073
15.98	15.98	1190.44	0.897	0.939	3-M2t	0.687	0.553	0.645	0.645	3.151	1.358
23.97	23.97	1190.69	1.139	1.194	3-M2t	0.864	0.691	0.812	0.812	3.597	1.550
31.96	31.96	1190.92	1.356	1.423	3-M2t	1.027	0.814	0.953	0.953	3.986	1.697
39.94	39.94	1191.14	1.558	1.636	3-M2t	1.183	0.927	1.077	1.077	4.341	1.819
47.93	47.93	1191.34	1.749	1.839	3-M2t	1.337	1.037	1.190	1.190	4.671	1.923
55.92	55.92	1191.54	1.928	2.036	3-M2t	1.490	1.134	1.293	1.293	4.983	2.014
63.91	63.91	1191.73	2.097	2.230	3-M2t	1.648	1.227	1.389	1.389	5.282	2.096
64.11	64.11	1191.74	2.101	2.235	3-M2t	1.652	1.229	1.392	1.392	5.289	2.098
79.89	79.89	1192.13	2.421	2.626	3-M2t	1.993	1.401	1.564	1.564	5.847	2.238

 Straight Culvert
 Inlet Elevation (invert): 1189.50 ft, Outlet Elevation (invert): 1188.50 ft
 Culvert Length: 203.00 ft, Culvert Slope: 0.0049

Culvert Performance Curve Plot: Culvert 370



Water Surface Profile Plot for Culvert: Culvert 370



Site Data - Culvert 370

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1189.50 ft
 Outlet Station: 203.00 ft
 Outlet Elevation: 1188.50 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 370

Barrel Shape: Pipe Arch
 Barrel Span: 57.80 in
 Barrel Rise: 35.50 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 375

Table 3 - Downstream Channel Rating Curve (Crossing: 1371+00 - Culvert 370)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1188.50	0.00	0.00	0.00	0.00
7.99	1188.93	0.43	1.07	0.08	0.30
15.98	1189.15	0.65	1.36	0.12	0.32
23.97	1189.31	0.81	1.55	0.15	0.33
31.96	1189.45	0.95	1.70	0.18	0.34
39.94	1189.58	1.08	1.82	0.20	0.35
47.93	1189.69	1.19	1.92	0.22	0.35
55.92	1189.79	1.29	2.01	0.24	0.36
63.91	1189.89	1.39	2.10	0.26	0.36
64.11	1189.89	1.39	2.10	0.26	0.36
79.89	1190.06	1.56	2.24	0.29	0.37

Tailwater Channel Data - 1371+00 - Culvert 370

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1188.50 ft

Roadway Data for Crossing: 1371+00 - Culvert 370

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1193.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1378+00 - Culvert 375

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 375 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1188.00	0.00	0.00	0.00	1
1188.67	7.99	7.99	0.00	1
1189.00	15.98	15.98	0.00	1
1189.29	23.97	23.97	0.00	1
1189.53	31.96	31.96	0.00	1
1189.77	39.94	39.94	0.00	1
1189.99	47.93	47.93	0.00	1
1190.21	55.92	55.92	0.00	1
1190.42	63.91	63.91	0.00	1
1190.43	64.11	64.11	0.00	1
1190.86	79.89	79.89	0.00	1
1192.31	117.05	117.05	0.00	Overtopping

Rating Curve Plot for Crossing: 1378+00 - Culvert 375

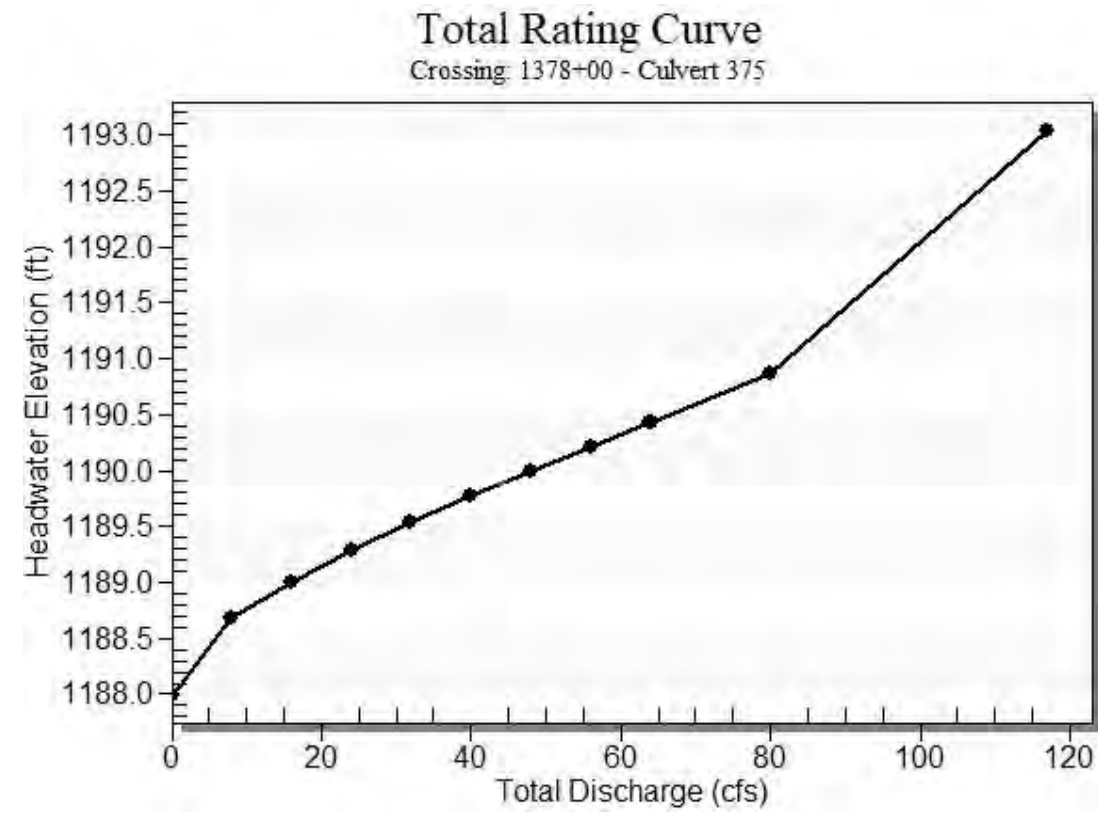
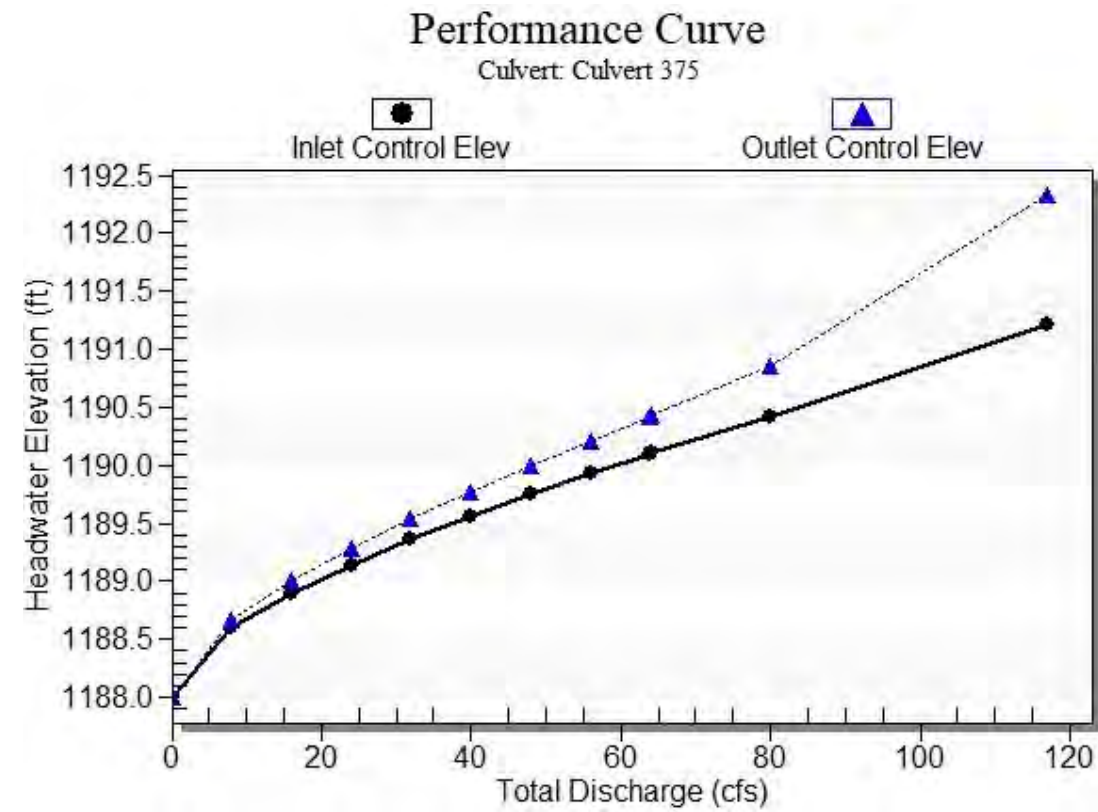


Table 2 - Culvert Summary Table: Culvert 375

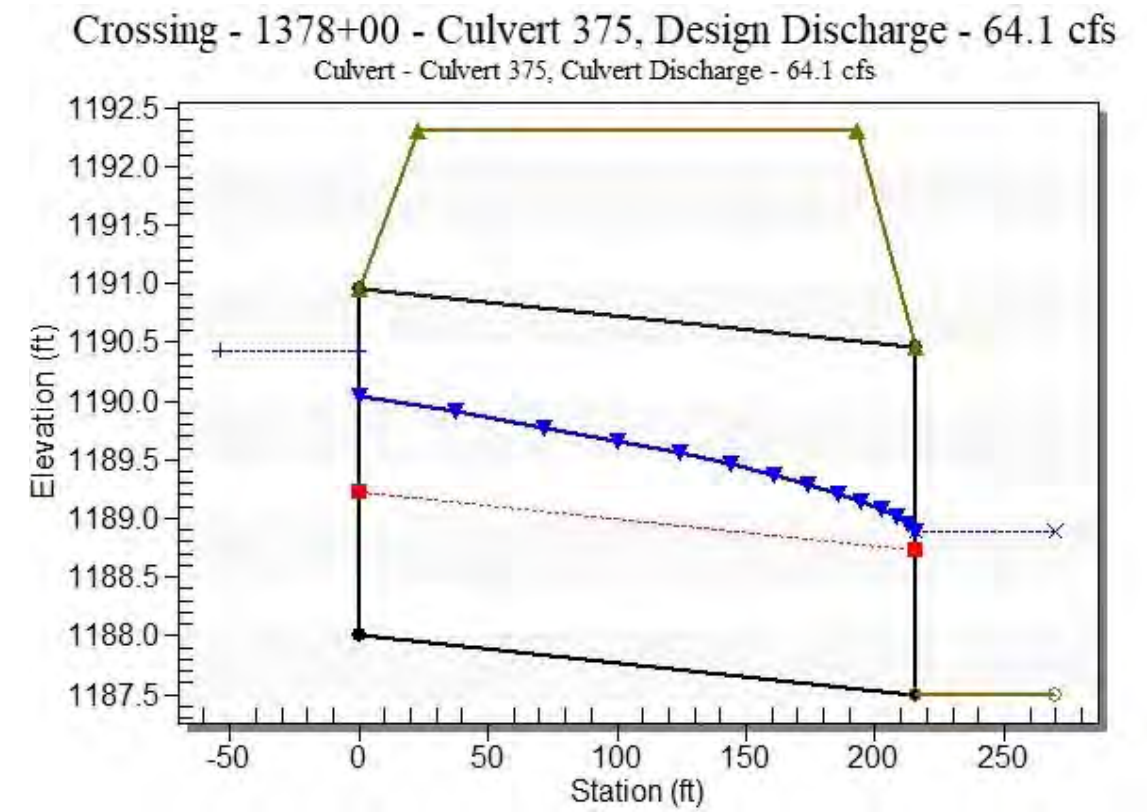
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1188.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1188.67	0.607	0.675	3-M2t	0.579	0.378	0.434	0.434	2.600	1.073
15.98	15.98	1189.00	0.899	1.002	3-M2t	0.850	0.553	0.645	0.645	3.151	1.358
23.97	23.97	1189.29	1.142	1.286	3-M2t	1.086	0.691	0.812	0.812	3.597	1.550
31.96	31.96	1189.53	1.359	1.534	3-M2t	1.311	0.814	0.953	0.953	3.986	1.697
39.94	39.94	1189.77	1.562	1.767	3-M2t	1.536	0.927	1.077	1.077	4.341	1.819
47.93	47.93	1189.99	1.753	1.991	3-M2t	1.771	1.037	1.190	1.190	4.671	1.923
55.92	55.92	1190.21	1.932	2.209	3-M2t	2.034	1.134	1.293	1.293	4.983	2.014
63.91	63.91	1190.42	2.101	2.424	3-M2t	2.958	1.227	1.389	1.389	5.282	2.096
64.11	64.11	1190.43	2.105	2.430	3-M2t	2.958	1.229	1.392	1.392	5.289	2.098
79.89	79.89	1190.86	2.425	2.861	3-M2t	2.958	1.401	1.564	1.564	5.847	2.238

 Straight Culvert
 Inlet Elevation (invert): 1188.00 ft, Outlet Elevation (invert): 1187.50 ft
 Culvert Length: 216.00 ft, Culvert Slope: 0.0023

Culvert Performance Curve Plot: Culvert 375



Water Surface Profile Plot for Culvert: Culvert 375



Site Data - Culvert 375

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1188.00 ft
 Outlet Station: 216.00 ft
 Outlet Elevation: 1187.50 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 375

Barrel Shape: Pipe Arch
 Barrel Span: 57.80 in
 Barrel Rise: 35.50 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 380

Table 3 - Downstream Channel Rating Curve (Crossing: 1378+00 - Culvert 375)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1187.50	0.00	0.00	0.00	0.00
7.99	1187.93	0.43	1.07	0.08	0.30
15.98	1188.15	0.65	1.36	0.12	0.32
23.97	1188.31	0.81	1.55	0.15	0.33
31.96	1188.45	0.95	1.70	0.18	0.34
39.94	1188.58	1.08	1.82	0.20	0.35
47.93	1188.69	1.19	1.92	0.22	0.35
55.92	1188.79	1.29	2.01	0.24	0.36
63.91	1188.89	1.39	2.10	0.26	0.36
64.11	1188.89	1.39	2.10	0.26	0.36
79.89	1189.06	1.56	2.24	0.29	0.37

Tailwater Channel Data - 1378+00 - Culvert 375

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1187.50 ft

Roadway Data for Crossing: 1378+00 - Culvert 375

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1192.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1383+00 - Culvert 380

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 380 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1185.00	0.00	0.00	0.00	1
1185.26	7.99	7.99	0.00	1
1185.41	15.98	15.98	0.00	1
1185.54	23.97	23.97	0.00	1
1185.66	31.96	31.96	0.00	1
1185.76	39.94	39.94	0.00	1
1185.86	47.93	47.93	0.00	1
1185.95	55.92	55.92	0.00	1
1186.04	63.91	63.91	0.00	1
1186.05	64.11	64.11	0.00	1
1186.21	79.89	79.89	0.00	1
1192.31	1098.00	1098.00	0.00	Overtopping

Rating Curve Plot for Crossing: 1383+00 - Culvert 380

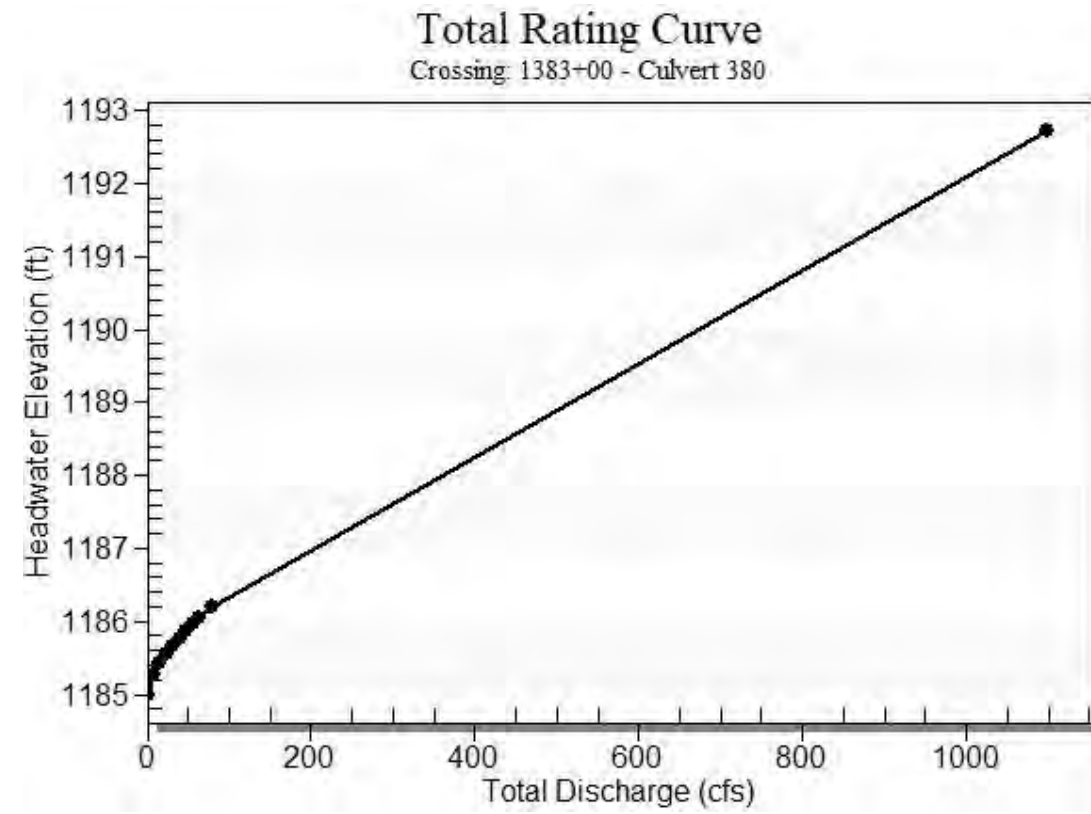


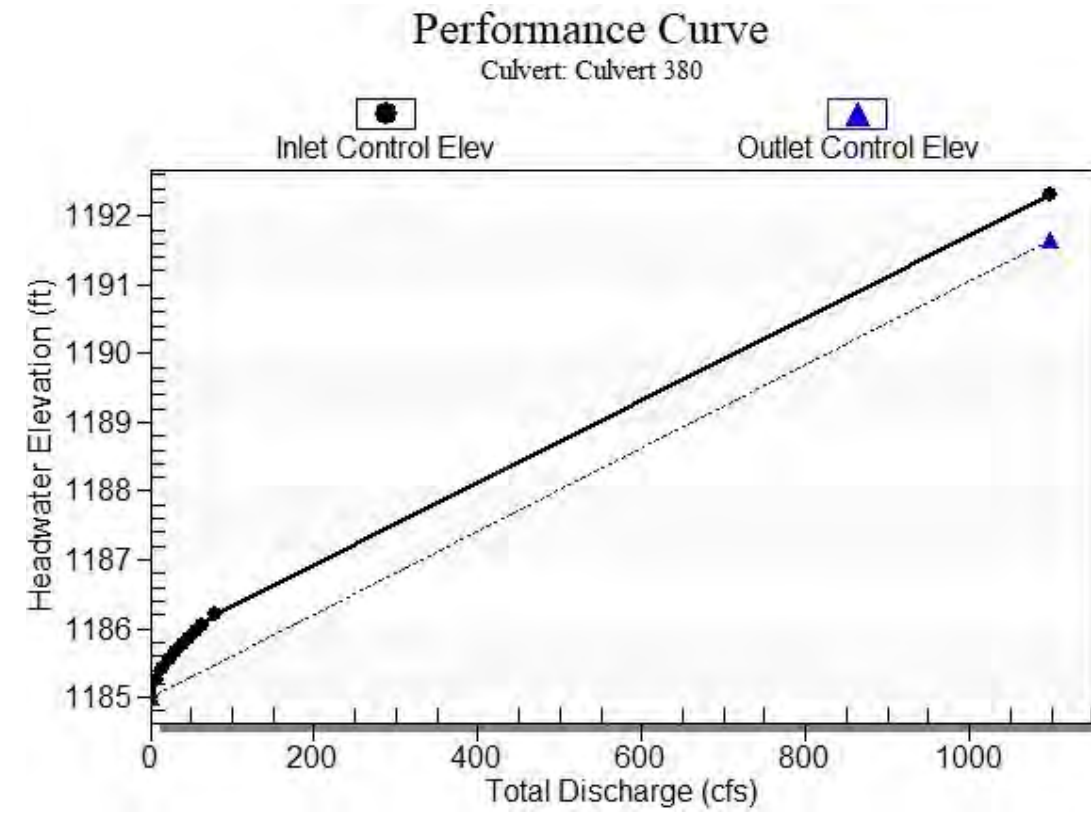
Table 2 - Culvert Summary Table: Culvert 380

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1185.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1185.26	0.261	0.0*	1-S2n	0.157	0.170	0.157	0.142	2.547	1.687
15.98	15.98	1185.41	0.414	0.0*	1-S2n	0.233	0.271	0.233	0.215	3.434	2.212
23.97	23.97	1185.54	0.543	0.0*	1-S2n	0.308	0.355	0.308	0.273	3.887	2.591
31.96	31.96	1185.66	0.657	0.0*	1-S2n	0.364	0.430	0.364	0.325	4.393	2.897
39.94	39.94	1185.76	0.763	0.0*	1-S2n	0.419	0.498	0.419	0.371	4.764	3.157
47.93	47.93	1185.86	0.861	0.0*	1-S2n	0.472	0.563	0.472	0.414	5.074	3.385
55.92	55.92	1185.95	0.955	0.0*	1-S2n	0.518	0.624	0.518	0.453	5.398	3.590
63.91	63.91	1186.04	1.043	0.0*	1-S2n	0.564	0.682	0.564	0.491	5.670	3.777
64.11	64.11	1186.05	1.046	0.0*	1-S2n	0.565	0.683	0.565	0.492	5.676	3.782
79.89	79.89	1186.21	1.211	0.0*	1-S2n	0.650	0.791	0.670	0.560	5.965	4.110

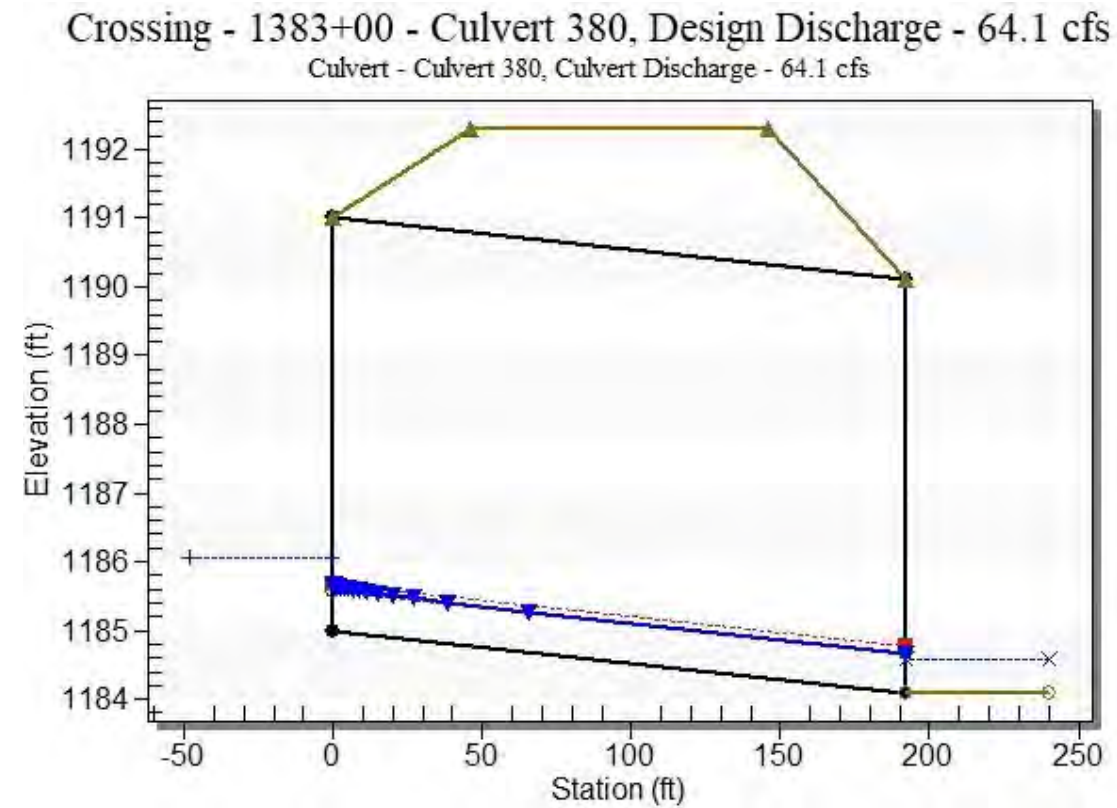
* Full Flow Headwater elevation is below inlet invert.

Straight Culvert
Inlet Elevation (invert): 1185.00 ft, Outlet Elevation (invert): 1184.10 ft
Culvert Length: 192.00 ft, Culvert Slope: 0.0047

Culvert Performance Curve Plot: Culvert 380



Water Surface Profile Plot for Culvert: Culvert 380



Site Data - Culvert 380

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1185.00 ft
 Outlet Station: 192.00 ft
 Outlet Elevation: 1184.10 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 380

Barrel Shape: Concrete Box
 Barrel Span: 10.00 ft
 Barrel Rise: 6.00 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge (30-75° flare) Wingwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1383+00 - Culvert 380)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1184.10	0.00	0.00	0.00	0.00
7.99	1184.24	0.14	1.69	0.03	0.79
15.98	1184.31	0.21	2.21	0.04	0.85
23.97	1184.37	0.27	2.59	0.05	0.88
31.96	1184.42	0.32	2.90	0.06	0.91
39.94	1184.47	0.37	3.16	0.07	0.93
47.93	1184.51	0.41	3.39	0.08	0.94
55.92	1184.55	0.45	3.59	0.08	0.96
63.91	1184.59	0.49	3.78	0.09	0.97
64.11	1184.59	0.49	3.78	0.09	0.97
79.89	1184.66	0.56	4.11	0.10	0.99

Tailwater Channel Data - 1383+00 - Culvert 380

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 33.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1184.10 ft

Roadway Data for Crossing: 1383+00 - Culvert 380

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1192.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 100.00 ft

HY-8 Culvert Analysis Report Structure 385

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1385+52 - Culvert 385

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 385 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1185.00	0.00	0.00	0.00	1
1186.45	7.99	7.99	0.00	1
1187.13	15.98	15.98	0.00	1
1187.75	23.97	23.97	0.00	1
1188.80	31.96	31.96	0.00	1
1190.40	39.94	39.94	0.00	1
1191.84	47.93	46.37	1.37	30
1191.92	55.92	46.68	9.13	6
1191.97	63.91	46.92	16.79	4
1191.97	64.11	46.92	16.93	2
1192.06	79.89	47.26	32.53	4
1191.81	46.22	46.22	0.00	Overtopping

Rating Curve Plot for Crossing: 1385+52 - Culvert 385

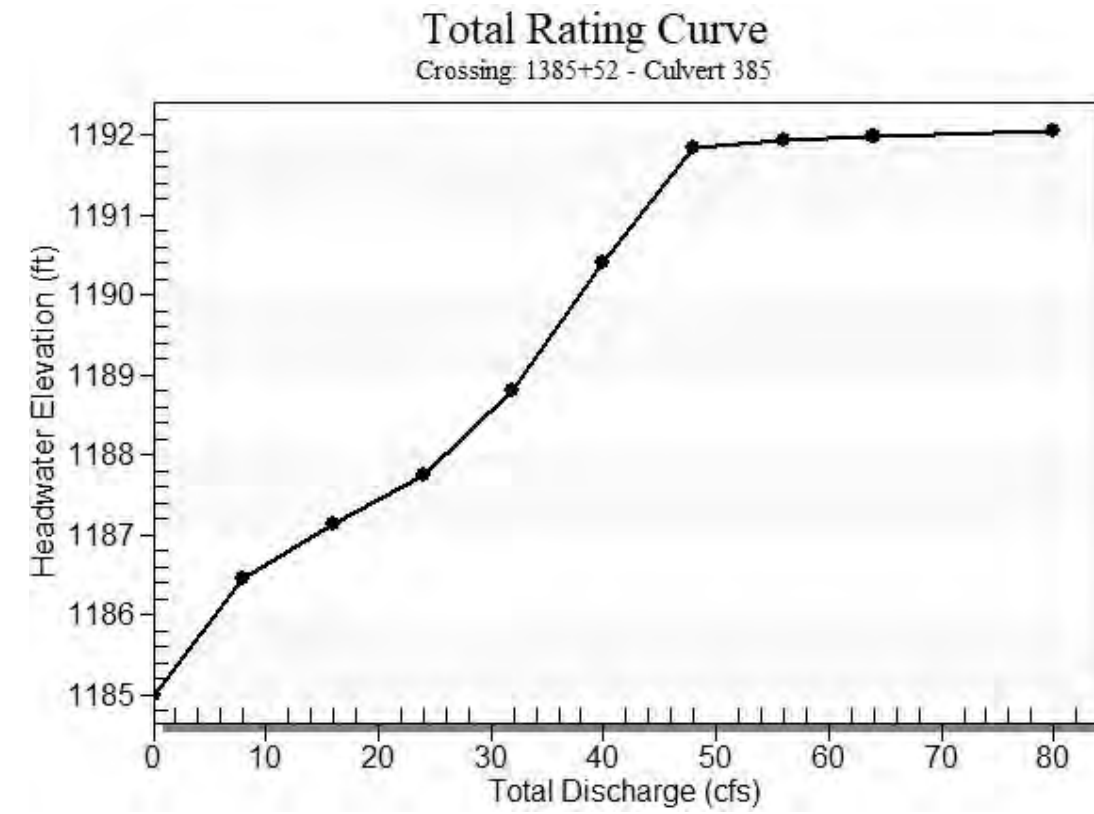
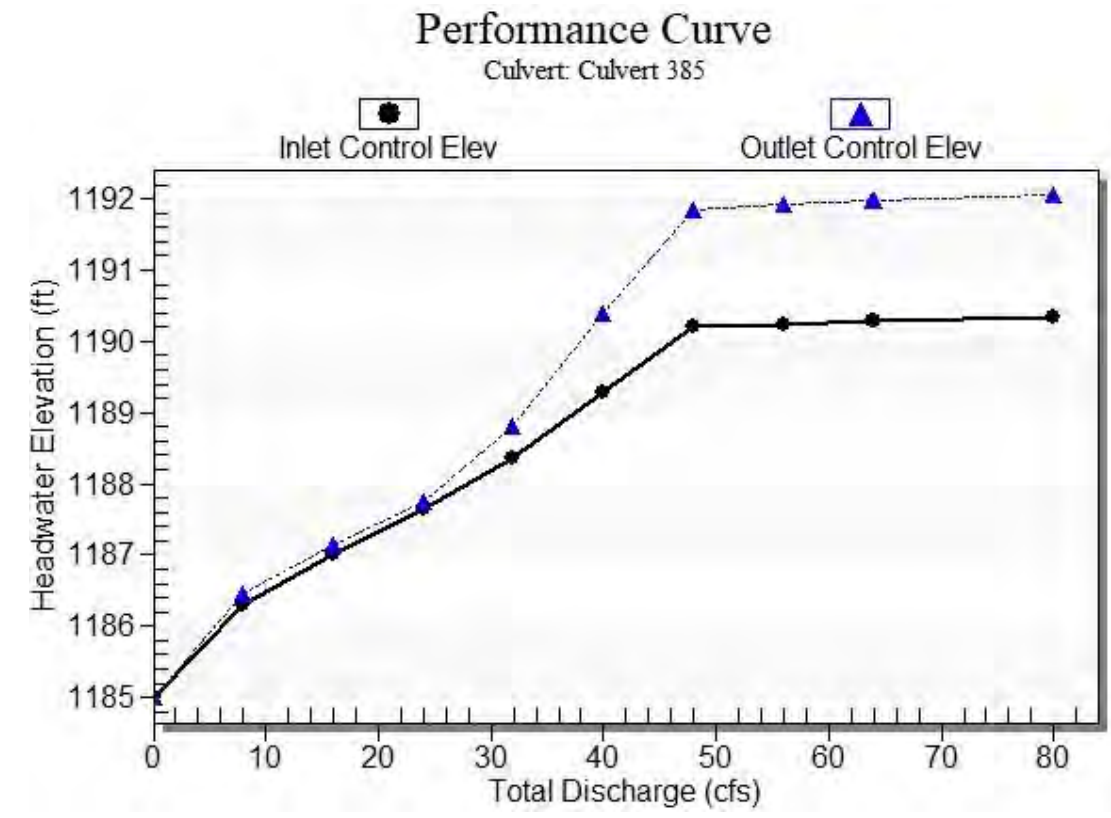


Table 2 - Culvert Summary Table: Culvert 385

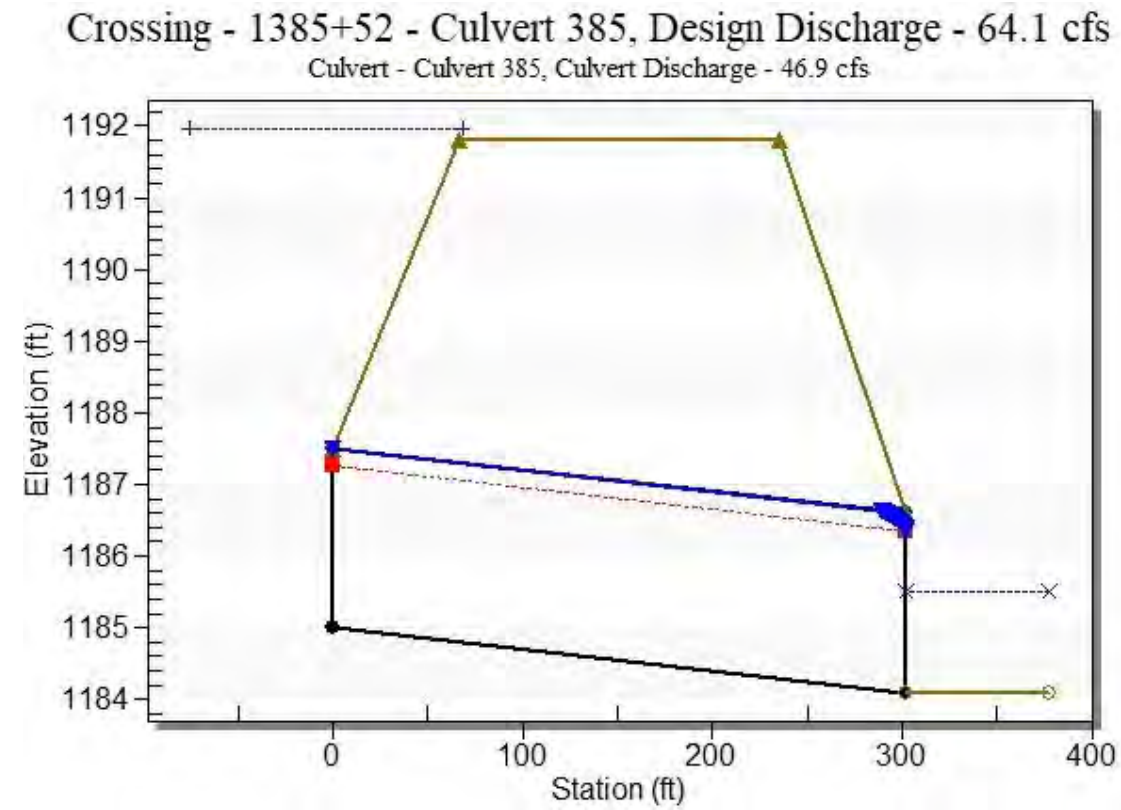
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1185.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1186.45	1.310	1.453	2-M2c	0.961	0.937	0.937	0.434	4.757	1.073
15.98	15.98	1187.13	2.014	2.134	2-M2c	1.441	1.347	1.347	0.645	5.927	1.358
23.97	23.97	1187.75	2.633	2.747	7-M2c	1.967	1.663	1.663	0.812	6.911	1.550
31.96	31.96	1188.80	3.357	3.795	7-M2c	2.500	1.923	1.923	0.953	7.888	1.697
39.94	39.94	1190.40	4.282	5.397	7-M2c	2.500	2.127	2.127	1.077	8.976	1.819
47.93	46.37	1191.84	5.196	6.841	7-M2c	2.500	2.248	2.248	1.190	9.972	1.923
55.92	46.68	1191.92	5.243	6.919	7-M2c	2.500	2.253	2.253	1.293	10.023	2.014
63.91	46.92	1191.97	5.280	6.972	7-M2c	2.500	2.256	2.256	1.389	10.062	2.096
64.11	46.92	1191.97	5.280	6.972	7-M2c	2.500	2.256	2.256	1.392	10.062	2.098
79.89	47.26	1192.06	5.333	7.059	7-M2c	2.500	2.262	2.262	1.564	10.117	2.238

 Straight Culvert
 Inlet Elevation (invert): 1185.00 ft, Outlet Elevation (invert): 1184.10 ft
 Culvert Length: 302.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 385



Water Surface Profile Plot for Culvert: Culvert 385



Site Data - Culvert 385

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1185.00 ft
 Outlet Station: 302.00 ft
 Outlet Elevation: 1184.10 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 385

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1385+52 - Culvert 385)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1184.10	0.00	0.00	0.00	0.00
7.99	1184.53	0.43	1.07	0.08	0.30
15.98	1184.75	0.65	1.36	0.12	0.32
23.97	1184.91	0.81	1.55	0.15	0.33
31.96	1185.05	0.95	1.70	0.18	0.34
39.94	1185.18	1.08	1.82	0.20	0.35
47.93	1185.29	1.19	1.92	0.22	0.35
55.92	1185.39	1.29	2.01	0.24	0.36
63.91	1185.49	1.39	2.10	0.26	0.36
64.11	1185.49	1.39	2.10	0.26	0.36
79.89	1185.66	1.56	2.24	0.29	0.37

Tailwater Channel Data - 1385+52 - Culvert 385

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1184.10 ft

Roadway Data for Crossing: 1385+52 - Culvert 385

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1191.81 ft
 Roadway Surface: Gravel
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report

Structure 390

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1395+00 - Culvert 390

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 390 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1189.30	0.00	0.00	0.00	1
1190.14	7.99	7.99	0.00	1
1190.58	15.98	15.98	0.00	1
1190.96	23.97	23.97	0.00	1
1191.33	31.96	31.96	0.00	1
1191.76	39.94	39.94	0.00	1
1192.33	47.93	47.16	0.59	31
1192.40	55.92	48.01	7.78	6
1192.45	63.91	48.35	15.32	4
1192.45	64.11	48.37	15.46	2
1192.53	79.89	49.40	30.40	4
1192.31	46.97	46.97	0.00	Overtopping

Rating Curve Plot for Crossing: 1395+00 - Culvert 390

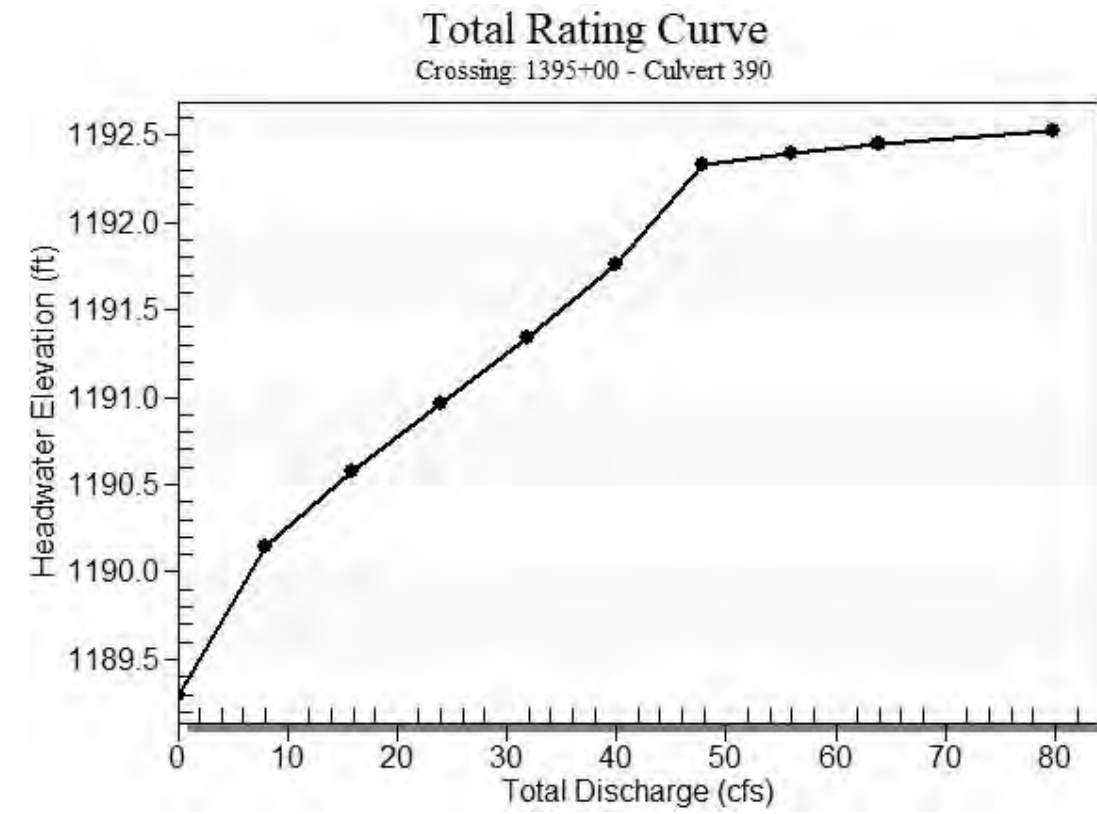
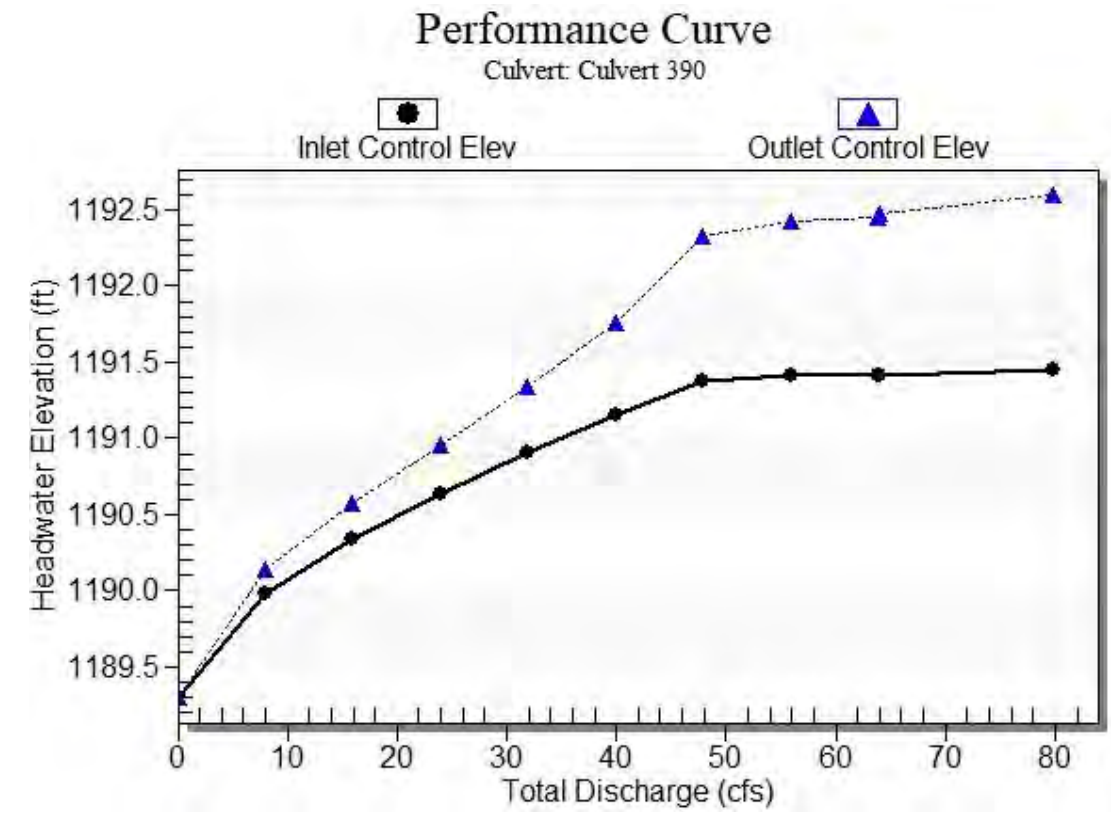


Table 2 - Culvert Summary Table: Culvert 390

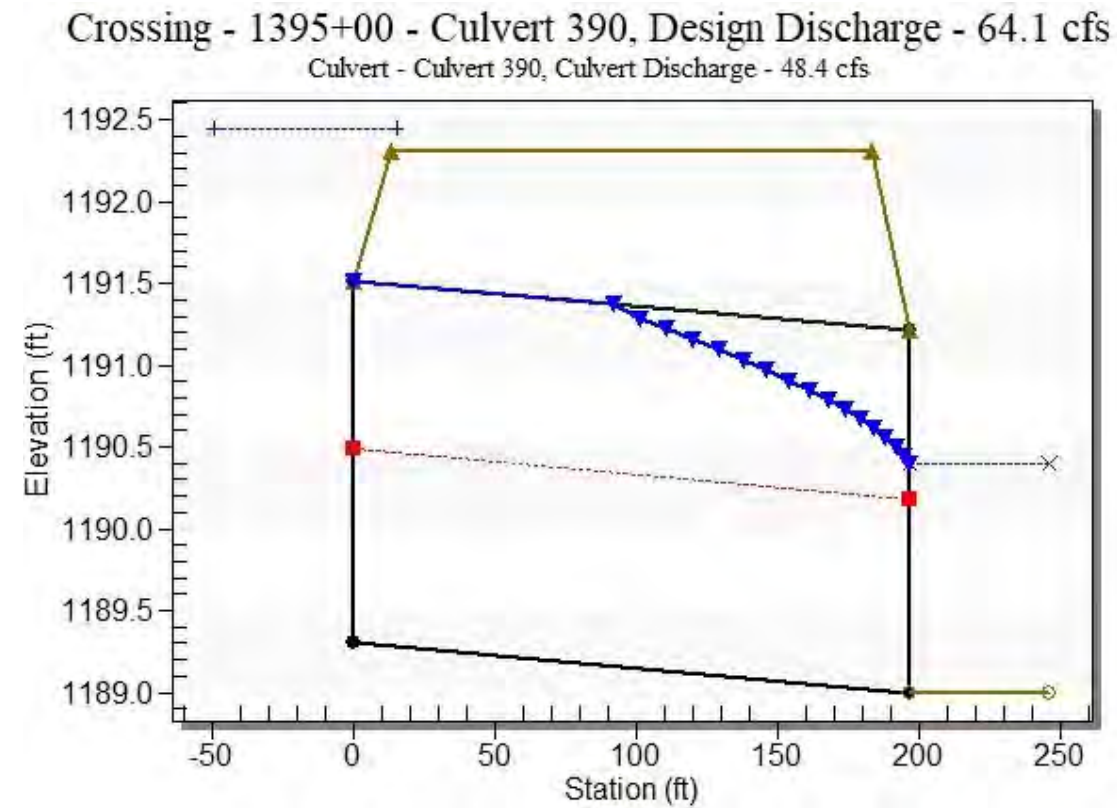
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1189.30	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1190.14	0.686	0.840	3-M2t	0.773	0.414	0.434	0.434	3.182	1.073
15.98	15.98	1190.58	1.038	1.275	3-M2t	1.250	0.611	0.645	0.645	3.961	1.358
23.97	23.97	1190.96	1.339	1.658	3-M2t	2.217	0.788	0.812	0.812	4.601	1.550
31.96	31.96	1191.33	1.604	2.035	3-M2t	2.217	0.936	0.953	0.953	5.163	1.697
39.94	39.94	1191.76	1.853	2.459	3-M2t	2.217	1.065	1.077	1.077	5.679	1.819
47.93	47.16	1192.33	2.080	3.026	7-M2t	2.217	1.168	1.190	1.190	6.065	1.923
55.92	48.01	1192.40	2.107	3.128	7-M2t	2.217	1.179	1.293	1.293	5.690	2.014
63.91	48.35	1192.45	2.119	3.150	7-M2t	2.217	1.183	1.389	1.389	5.354	2.096
64.11	48.37	1192.45	2.119	3.178	7-M2t	2.217	1.184	1.392	1.392	5.348	2.098
79.89	49.40	1192.53	2.153	3.300	7-M2t	2.217	1.202	1.564	1.564	4.917	2.238

 Straight Culvert
 Inlet Elevation (invert): 1189.30 ft, Outlet Elevation (invert): 1189.00 ft
 Culvert Length: 197.00 ft, Culvert Slope: 0.0015

Culvert Performance Curve Plot: Culvert 390



Water Surface Profile Plot for Culvert: Culvert 390



Site Data - Culvert 390

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1189.30 ft
 Outlet Station: 197.00 ft
 Outlet Elevation: 1189.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 390

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1395+00 - Culvert 390)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1189.00	0.00	0.00	0.00	0.00
7.99	1189.43	0.43	1.07	0.08	0.30
15.98	1189.65	0.65	1.36	0.12	0.32
23.97	1189.81	0.81	1.55	0.15	0.33
31.96	1189.95	0.95	1.70	0.18	0.34
39.94	1190.08	1.08	1.82	0.20	0.35
47.93	1190.19	1.19	1.92	0.22	0.35
55.92	1190.29	1.29	2.01	0.24	0.36
63.91	1190.39	1.39	2.10	0.26	0.36
64.11	1190.39	1.39	2.10	0.26	0.36
79.89	1190.56	1.56	2.24	0.29	0.37

Tailwater Channel Data - 1395+00 - Culvert 390

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1189.00 ft

Roadway Data for Crossing: 1395+00 - Culvert 390

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1192.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report Structure 395

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1404+47 - Culvert 395

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 395 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1188.00	0.00	0.00	0.00	1
1188.78	7.99	7.99	0.00	1
1189.12	15.98	15.98	0.00	1
1189.38	23.97	23.97	0.00	1
1189.61	31.96	31.96	0.00	1
1189.81	39.94	39.94	0.00	1
1190.00	47.93	47.93	0.00	1
1190.20	55.92	55.92	0.00	1
1190.40	63.91	63.91	0.00	1
1190.40	64.11	64.11	0.00	1
1190.75	79.89	79.89	0.00	1
1193.31	198.71	198.71	0.00	Overtopping

Rating Curve Plot for Crossing: 1404+47 - Culvert 395

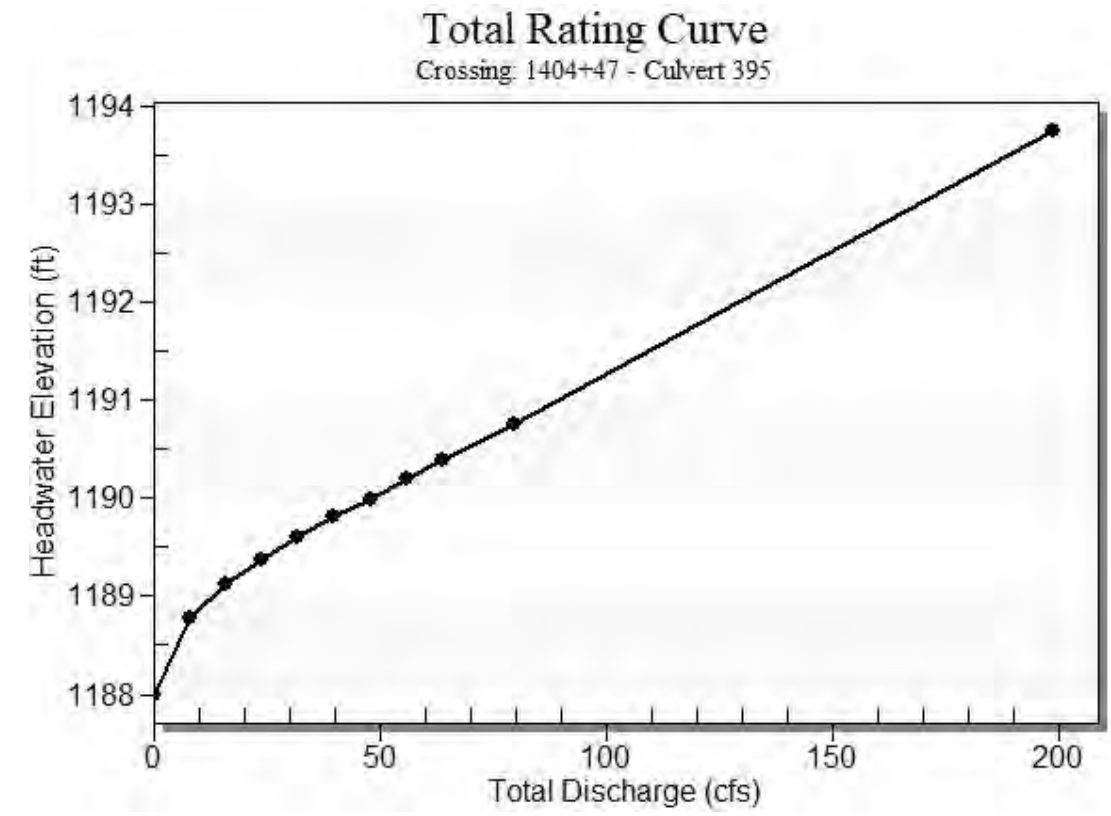


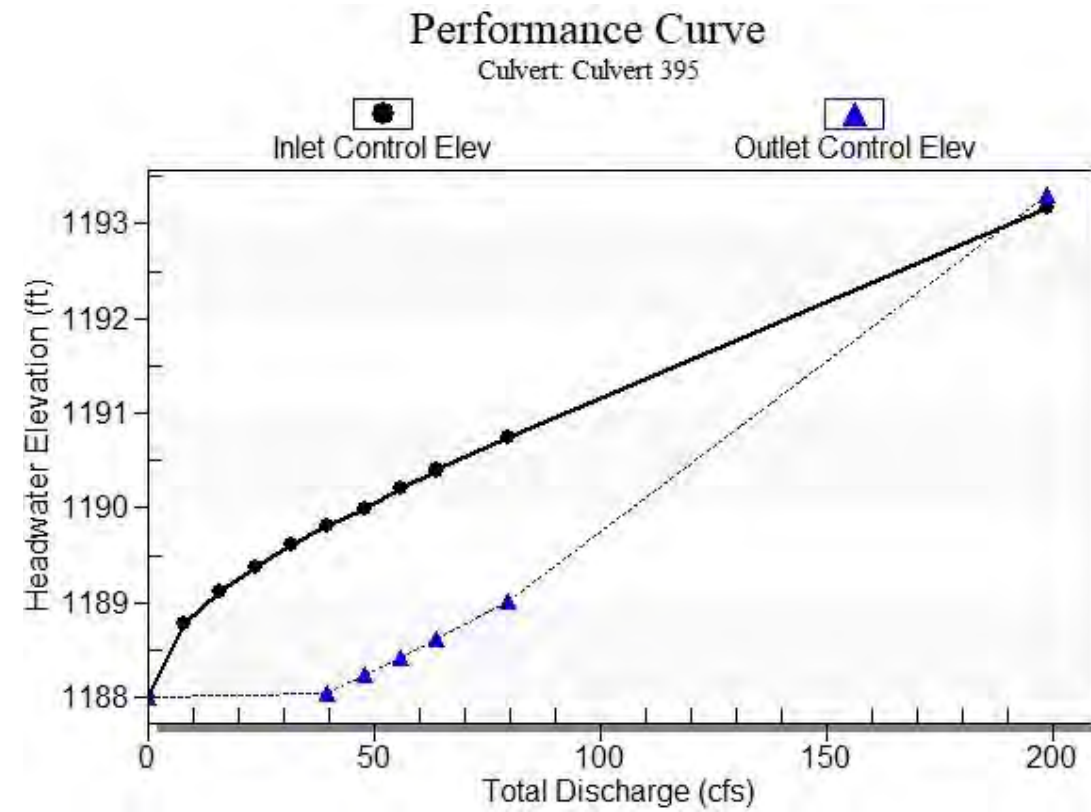
Table 2 - Culvert Summary Table: Culvert 395

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1188.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1188.78	0.781	0.0*	1-S2n	0.570	0.573	0.570	0.434	3.494	1.073
15.98	15.98	1189.12	1.118	0.0*	1-S2n	0.803	0.819	0.803	0.645	4.278	1.358
23.97	23.97	1189.38	1.381	0.0*	1-S2n	0.983	1.007	0.983	0.812	4.813	1.550
31.96	31.96	1189.61	1.608	0.0*	1-S2n	1.139	1.169	1.139	0.953	5.225	1.697
39.94	39.94	1189.81	1.810	0.045	1-S2n	1.279	1.311	1.279	1.077	5.570	1.819
47.93	47.93	1190.00	1.997	0.237	1-S2n	1.409	1.443	1.409	1.190	5.852	1.923
55.92	55.92	1190.20	2.203	0.426	1-S2n	1.531	1.562	1.531	1.293	6.102	2.014
63.91	63.91	1190.40	2.396	0.619	1-S2n	1.648	1.675	1.648	1.389	6.325	2.096
64.11	64.11	1190.40	2.401	0.624	1-S2n	1.651	1.677	1.651	1.392	6.330	2.098
79.89	79.89	1190.75	2.751	1.025	1-S2n	1.870	1.887	1.870	1.564	6.703	2.238

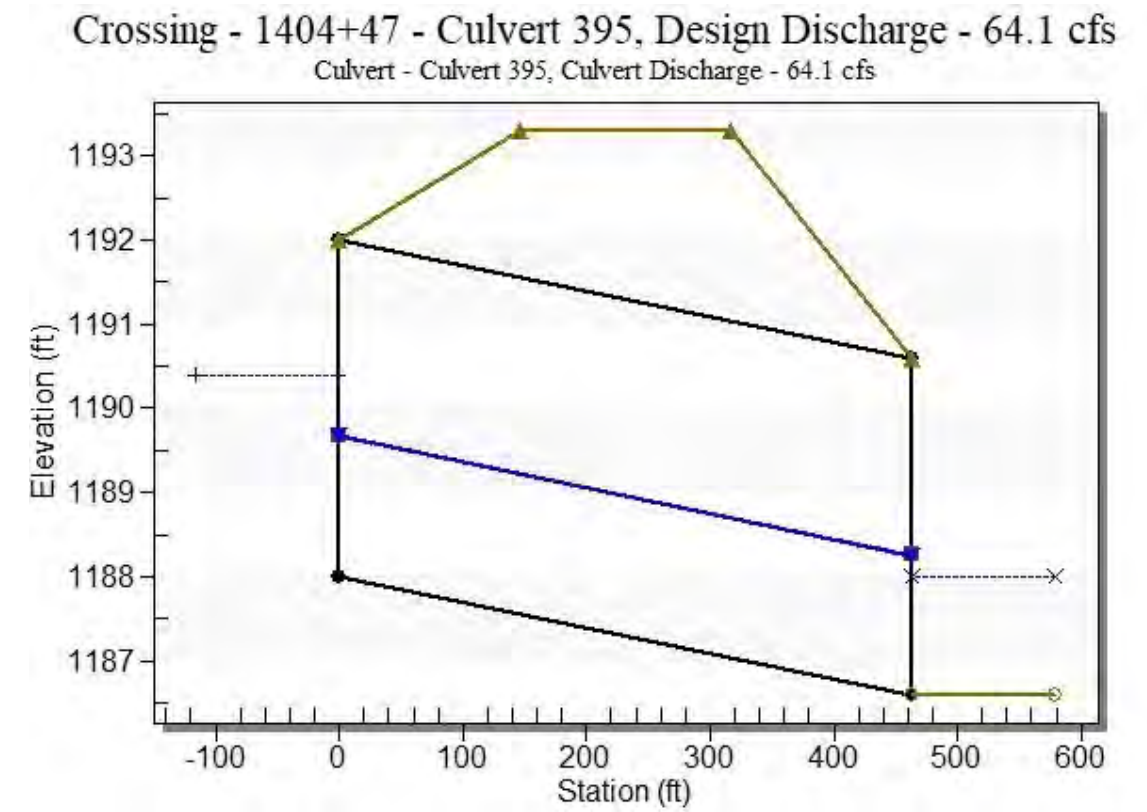
* Full Flow Headwater elevation is below inlet invert.

 Straight Culvert
 Inlet Elevation (invert): 1188.00 ft, Outlet Elevation (invert): 1186.60 ft
 Culvert Length: 463.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 395



Water Surface Profile Plot for Culvert: Culvert 395



Site Data - Culvert 395

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1188.00 ft
 Outlet Station: 463.00 ft
 Outlet Elevation: 1186.60 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 395

Barrel Shape: Circular
 Barrel Diameter: 4.00 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

HY-8 Culvert Analysis Report Structure 400

Table 3 - Downstream Channel Rating Curve (Crossing: 1404+47 - Culvert 395)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1186.60	0.00	0.00	0.00	0.00
7.99	1187.03	0.43	1.07	0.08	0.30
15.98	1187.25	0.65	1.36	0.12	0.32
23.97	1187.41	0.81	1.55	0.15	0.33
31.96	1187.55	0.95	1.70	0.18	0.34
39.94	1187.68	1.08	1.82	0.20	0.35
47.93	1187.79	1.19	1.92	0.22	0.35
55.92	1187.89	1.29	2.01	0.24	0.36
63.91	1187.99	1.39	2.10	0.26	0.36
64.11	1187.99	1.39	2.10	0.26	0.36
79.89	1188.16	1.56	2.24	0.29	0.37

Tailwater Channel Data - 1404+47 - Culvert 395

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1186.60 ft

Roadway Data for Crossing: 1404+47 - Culvert 395

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1193.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1411+00 - Culvert 400

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 400 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1190.00	0.00	0.00	0.00	1
1190.85	7.99	7.99	0.00	1
1191.22	15.98	15.98	0.00	1
1191.52	23.97	23.97	0.00	1
1191.82	31.96	31.96	0.00	1
1192.09	39.94	39.94	0.00	1
1192.34	47.93	47.93	0.00	1
1192.58	55.92	55.92	0.00	1
1192.81	63.91	63.91	0.00	1
1192.81	64.11	64.11	0.00	1
1193.29	79.89	79.89	0.00	1
1194.31	107.89	107.89	0.00	Overtopping

Rating Curve Plot for Crossing: 1411+00 - Culvert 400

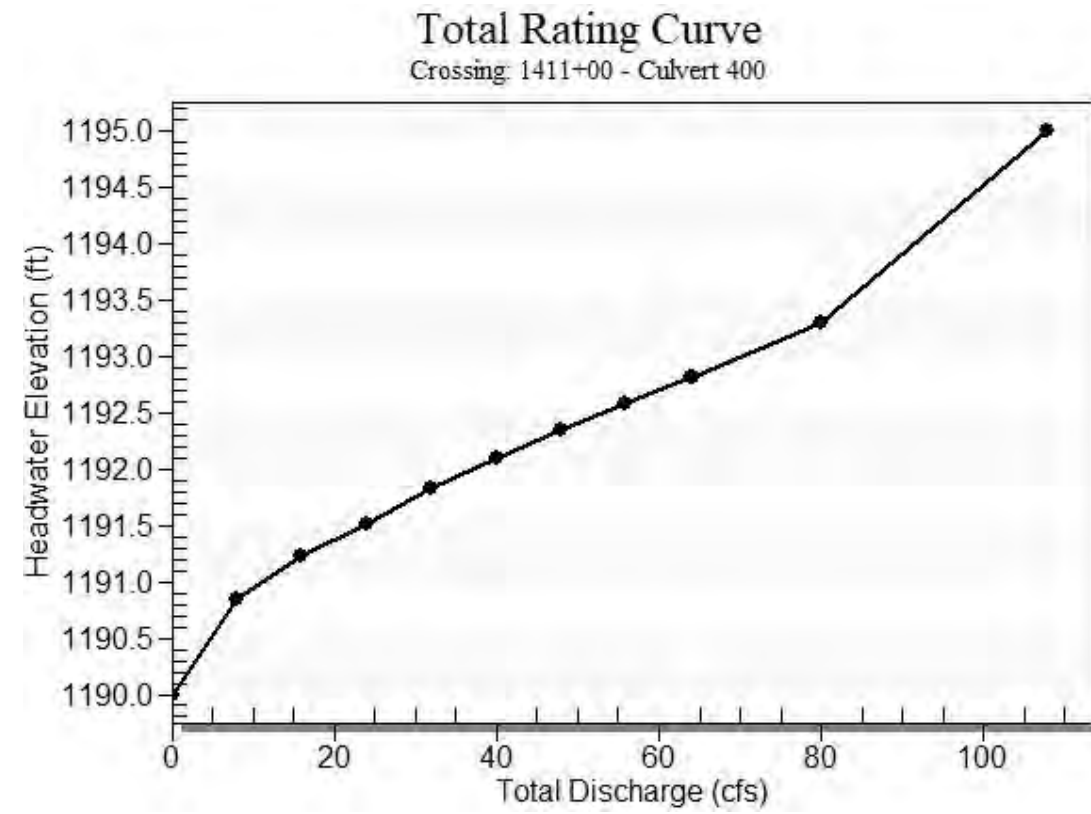


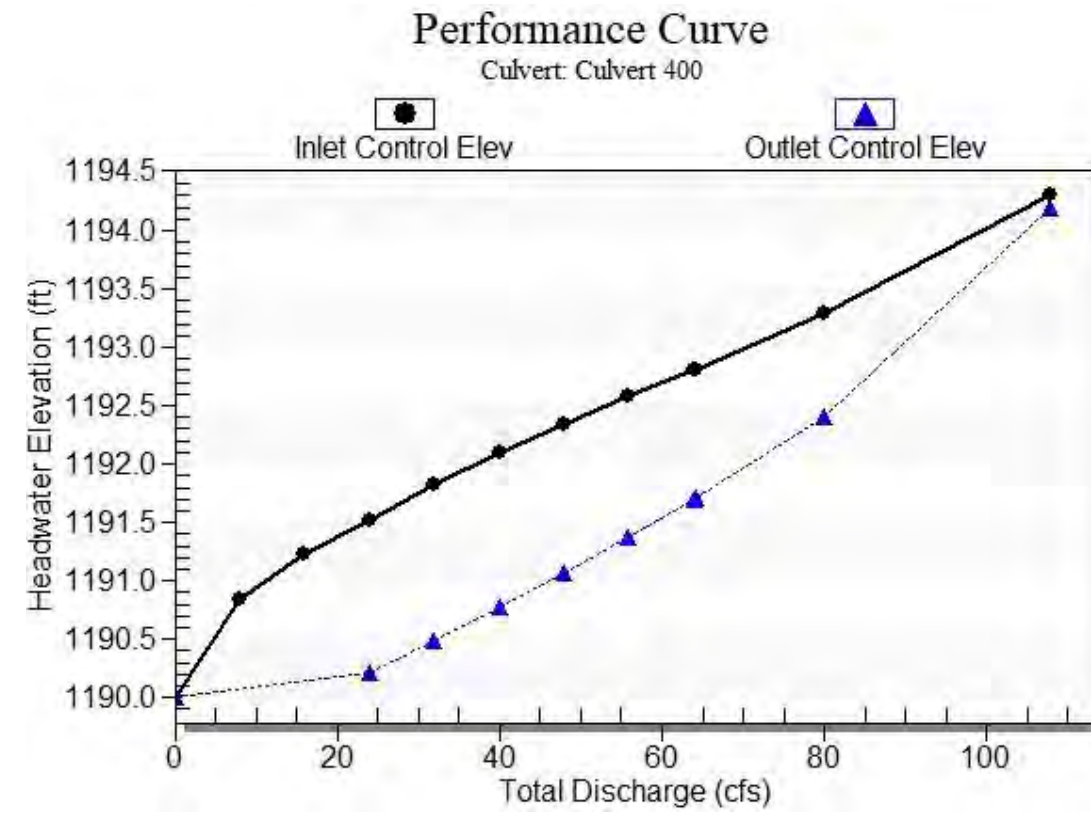
Table 2 - Culvert Summary Table: Culvert 400

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1190.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1190.85	0.848	0.0*	1-S2n	0.552	0.620	0.552	0.434	4.319	1.073
15.98	15.98	1191.22	1.221	0.0*	1-S2n	0.780	0.886	0.780	0.645	5.274	1.358
23.97	23.97	1191.52	1.520	0.216	1-S2n	0.962	1.094	0.962	0.812	5.921	1.550
31.96	31.96	1191.82	1.824	0.490	1-S2n	1.121	1.274	1.121	0.953	6.407	1.697
39.94	39.94	1192.09	2.093	0.772	1-S2n	1.267	1.434	1.267	1.077	6.798	1.819
47.93	47.93	1192.34	2.340	1.062	1-S2n	1.406	1.576	1.406	1.190	7.125	1.923
55.92	55.92	1192.58	2.576	1.369	1-S2n	1.541	1.707	1.541	1.293	7.402	2.014
63.91	63.91	1192.81	2.807	1.696	1-S2n	1.673	1.831	1.723	1.389	7.372	2.096
64.11	64.11	1192.81	2.813	1.705	1-S2n	1.676	1.834	1.676	1.392	7.646	2.098
79.89	79.89	1193.29	3.291	2.407	5-S2n	1.942	2.056	1.942	1.564	8.008	2.238

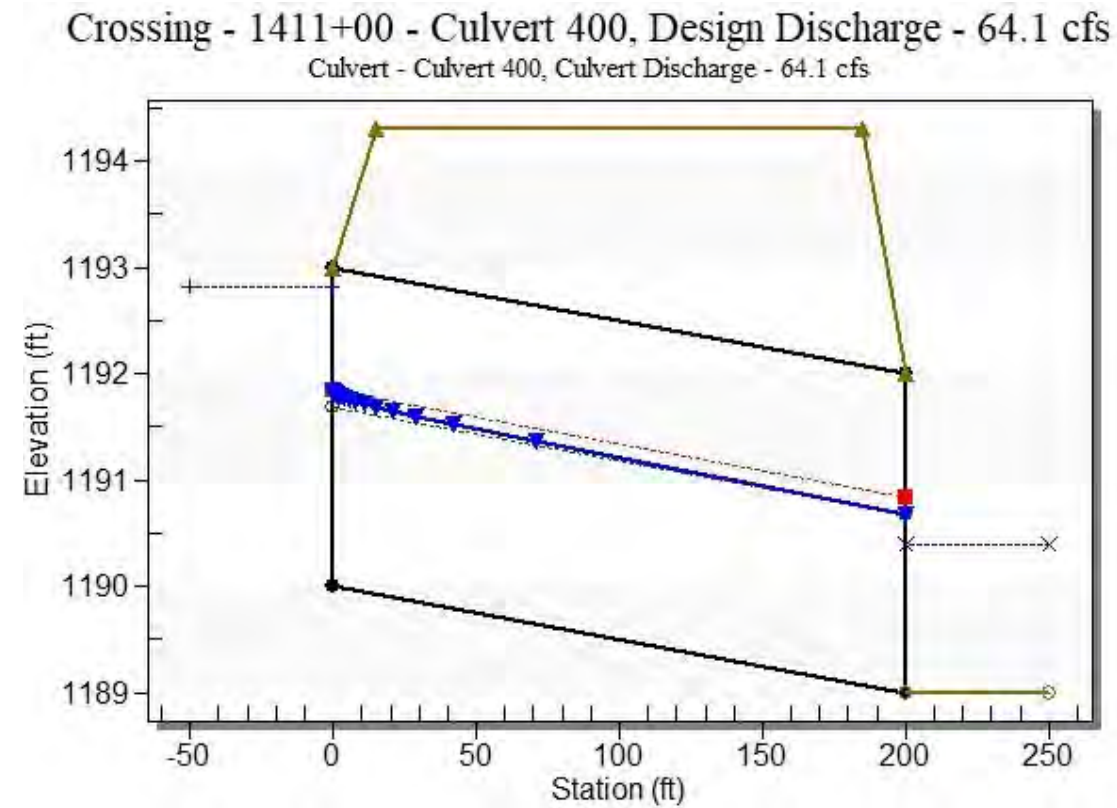
* Full Flow Headwater elevation is below inlet invert.

Straight Culvert
Inlet Elevation (invert): 1190.00 ft, Outlet Elevation (invert): 1189.00 ft
Culvert Length: 200.00 ft, Culvert Slope: 0.0050

Culvert Performance Curve Plot: Culvert 400



Water Surface Profile Plot for Culvert: Culvert 400



Site Data - Culvert 400

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1190.00 ft
 Outlet Station: 200.00 ft
 Outlet Elevation: 1189.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 400

Barrel Shape: Circular
 Barrel Diameter: 3.00 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1411+00 - Culvert 400)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1189.00	0.00	0.00	0.00	0.00
7.99	1189.43	0.43	1.07	0.08	0.30
15.98	1189.65	0.65	1.36	0.12	0.32
23.97	1189.81	0.81	1.55	0.15	0.33
31.96	1189.95	0.95	1.70	0.18	0.34
39.94	1190.08	1.08	1.82	0.20	0.35
47.93	1190.19	1.19	1.92	0.22	0.35
55.92	1190.29	1.29	2.01	0.24	0.36
63.91	1190.39	1.39	2.10	0.26	0.36
64.11	1190.39	1.39	2.10	0.26	0.36
79.89	1190.56	1.56	2.24	0.29	0.37

Tailwater Channel Data - 1411+00 - Culvert 400

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1189.00 ft

Roadway Data for Crossing: 1411+00 - Culvert 400

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1194.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report Structure 405

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1417+00 - Culvert 405

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 405 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1190.50	0.00	0.00	0.00	1
1191.24	7.99	7.99	0.00	1
1191.64	15.98	15.98	0.00	1
1192.00	23.97	23.97	0.00	1
1192.35	31.96	31.96	0.00	1
1192.72	39.94	39.94	0.00	1
1193.23	47.93	47.93	0.00	1
1194.02	55.92	55.92	0.00	1
1194.82	63.91	63.37	0.39	30
1194.82	64.11	63.38	0.44	2
1194.95	79.89	64.59	15.08	5
1194.81	63.31	63.31	0.00	Overtopping

Rating Curve Plot for Crossing: 1417+00 - Culvert 405

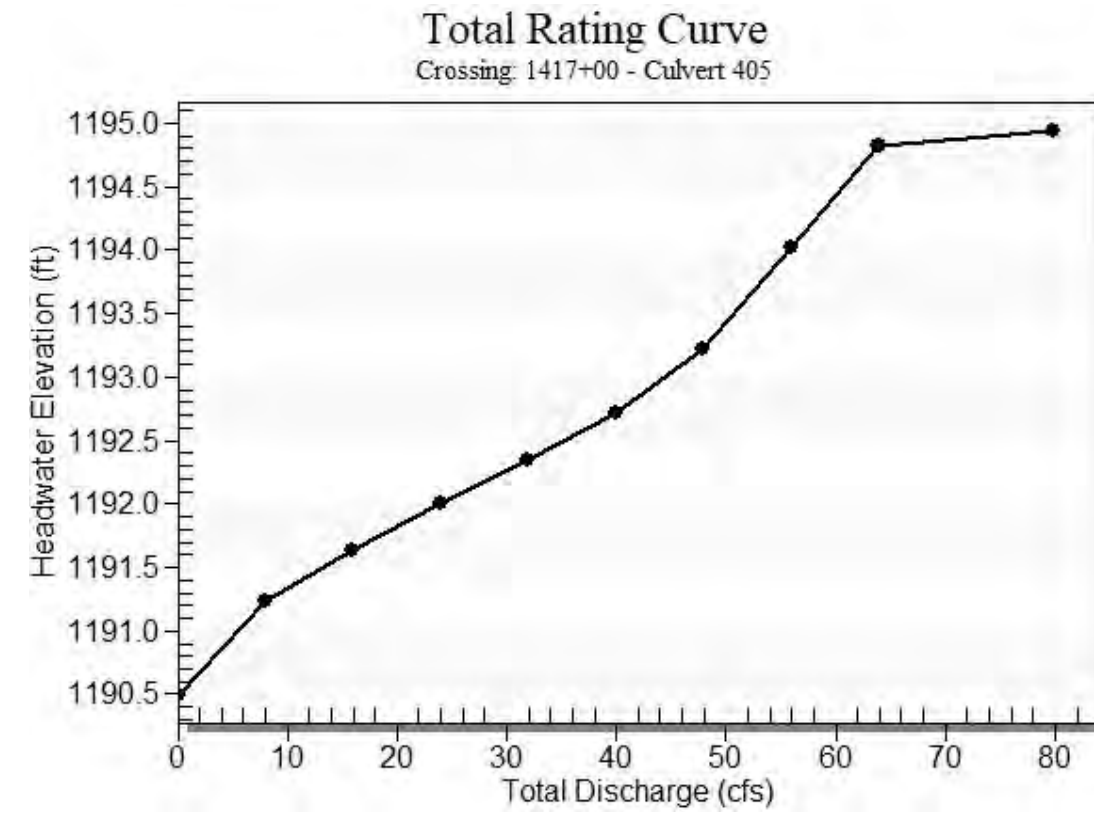
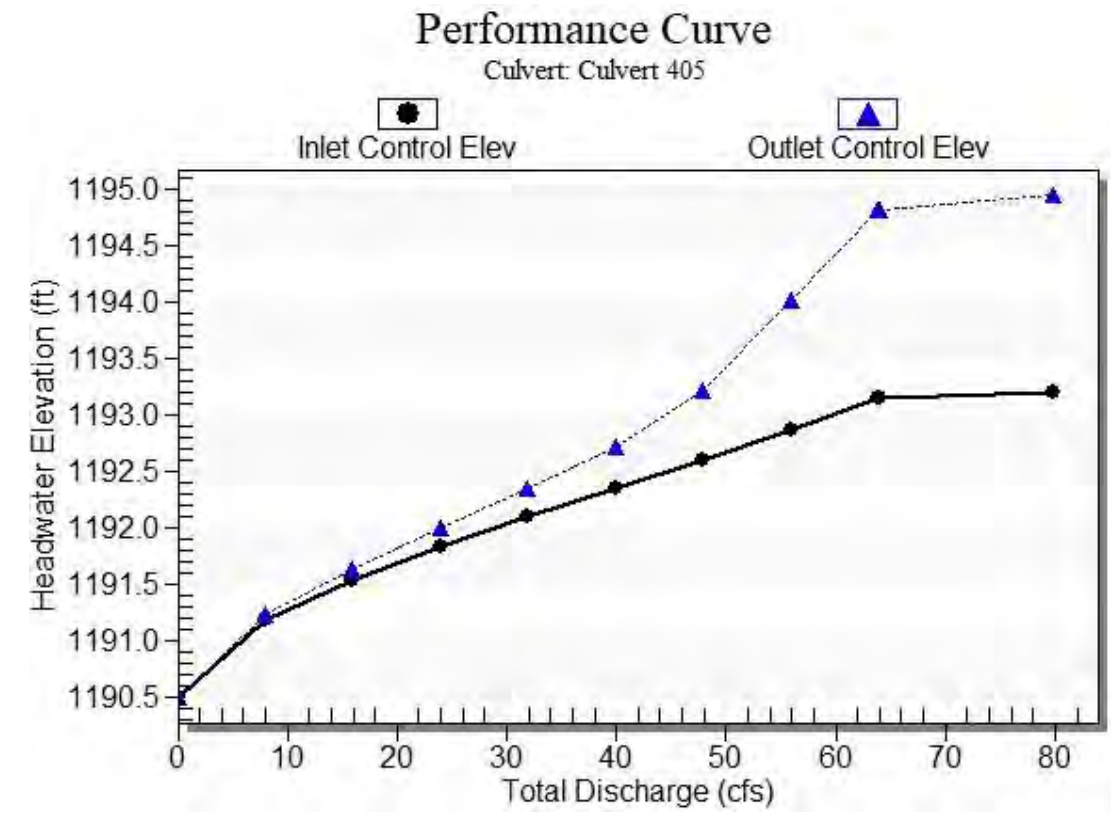


Table 2 - Culvert Summary Table: Culvert 405

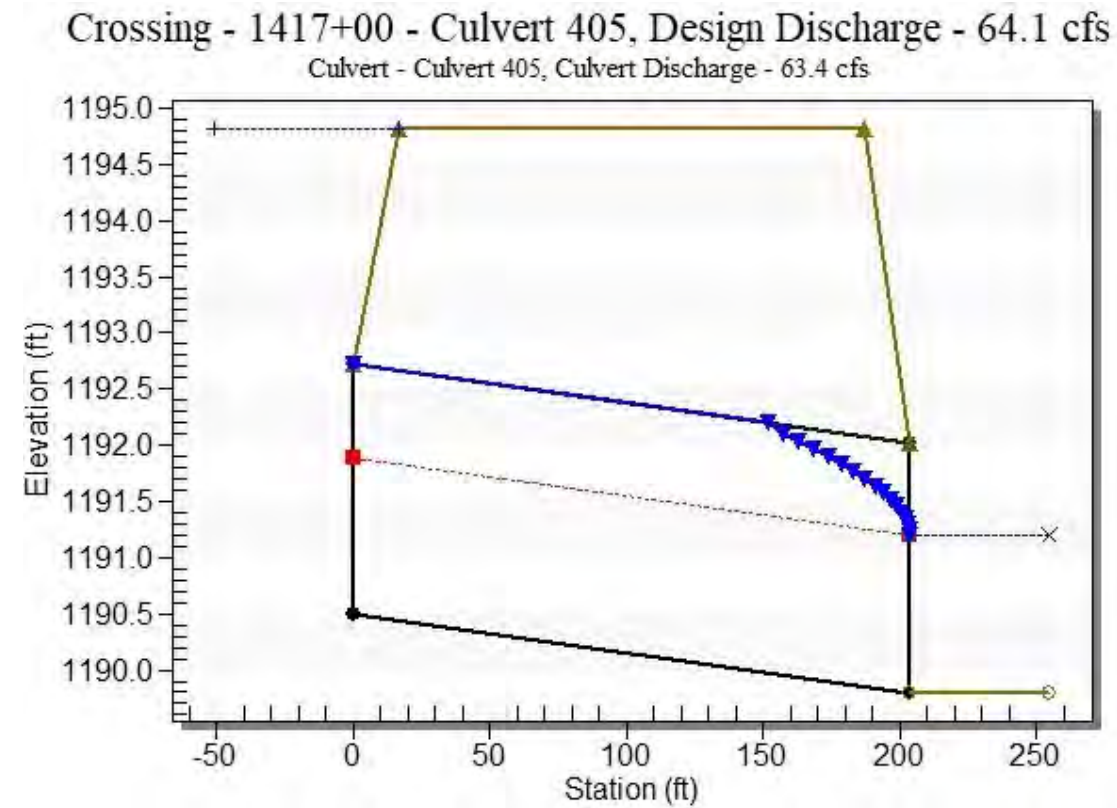
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1190.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1191.24	0.685	0.739	3-M2t	0.605	0.414	0.434	0.434	3.182	1.073
15.98	15.98	1191.64	1.036	1.138	3-M2t	0.932	0.611	0.645	0.645	3.961	1.358
23.97	23.97	1192.00	1.336	1.504	3-M2t	1.249	0.788	0.812	0.812	4.601	1.550
31.96	31.96	1192.35	1.601	1.853	3-M2t	1.622	0.936	0.953	0.953	5.163	1.697
39.94	39.94	1192.72	1.851	2.221	3-M2t	2.217	1.065	1.077	1.077	5.679	1.819
47.93	47.93	1193.23	2.103	2.726	7-M2t	2.217	1.178	1.190	1.190	6.164	1.923
55.92	55.92	1194.02	2.374	3.516	7-M2c	2.217	1.295	1.295	1.293	6.619	2.014
63.91	63.37	1194.82	2.653	4.323	7-M2c	2.217	1.392	1.392	1.389	7.004	2.096
64.11	63.38	1194.82	2.653	4.323	7-M2c	2.217	1.392	1.392	1.392	7.004	2.098
79.89	64.59	1194.95	2.702	4.457	7-M2t	2.217	1.408	1.564	1.564	6.430	2.238

 Straight Culvert
 Inlet Elevation (invert): 1190.50 ft, Outlet Elevation (invert): 1189.80 ft
 Culvert Length: 204.00 ft, Culvert Slope: 0.0034

Culvert Performance Curve Plot: Culvert 405



Water Surface Profile Plot for Culvert: Culvert 405



Site Data - Culvert 405

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1190.50 ft
 Outlet Station: 204.00 ft
 Outlet Elevation: 1189.80 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 405

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1417+00 - Culvert 405)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1189.80	0.00	0.00	0.00	0.00
7.99	1190.23	0.43	1.07	0.08	0.30
15.98	1190.45	0.65	1.36	0.12	0.32
23.97	1190.61	0.81	1.55	0.15	0.33
31.96	1190.75	0.95	1.70	0.18	0.34
39.94	1190.88	1.08	1.82	0.20	0.35
47.93	1190.99	1.19	1.92	0.22	0.35
55.92	1191.09	1.29	2.01	0.24	0.36
63.91	1191.19	1.39	2.10	0.26	0.36
64.11	1191.19	1.39	2.10	0.26	0.36
79.89	1191.36	1.56	2.24	0.29	0.37

Tailwater Channel Data - 1417+00 - Culvert 405

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1189.80 ft

Roadway Data for Crossing: 1417+00 - Culvert 405

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1194.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report Structure 410

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 64.111 cfs

Maximum Flow: 79.888 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1423+00 - Culvert 410

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 410 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1191.70	0.00	0.00	0.00	1
1192.48	7.99	7.99	0.00	1
1192.90	15.98	15.98	0.00	1
1193.28	23.97	23.97	0.00	1
1193.64	31.96	31.96	0.00	1
1194.04	39.94	39.94	0.00	1
1194.64	47.93	47.93	0.00	1
1195.33	55.92	55.17	0.56	30
1195.40	63.91	55.69	8.05	6
1195.40	64.11	55.70	8.17	2
1195.49	79.89	56.70	22.96	4
1195.31	55.02	55.02	0.00	Overtopping

Rating Curve Plot for Crossing: 1423+00 - Culvert 410

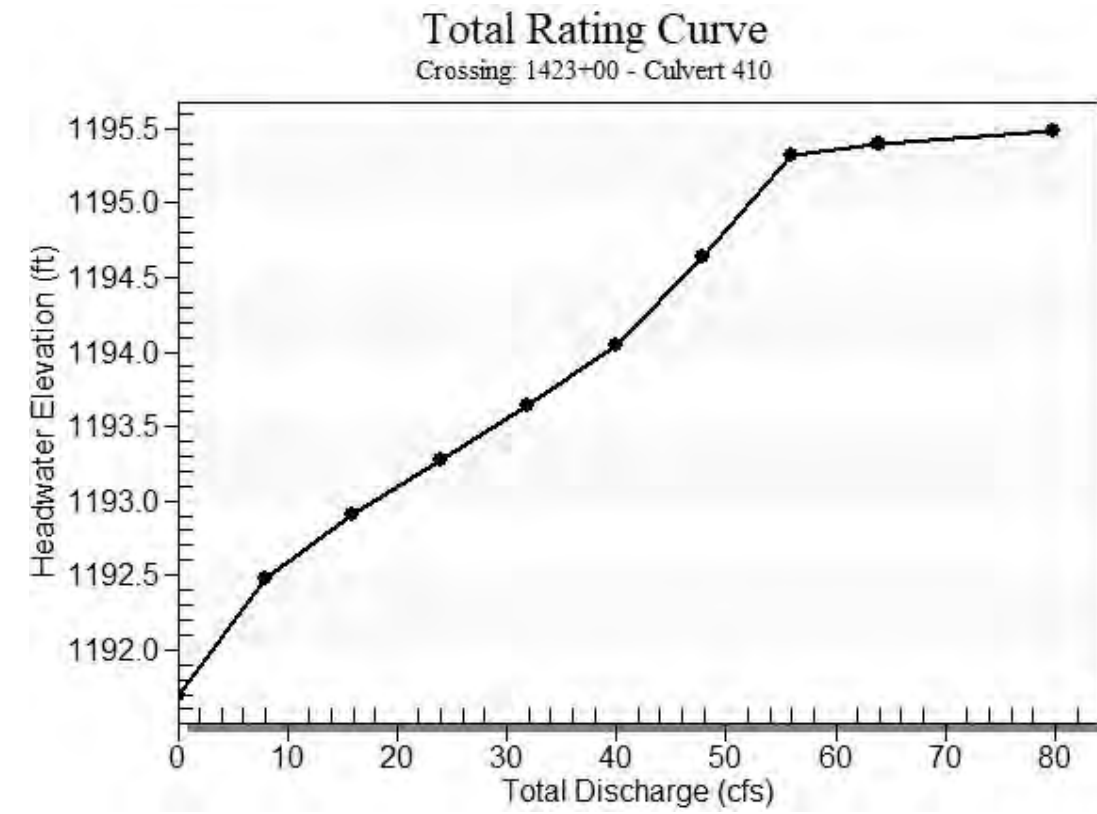
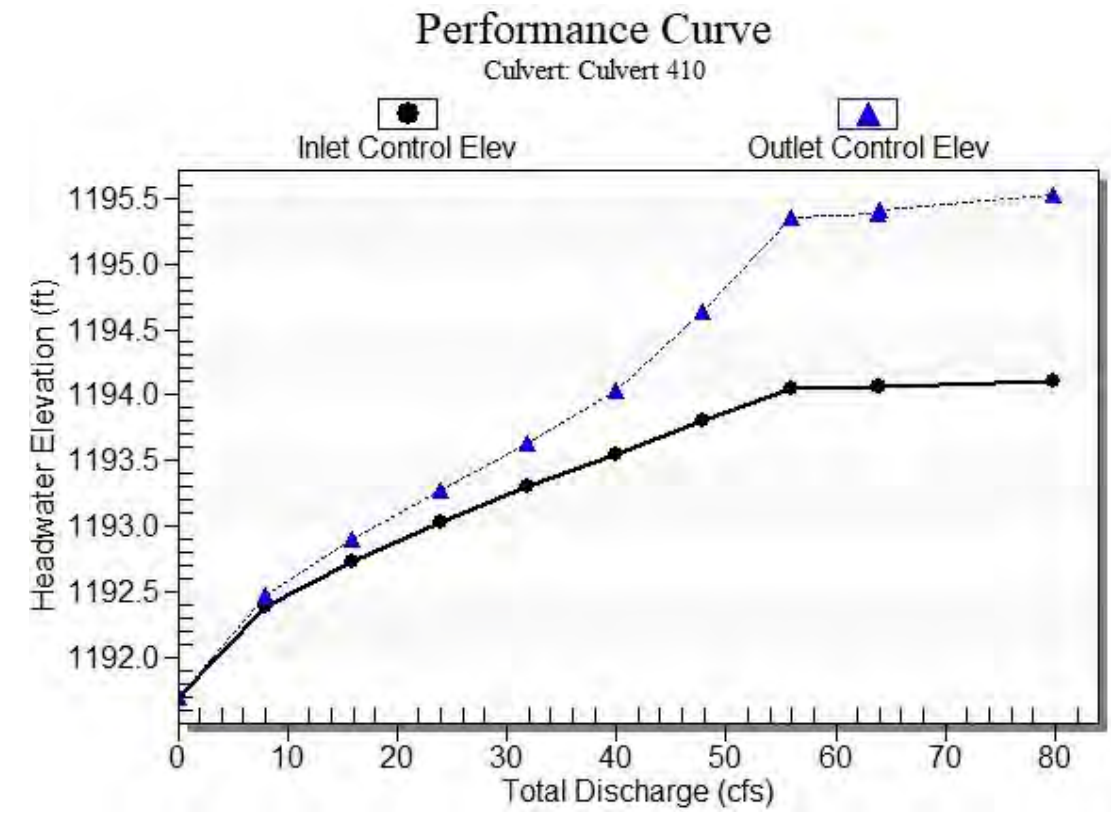


Table 2 - Culvert Summary Table: Culvert 410

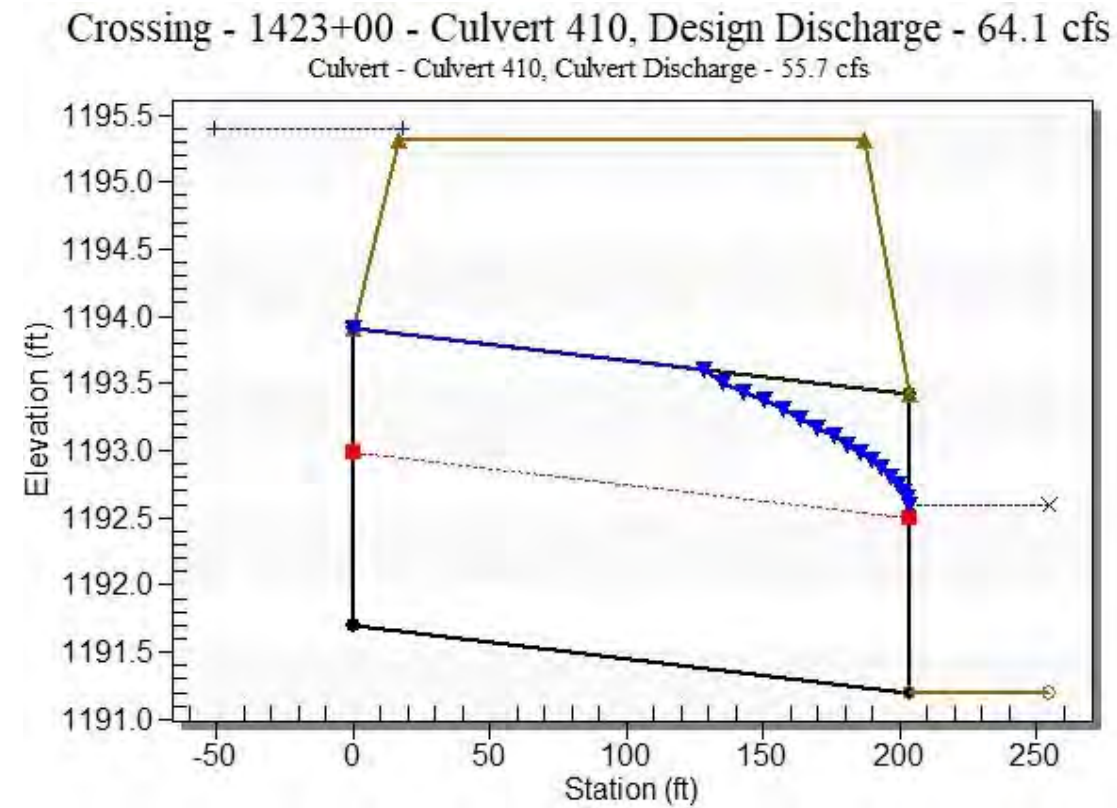
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1191.70	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
7.99	7.99	1192.48	0.686	0.775	3-M2t	0.668	0.414	0.434	0.434	3.182	1.073
15.98	15.98	1192.90	1.037	1.203	3-M2t	1.046	0.611	0.645	0.645	3.961	1.358
23.97	23.97	1193.28	1.337	1.578	3-M2t	1.439	0.788	0.812	0.812	4.601	1.550
31.96	31.96	1193.64	1.603	1.941	3-M2t	2.217	0.936	0.953	0.953	5.163	1.697
39.94	39.94	1194.04	1.852	2.338	3-M2t	2.217	1.065	1.077	1.077	5.679	1.819
47.93	47.93	1194.64	2.104	2.937	7-M2t	2.217	1.178	1.190	1.190	6.164	1.923
55.92	55.17	1195.33	2.348	3.648	7-M2t	2.217	1.285	1.293	1.293	6.539	2.014
63.91	55.69	1195.40	2.366	3.682	7-M2t	2.217	1.292	1.389	1.389	6.167	2.096
64.11	55.70	1195.40	2.367	3.708	7-M2t	2.217	1.292	1.392	1.392	6.159	2.098
79.89	56.70	1195.49	2.403	3.825	7-M2t	2.217	1.306	1.564	1.564	5.645	2.238

 Straight Culvert
 Inlet Elevation (invert): 1191.70 ft, Outlet Elevation (invert): 1191.20 ft
 Culvert Length: 204.00 ft, Culvert Slope: 0.0025

Culvert Performance Curve Plot: Culvert 410



Water Surface Profile Plot for Culvert: Culvert 410



Site Data - Culvert 410

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1191.70 ft
 Outlet Station: 204.00 ft
 Outlet Elevation: 1191.20 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 410

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1423+00 - Culvert 410)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1191.20	0.00	0.00	0.00	0.00
7.99	1191.63	0.43	1.07	0.08	0.30
15.98	1191.85	0.65	1.36	0.12	0.32
23.97	1192.01	0.81	1.55	0.15	0.33
31.96	1192.15	0.95	1.70	0.18	0.34
39.94	1192.28	1.08	1.82	0.20	0.35
47.93	1192.39	1.19	1.92	0.22	0.35
55.92	1192.49	1.29	2.01	0.24	0.36
63.91	1192.59	1.39	2.10	0.26	0.36
64.11	1192.59	1.39	2.10	0.26	0.36
79.89	1192.76	1.56	2.24	0.29	0.37

Tailwater Channel Data - 1423+00 - Culvert 410

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1191.20 ft

Roadway Data for Crossing: 1423+00 - Culvert 410

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1195.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report Structure 415

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 72.8 cfs

Maximum Flow: 89 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1429+00 - Culvert 415

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 415 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1192.30	0.00	0.00	0.00	1
1193.10	8.90	8.90	0.00	1
1193.56	17.80	17.80	0.00	1
1193.96	26.70	26.70	0.00	1
1194.36	35.60	35.60	0.00	1
1194.84	44.50	44.50	0.00	1
1195.36	53.40	50.44	2.79	19
1195.42	62.30	51.15	10.94	5
1195.47	71.20	51.69	19.30	4
1195.48	72.80	51.78	20.87	3
1195.56	89.00	52.40	36.52	4
1195.31	49.95	49.95	0.00	Overtopping

Rating Curve Plot for Crossing: 1429+00 - Culvert 415

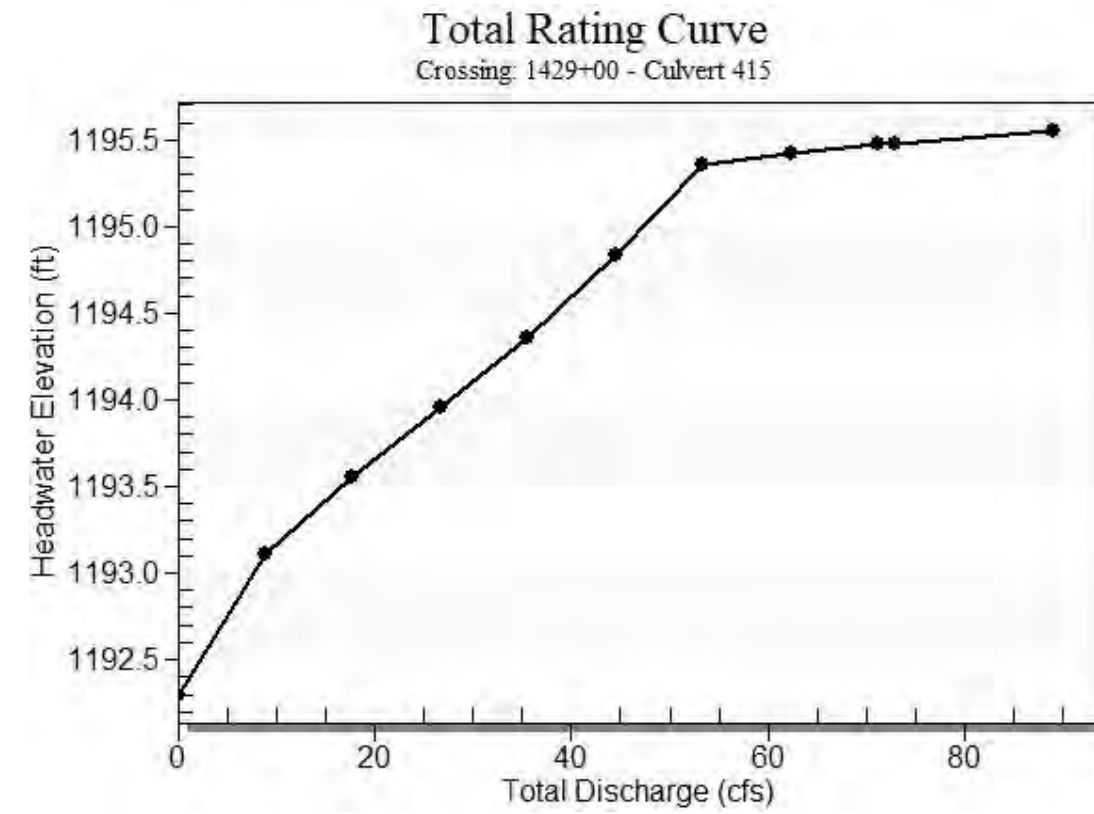
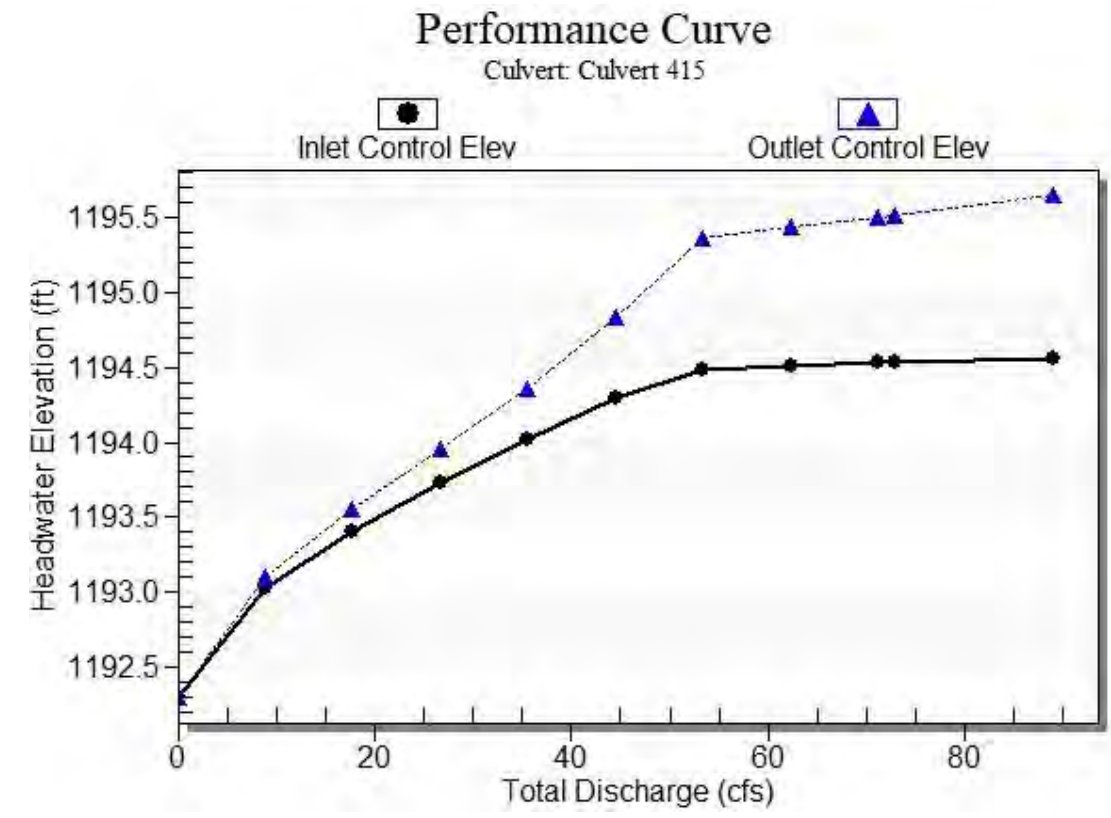


Table 2 - Culvert Summary Table: Culvert 415

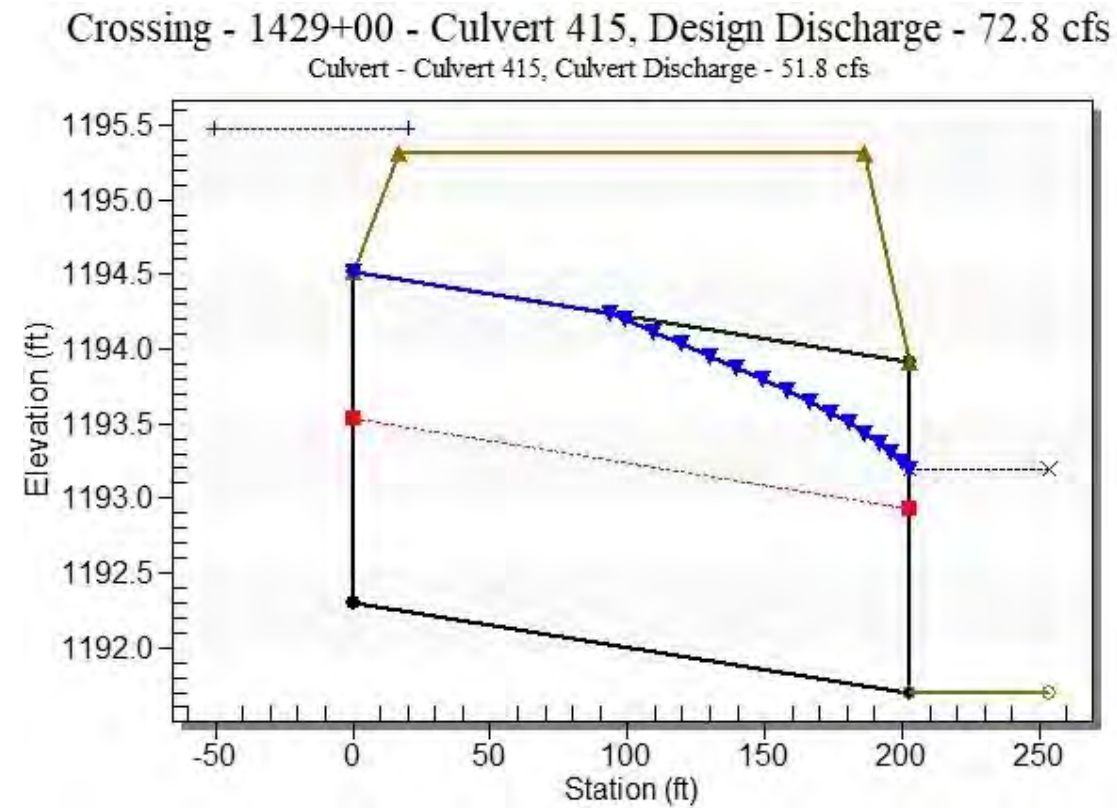
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1192.30	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
8.90	8.90	1193.10	0.730	0.804	3-M2t	0.674	0.440	0.461	0.461	3.284	1.114
17.80	17.80	1193.56	1.107	1.258	3-M2t	1.057	0.655	0.686	0.686	4.115	1.407
26.70	26.70	1193.96	1.431	1.658	3-M2t	1.459	0.841	0.862	0.862	4.800	1.604
35.60	35.60	1194.36	1.716	2.060	3-M2t	2.217	0.997	1.011	1.011	5.403	1.755
44.50	44.50	1194.84	1.994	2.537	3-M2t	2.217	1.131	1.143	1.143	5.959	1.880
53.40	50.44	1195.36	2.186	3.060	7-M2t	2.217	1.217	1.261	1.261	6.124	1.987
62.30	51.15	1195.42	2.210	3.131	7-M2t	2.217	1.226	1.371	1.371	5.737	2.080
71.20	51.69	1195.47	2.228	3.202	7-M2t	2.217	1.234	1.472	1.472	5.430	2.164
72.80	51.78	1195.48	2.231	3.214	7-M2t	2.217	1.235	1.489	1.489	5.382	2.178
89.00	52.40	1195.56	2.252	3.350	7-M2t	2.217	1.243	1.656	1.656	4.973	2.309

 Straight Culvert
 Inlet Elevation (invert): 1192.30 ft, Outlet Elevation (invert): 1191.70 ft
 Culvert Length: 203.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 415



Water Surface Profile Plot for Culvert: Culvert 415



Site Data - Culvert 415

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1192.30 ft
 Outlet Station: 203.00 ft
 Outlet Elevation: 1191.70 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 415

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1429+00 - Culvert 415)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1191.70	0.00	0.00	0.00	0.00
8.90	1192.16	0.46	1.11	0.09	0.31
17.80	1192.39	0.69	1.41	0.13	0.33
26.70	1192.56	0.86	1.60	0.16	0.34
35.60	1192.71	1.01	1.76	0.19	0.34
44.50	1192.84	1.14	1.88	0.21	0.35
53.40	1192.96	1.26	1.99	0.24	0.35
62.30	1193.07	1.37	2.08	0.26	0.36
71.20	1193.17	1.47	2.16	0.28	0.36
72.80	1193.19	1.49	2.18	0.28	0.36
89.00	1193.36	1.66	2.31	0.31	0.37

Tailwater Channel Data - 1429+00 - Culvert 415

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1191.70 ft

Roadway Data for Crossing: 1429+00 - Culvert 415

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1195.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report

Structure 420

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 72.8 cfs

Maximum Flow: 89 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1435+00 - Culvert 420

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 420 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1192.70	0.00	0.00	0.00	1
1193.50	8.90	8.90	0.00	1
1193.95	17.80	17.80	0.00	1
1194.35	26.70	26.70	0.00	1
1194.75	35.60	35.60	0.00	1
1195.22	44.50	44.50	0.00	1
1195.84	53.40	51.70	1.49	24
1195.91	62.30	52.30	9.90	6
1195.97	71.20	52.92	18.08	4
1195.97	72.80	53.02	19.62	3
1196.05	89.00	53.90	35.02	4
1195.81	51.38	51.38	0.00	Overtopping

Rating Curve Plot for Crossing: 1435+00 - Culvert 420

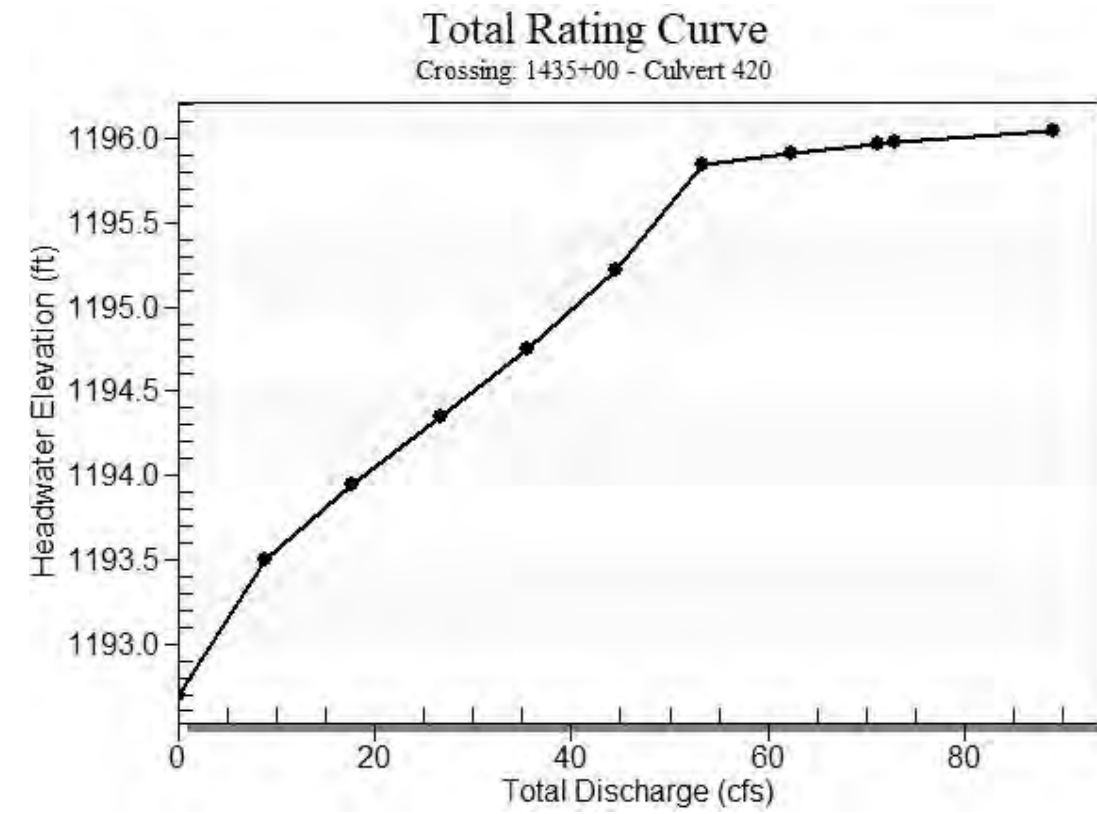
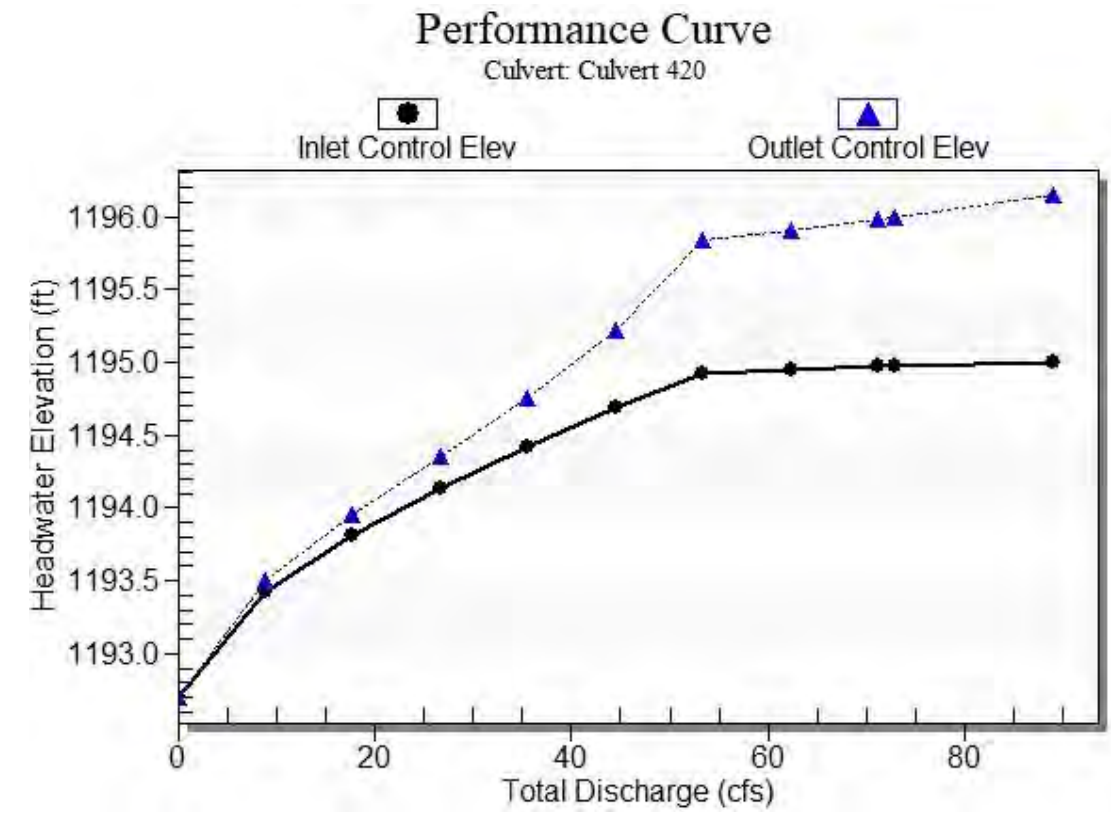


Table 2 - Culvert Summary Table: Culvert 420

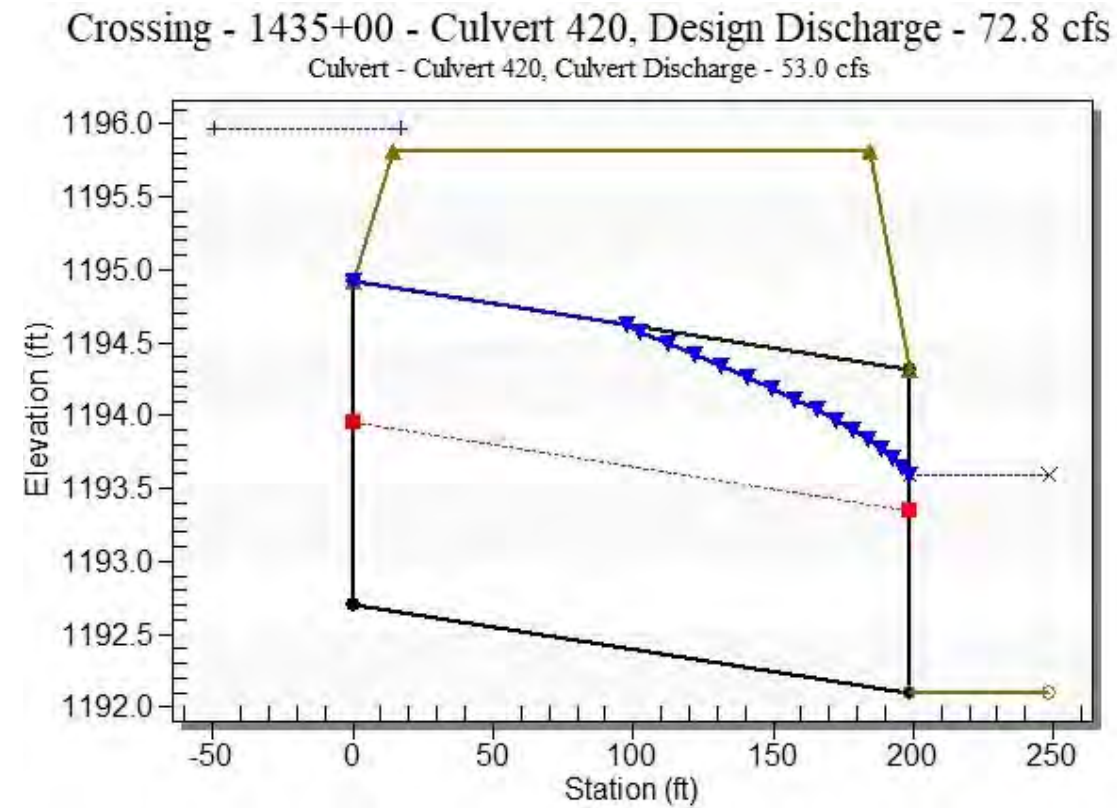
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1192.70	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
8.90	8.90	1193.50	0.730	0.802	3-M2t	0.670	0.440	0.461	0.461	3.284	1.114
17.80	17.80	1193.95	1.107	1.249	3-M2t	1.050	0.655	0.686	0.686	4.115	1.407
26.70	26.70	1194.35	1.431	1.651	3-M2t	1.445	0.841	0.862	0.862	4.800	1.604
35.60	35.60	1194.75	1.716	2.050	3-M2t	2.217	0.997	1.011	1.011	5.403	1.755
44.50	44.50	1195.22	1.994	2.518	3-M2t	2.217	1.131	1.143	1.143	5.959	1.880
53.40	51.70	1195.84	2.228	3.144	7-M2t	2.217	1.234	1.261	1.261	6.277	1.987
62.30	52.30	1195.91	2.248	3.204	7-M2t	2.217	1.242	1.371	1.371	5.866	2.080
71.20	52.92	1195.97	2.269	3.281	7-M2t	2.217	1.250	1.472	1.472	5.559	2.164
72.80	53.02	1195.97	2.273	3.294	7-M2t	2.217	1.252	1.489	1.489	5.511	2.178
89.00	53.90	1196.05	2.303	3.452	7-M2t	2.217	1.263	1.656	1.656	5.114	2.309

 Straight Culvert
 Inlet Elevation (invert): 1192.70 ft, Outlet Elevation (invert): 1192.10 ft
 Culvert Length: 199.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 420



Water Surface Profile Plot for Culvert: Culvert 420



Site Data - Culvert 420

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1192.70 ft
 Outlet Station: 199.00 ft
 Outlet Elevation: 1192.10 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 420

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1435+00 - Culvert 420)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1192.10	0.00	0.00	0.00	0.00
8.90	1192.56	0.46	1.11	0.09	0.31
17.80	1192.79	0.69	1.41	0.13	0.33
26.70	1192.96	0.86	1.60	0.16	0.34
35.60	1193.11	1.01	1.76	0.19	0.34
44.50	1193.24	1.14	1.88	0.21	0.35
53.40	1193.36	1.26	1.99	0.24	0.35
62.30	1193.47	1.37	2.08	0.26	0.36
71.20	1193.57	1.47	2.16	0.28	0.36
72.80	1193.59	1.49	2.18	0.28	0.36
89.00	1193.76	1.66	2.31	0.31	0.37

Tailwater Channel Data - 1435+00 - Culvert 420

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1192.10 ft

Roadway Data for Crossing: 1435+00 - Culvert 420

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1195.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report

Structure 425

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 72.8 cfs

Maximum Flow: 89 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1442+00 - Culvert 425

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 425 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1194.80	0.00	0.00	0.00	1
1195.69	8.90	8.90	0.00	1
1196.15	17.80	17.80	0.00	1
1196.57	26.70	26.70	0.00	1
1196.99	35.60	35.60	0.00	1
1197.10	44.50	37.81	6.53	7
1197.15	53.40	38.83	14.48	5
1197.20	62.30	39.65	22.53	4
1197.24	71.20	40.36	30.79	4
1197.25	72.80	40.47	32.27	3
1197.31	89.00	41.51	47.29	3
1197.02	36.27	36.27	0.00	Overtopping

Rating Curve Plot for Crossing: 1442+00 - Culvert 425

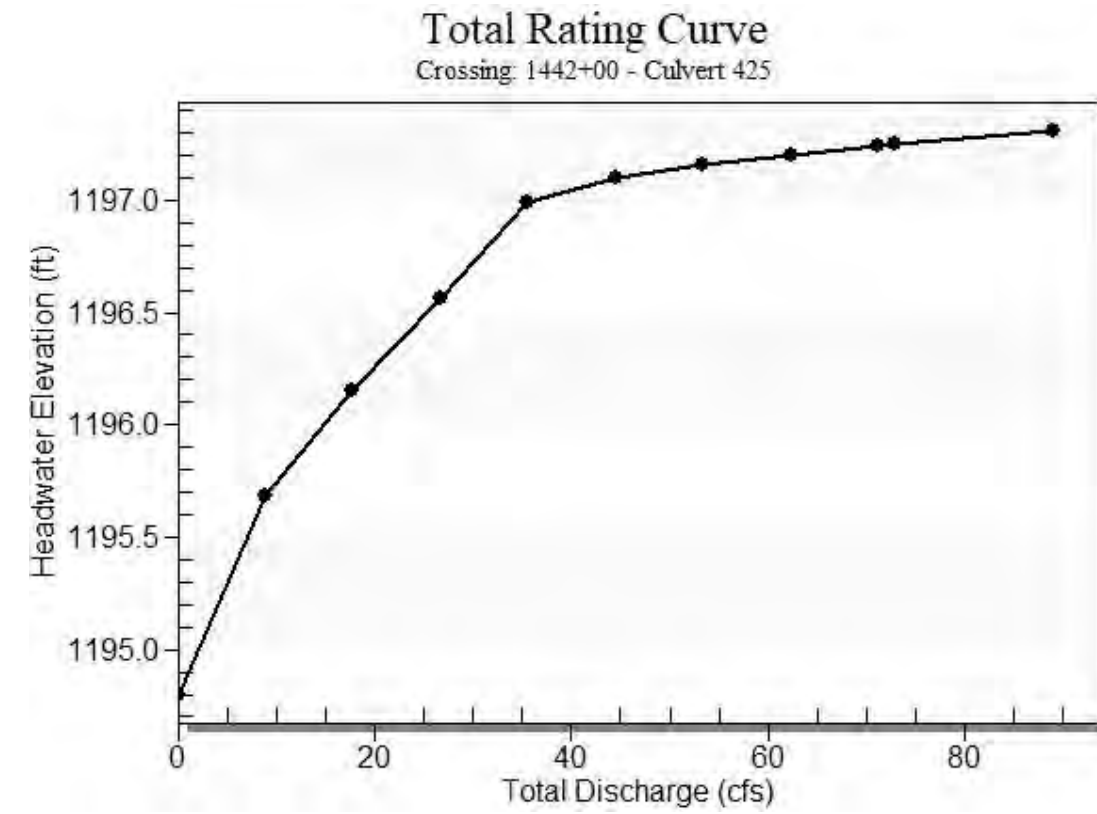
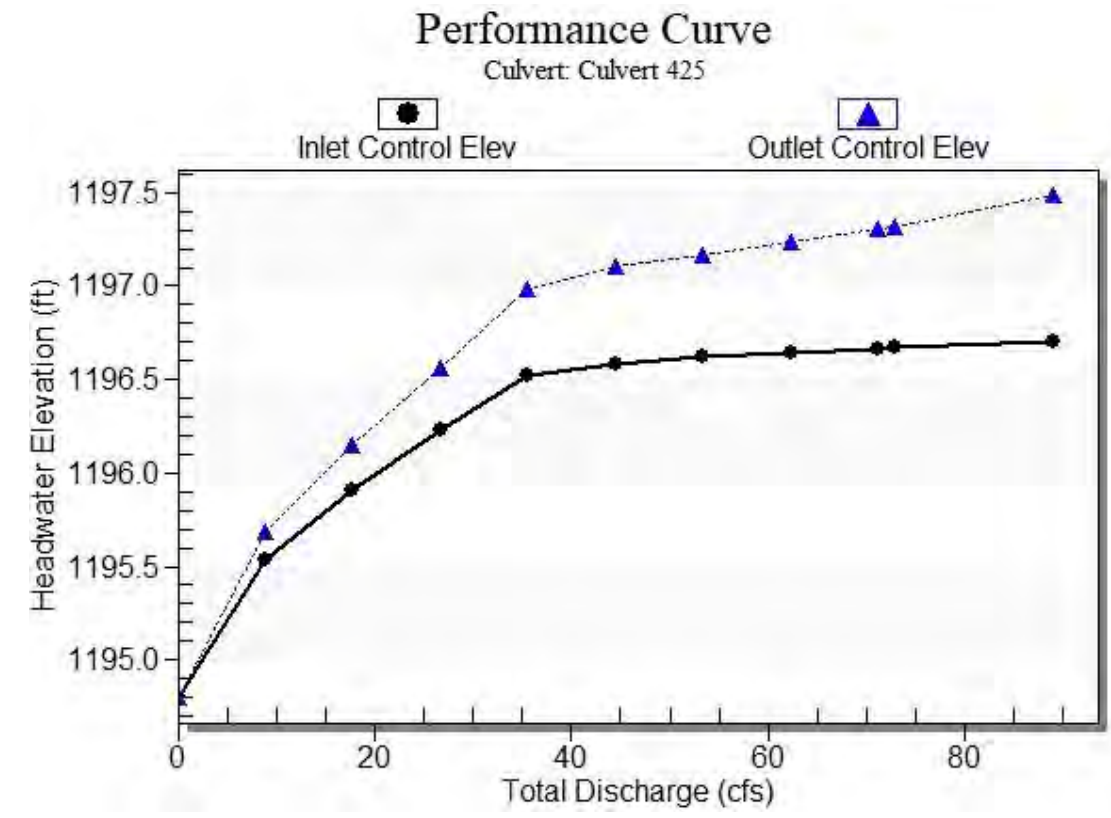


Table 2 - Culvert Summary Table: Culvert 425

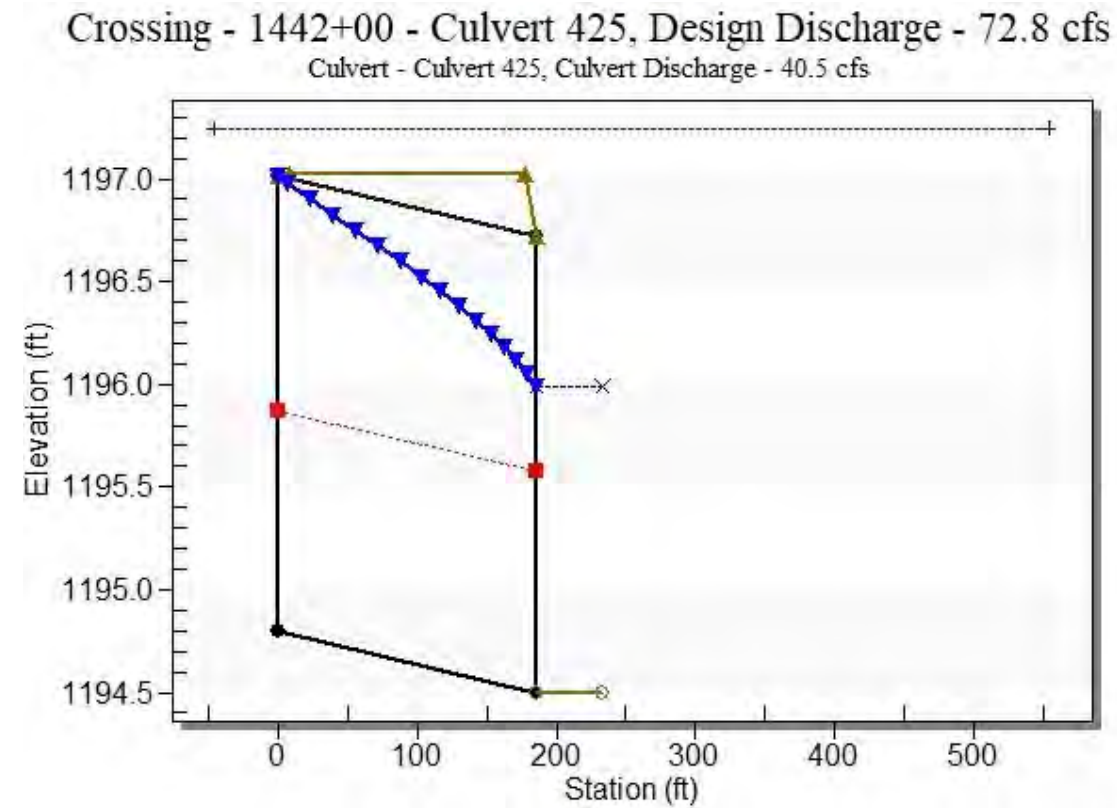
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1194.80	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
8.90	8.90	1195.69	0.731	0.885	3-M2t	0.813	0.440	0.461	0.461	3.284	1.114
17.80	17.80	1196.15	1.109	1.350	3-M2t	1.333	0.655	0.686	0.686	4.115	1.407
26.70	26.70	1196.57	1.432	1.766	3-M2t	2.217	0.841	0.862	0.862	4.800	1.604
35.60	35.60	1196.99	1.718	2.186	3-M2t	2.217	0.997	1.011	1.011	5.403	1.755
44.50	37.81	1197.10	1.787	2.302	3-M2t	2.217	1.032	1.143	1.143	5.063	1.880
53.40	38.83	1197.15	1.818	2.367	3-M2t	2.217	1.048	1.261	1.261	4.715	1.987
62.30	39.65	1197.20	1.844	2.431	3-M2t	2.217	1.060	1.371	1.371	4.447	2.080
71.20	40.36	1197.24	1.866	2.503	3-M2t	2.217	1.071	1.472	1.472	4.240	2.164
72.80	40.47	1197.25	1.869	2.517	3-M2t	2.217	1.073	1.489	1.489	4.207	2.178
89.00	41.51	1197.31	1.901	2.689	7-M2t	2.217	1.088	1.656	1.656	3.939	2.309

 Straight Culvert
 Inlet Elevation (invert): 1194.80 ft, Outlet Elevation (invert): 1194.50 ft
 Culvert Length: 186.00 ft, Culvert Slope: 0.0016

Culvert Performance Curve Plot: Culvert 425



Water Surface Profile Plot for Culvert: Culvert 425



Site Data - Culvert 425

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1194.80 ft
 Outlet Station: 186.00 ft
 Outlet Elevation: 1194.50 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 425

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1442+00 - Culvert 425)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1194.50	0.00	0.00	0.00	0.00
8.90	1194.96	0.46	1.11	0.09	0.31
17.80	1195.19	0.69	1.41	0.13	0.33
26.70	1195.36	0.86	1.60	0.16	0.34
35.60	1195.51	1.01	1.76	0.19	0.34
44.50	1195.64	1.14	1.88	0.21	0.35
53.40	1195.76	1.26	1.99	0.24	0.35
62.30	1195.87	1.37	2.08	0.26	0.36
71.20	1195.97	1.47	2.16	0.28	0.36
72.80	1195.99	1.49	2.18	0.28	0.36
89.00	1196.16	1.66	2.31	0.31	0.37

Tailwater Channel Data - 1442+00 - Culvert 425

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1194.50 ft

Roadway Data for Crossing: 1442+00 - Culvert 425

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1197.02 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report Structure 430

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 72.8 cfs

Maximum Flow: 89 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1448+00 - Culvert 430

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 430 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1194.50	0.00	0.00	0.00	1
1195.36	8.90	8.90	0.00	1
1195.81	17.80	17.80	0.00	1
1196.23	26.70	26.70	0.00	1
1196.64	35.60	35.60	0.00	1
1197.20	44.50	44.50	0.00	1
1197.95	53.40	53.40	0.00	1
1198.37	62.30	57.77	4.40	15
1198.43	71.20	58.39	12.66	5
1198.44	72.80	58.48	14.12	3
1198.52	89.00	59.29	29.56	4
1198.31	57.11	57.11	0.00	Overtopping

Rating Curve Plot for Crossing: 1448+00 - Culvert 430

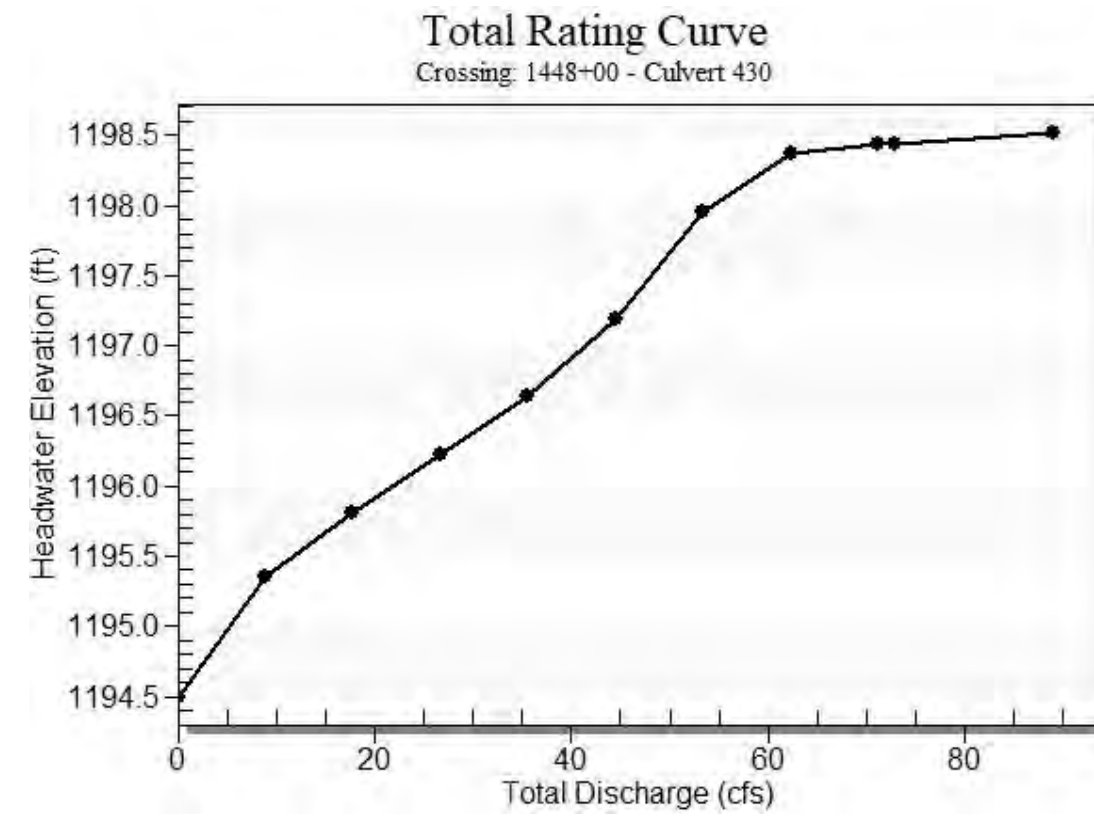
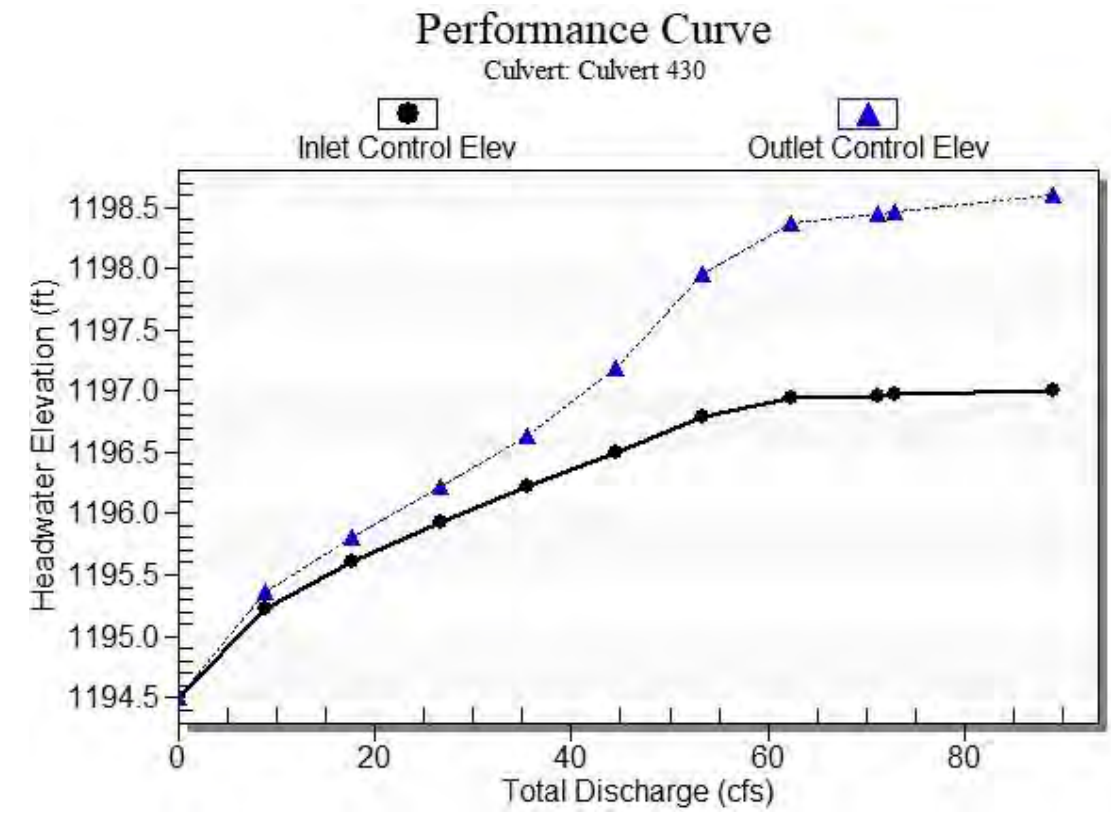


Table 2 - Culvert Summary Table: Culvert 430

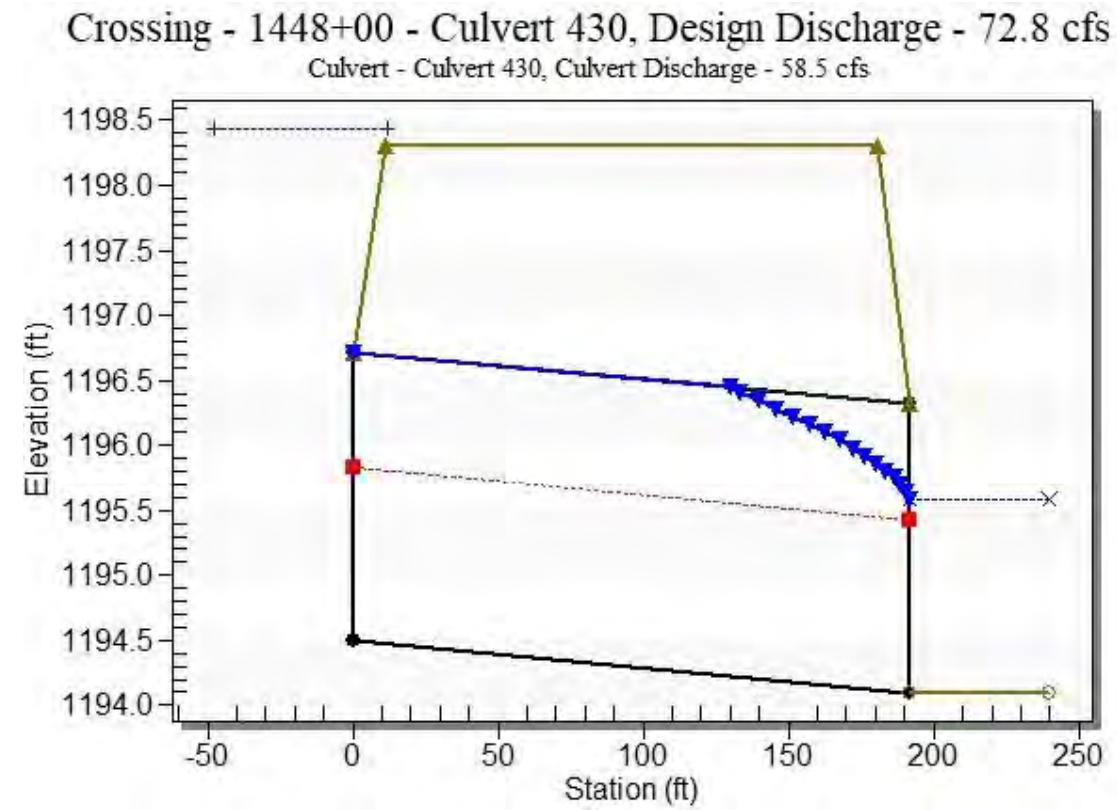
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1194.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
8.90	8.90	1195.36	0.731	0.856	3-M2t	0.750	0.440	0.461	0.461	3.284	1.114
17.80	17.80	1195.81	1.108	1.314	3-M2t	1.203	0.655	0.686	0.686	4.115	1.407
26.70	26.70	1196.23	1.432	1.726	3-M2t	2.217	0.841	0.862	0.862	4.800	1.604
35.60	35.60	1196.64	1.717	2.141	3-M2t	2.217	0.997	1.011	1.011	5.403	1.755
44.50	44.50	1197.20	1.995	2.695	7-M2t	2.217	1.131	1.143	1.143	5.959	1.880
53.40	53.40	1197.95	2.287	3.450	7-M2t	2.217	1.257	1.261	1.261	6.483	1.987
62.30	57.77	1198.37	2.442	3.872	7-M2t	2.217	1.320	1.371	1.371	6.479	2.080
71.20	58.39	1198.43	2.464	3.945	7-M2t	2.217	1.328	1.472	1.472	6.134	2.164
72.80	58.48	1198.44	2.468	3.957	7-M2t	2.217	1.329	1.489	1.489	6.078	2.178
89.00	59.29	1198.52	2.498	4.103	7-M2t	2.217	1.340	1.656	1.656	5.626	2.309

 Straight Culvert
 Inlet Elevation (invert): 1194.50 ft, Outlet Elevation (invert): 1194.10 ft
 Culvert Length: 192.00 ft, Culvert Slope: 0.0021

Culvert Performance Curve Plot: Culvert 430



Water Surface Profile Plot for Culvert: Culvert 430



Site Data - Culvert 430

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1194.50 ft
 Outlet Station: 192.00 ft
 Outlet Elevation: 1194.10 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 430

Barrel Shape: Pipe Arch
 Barrel Span: 43.30 in
 Barrel Rise: 26.60 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0250
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1448+00 - Culvert 430)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1194.10	0.00	0.00	0.00	0.00
8.90	1194.56	0.46	1.11	0.09	0.31
17.80	1194.79	0.69	1.41	0.13	0.33
26.70	1194.96	0.86	1.60	0.16	0.34
35.60	1195.11	1.01	1.76	0.19	0.34
44.50	1195.24	1.14	1.88	0.21	0.35
53.40	1195.36	1.26	1.99	0.24	0.35
62.30	1195.47	1.37	2.08	0.26	0.36
71.20	1195.57	1.47	2.16	0.28	0.36
72.80	1195.59	1.49	2.18	0.28	0.36
89.00	1195.76	1.66	2.31	0.31	0.37

Tailwater Channel Data - 1448+00 - Culvert 430

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1194.10 ft

Roadway Data for Crossing: 1448+00 - Culvert 430

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1198.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 170.00 ft

HY-8 Culvert Analysis Report Structure 435

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 72.8 cfs

Maximum Flow: 89 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1461+83 - Culvert 435

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 435 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1195.80	0.00	0.00	0.00	1
1196.47	8.90	8.90	0.00	1
1196.80	17.80	17.80	0.00	1
1197.08	26.70	26.70	0.00	1
1197.32	35.60	35.60	0.00	1
1197.55	44.50	44.50	0.00	1
1197.76	53.40	53.40	0.00	1
1197.97	62.30	62.30	0.00	1
1198.17	71.20	71.20	0.00	1
1198.20	72.80	72.80	0.00	1
1198.57	89.00	89.00	0.00	1
1199.31	116.46	116.46	0.00	Overtopping

Rating Curve Plot for Crossing: 1461+83 - Culvert 435

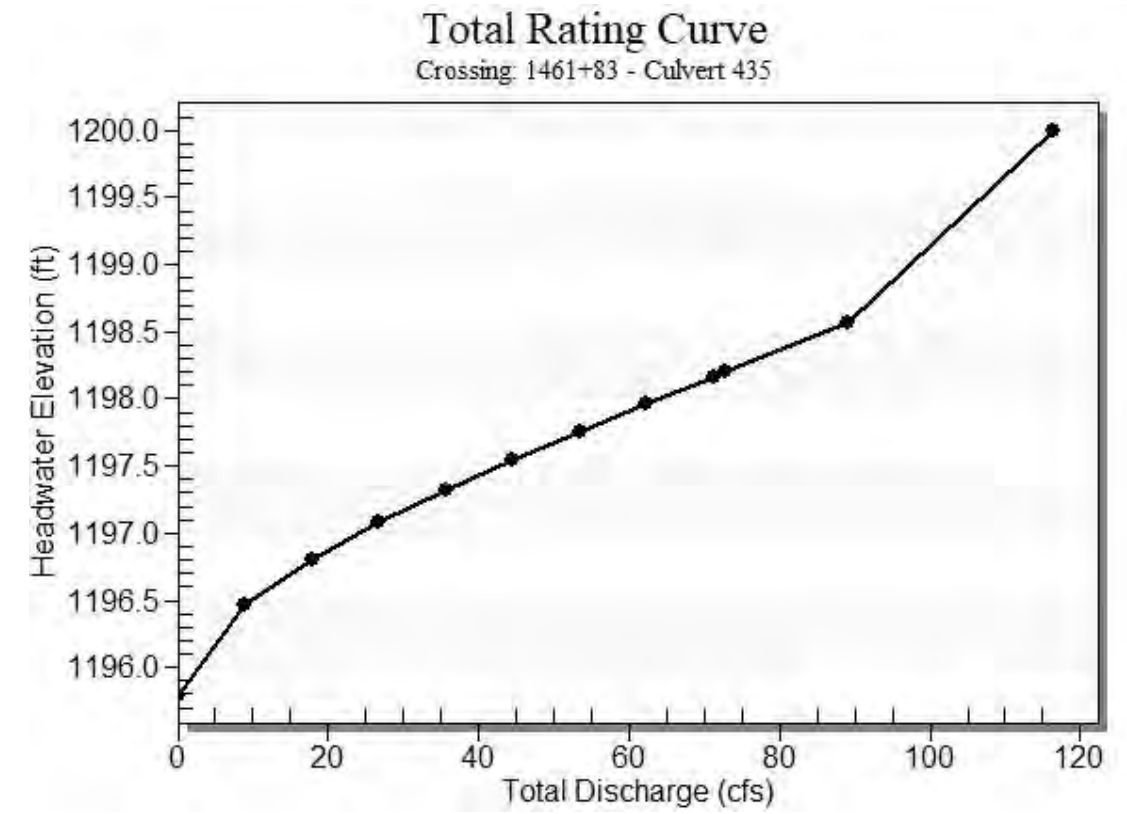
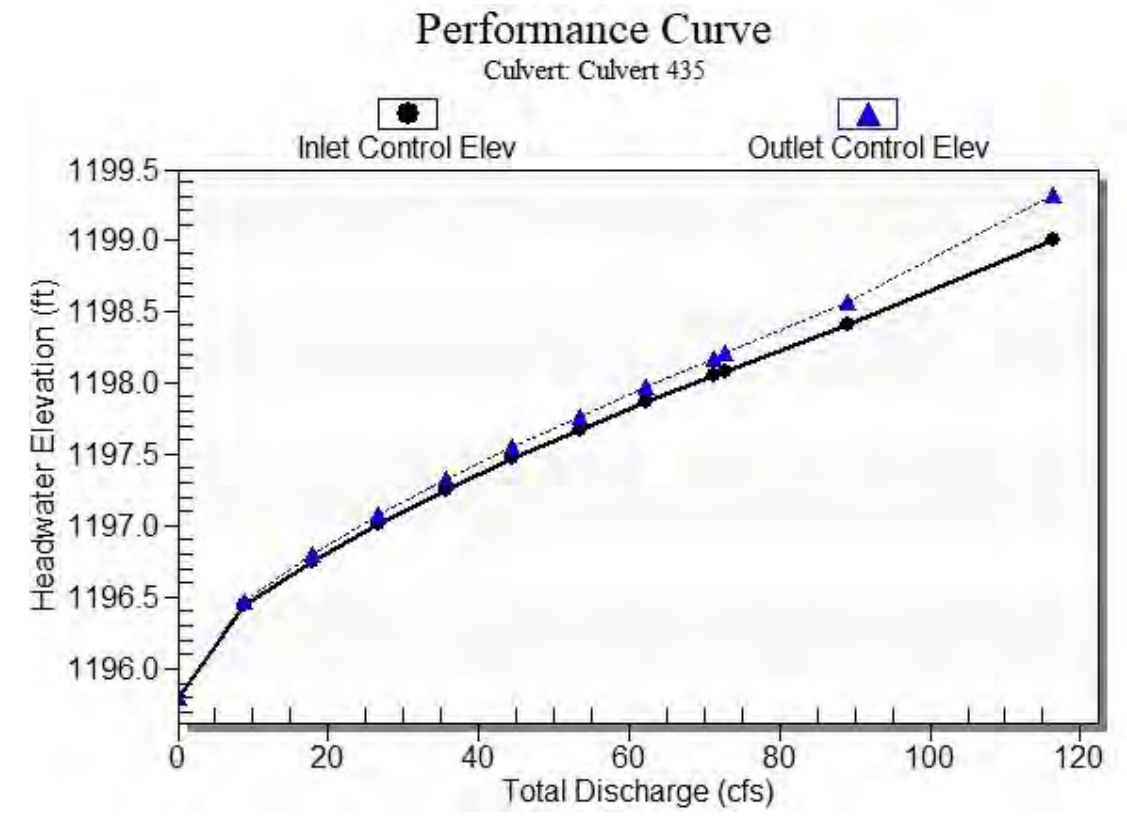


Table 2 - Culvert Summary Table: Culvert 435

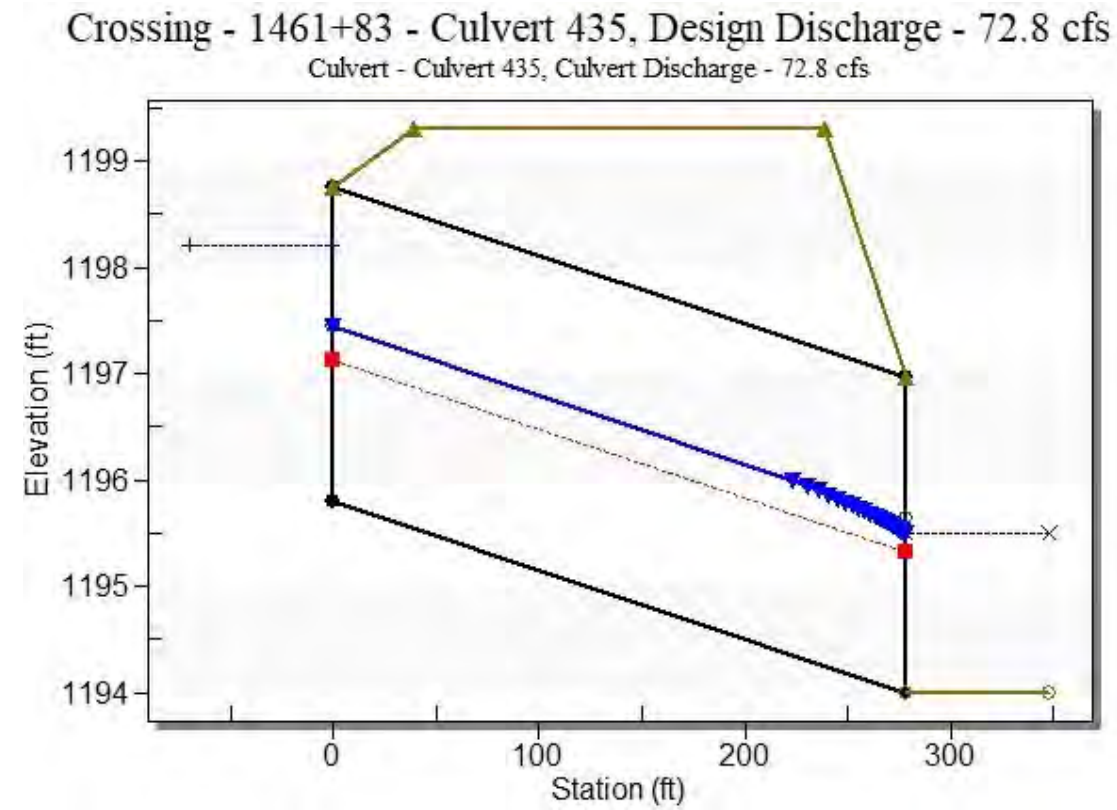
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1195.80	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
8.90	8.90	1196.47	0.643	0.671	3-M2t	0.469	0.401	0.461	0.461	2.672	1.114
17.80	17.80	1196.80	0.953	1.001	3-M1t	0.676	0.587	0.686	0.686	3.259	1.407
26.70	26.70	1197.08	1.214	1.276	3-M1t	0.849	0.736	0.862	0.862	3.735	1.604
35.60	35.60	1197.32	1.445	1.520	3-M1t	1.009	0.867	1.011	1.011	4.151	1.755
44.50	44.50	1197.55	1.667	1.747	3-M2t	1.161	0.991	1.143	1.143	4.532	1.880
53.40	53.40	1197.76	1.870	1.961	3-M2t	1.311	1.107	1.261	1.261	4.887	1.987
62.30	62.30	1197.97	2.061	2.166	3-M2t	1.460	1.208	1.371	1.371	5.222	2.080
71.20	71.20	1198.17	2.244	2.367	3-M2t	1.612	1.307	1.472	1.472	5.544	2.164
72.80	72.80	1198.20	2.276	2.403	3-M2t	1.640	1.324	1.489	1.489	5.601	2.178
89.00	89.00	1198.57	2.603	2.768	3-M2t	1.940	1.487	1.656	1.656	6.155	2.309

 Straight Culvert
 Inlet Elevation (invert): 1195.80 ft, Outlet Elevation (invert): 1194.00 ft
 Culvert Length: 278.01 ft, Culvert Slope: 0.0065

Culvert Performance Curve Plot: Culvert 435



Water Surface Profile Plot for Culvert: Culvert 435



Site Data - Culvert 435

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1195.80 ft
 Outlet Station: 278.00 ft
 Outlet Elevation: 1194.00 ft
 Number of Barrels: 2

Culvert Data Summary - Culvert 435

Barrel Shape: Pipe Arch
 Barrel Span: 57.80 in
 Barrel Rise: 35.50 in
 Barrel Material: Steel or Aluminum
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1461+83 - Culvert 435)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1194.00	0.00	0.00	0.00	0.00
8.90	1194.46	0.46	1.11	0.09	0.31
17.80	1194.69	0.69	1.41	0.13	0.33
26.70	1194.86	0.86	1.60	0.16	0.34
35.60	1195.01	1.01	1.76	0.19	0.34
44.50	1195.14	1.14	1.88	0.21	0.35
53.40	1195.26	1.26	1.99	0.24	0.35
62.30	1195.37	1.37	2.08	0.26	0.36
71.20	1195.47	1.47	2.16	0.28	0.36
72.80	1195.49	1.49	2.18	0.28	0.36
89.00	1195.66	1.66	2.31	0.31	0.37

Tailwater Channel Data - 1461+83 - Culvert 435

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 5.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0400
 Channel Invert Elevation: 1194.00 ft

Roadway Data for Crossing: 1461+83 - Culvert 435

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1199.31 ft
 Roadway Surface: Paved
 Roadway Top Width: 200.00 ft

HY-8 Culvert Analysis Report Structure 10 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 127.5 cfs

Maximum Flow: 144 cfs

Table 1 - Summary of Culvert Flows at Crossing: 929+00 - Culvert 10 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 10 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1144.50	0.00	0.00	0.00	1
1146.81	14.40	14.40	0.00	1
1148.28	28.80	20.41	8.23	16
1148.37	43.20	20.70	22.29	5
1148.44	57.60	20.90	36.42	4
1148.50	72.00	21.10	50.77	4
1148.55	86.40	21.30	64.80	3
1148.60	100.80	21.44	79.18	3
1148.65	115.20	21.62	93.52	3
1148.69	127.50	21.74	105.74	3
1148.74	144.00	21.91	122.08	3
1148.19	20.09	20.09	0.00	Overtopping

Rating Curve Plot for Crossing: 929+00 - Culvert 10 (Revised)

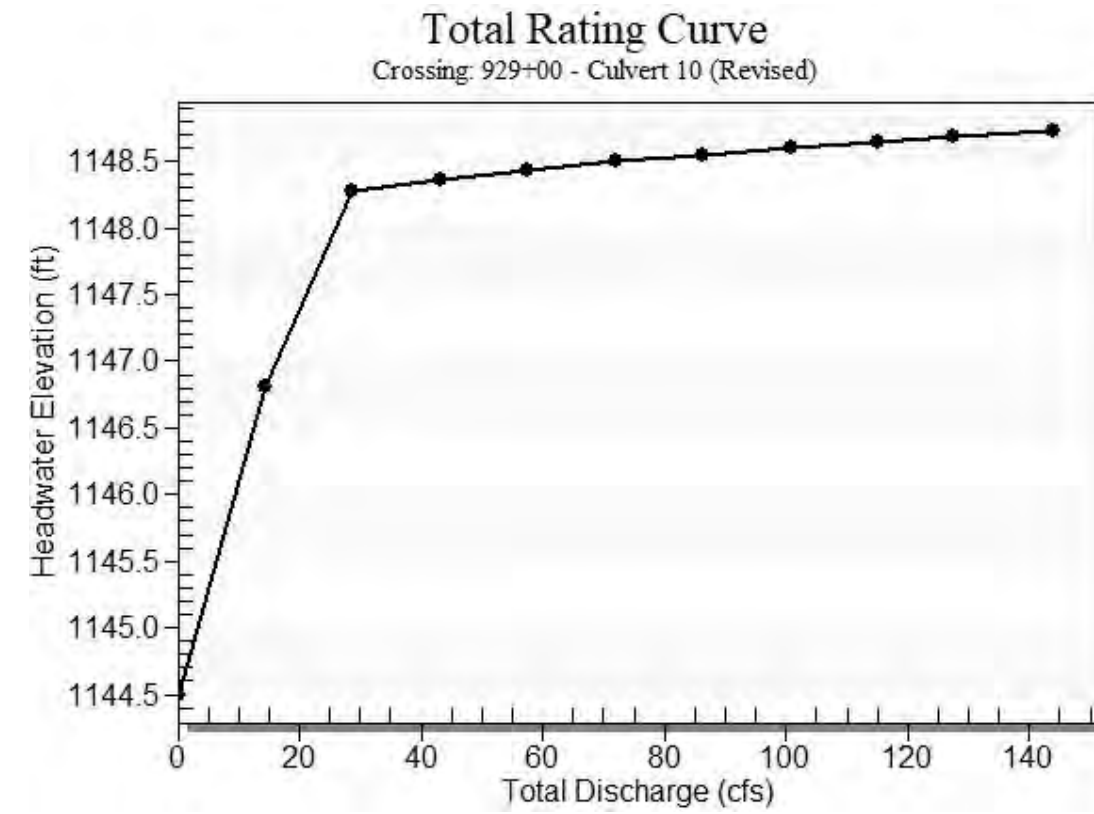
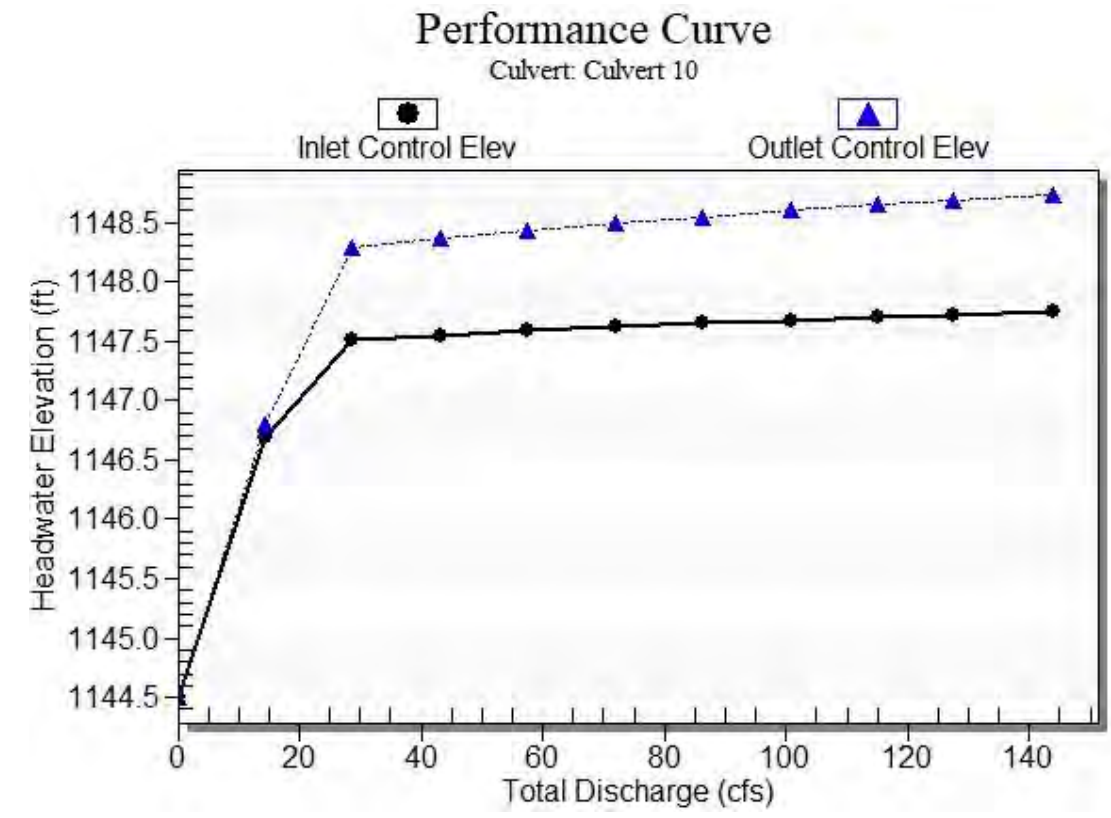


Table 2 - Culvert Summary Table: Culvert 10

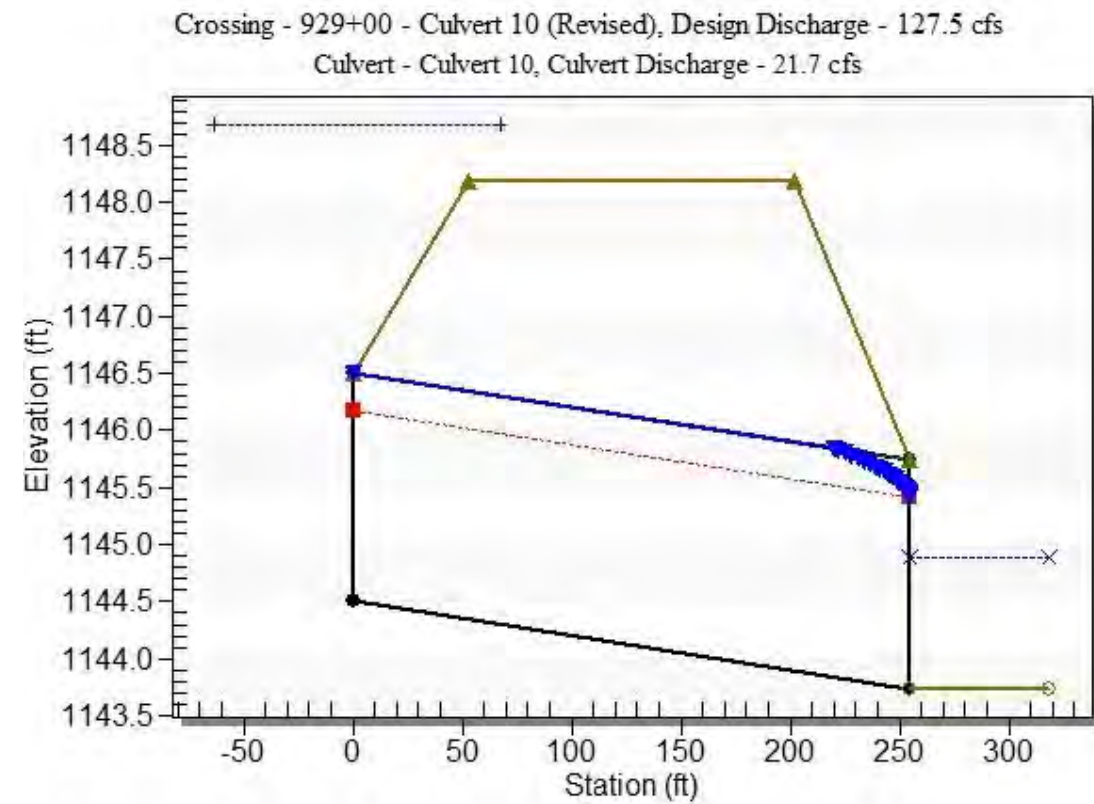
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1144.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
14.40	14.40	1146.81	2.185	2.307	7-M2c	2.000	1.363	1.363	0.321	6.312	2.812
28.80	20.41	1148.28	3.006	3.782	7-M2c	2.000	1.619	1.619	0.483	7.490	3.624
43.20	20.70	1148.37	3.052	3.867	7-M2c	2.000	1.630	1.630	0.613	7.552	4.187
57.60	20.90	1148.44	3.085	3.936	7-M2c	2.000	1.637	1.637	0.725	7.595	4.628
72.00	21.10	1148.50	3.118	3.996	7-M2c	2.000	1.644	1.644	0.825	7.638	4.996
86.40	21.30	1148.55	3.152	4.049	7-M2c	2.000	1.651	1.651	0.916	7.681	5.314
100.80	21.44	1148.60	3.176	4.100	7-M2c	2.000	1.655	1.655	1.001	7.712	5.595
115.20	21.62	1148.65	3.206	4.147	7-M2c	2.000	1.661	1.661	1.080	7.751	5.847
127.50	21.74	1148.69	3.227	4.184	7-M2c	2.000	1.665	1.665	1.144	7.777	6.044
144.00	21.91	1148.74	3.255	4.236	7-M2c	2.000	1.671	1.671	1.226	7.814	6.288

 Straight Culvert
 Inlet Elevation (invert): 1144.50 ft, Outlet Elevation (invert): 1143.74 ft
 Culvert Length: 255.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 10



Water Surface Profile Plot for Culvert: Culvert 10



Site Data - Culvert 10

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1144.50 ft
 Outlet Station: 255.00 ft
 Outlet Elevation: 1143.74 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 10

Barrel Shape: Circular
 Barrel Diameter: 2.00 ft
 Barrel Material: Smooth HDPE
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 929+00 - Culvert 10)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1143.74	0.00	0.00	0.00	0.00
14.40	1144.06	0.32	2.81	0.06	0.90
28.80	1144.22	0.48	3.62	0.09	0.96
43.20	1144.35	0.61	4.19	0.11	0.99
57.60	1144.46	0.72	4.63	0.14	1.02
72.00	1144.56	0.82	5.00	0.15	1.04
86.40	1144.66	0.92	5.31	0.17	1.05
100.80	1144.74	1.00	5.59	0.19	1.06
115.20	1144.82	1.08	5.85	0.20	1.08
127.50	1144.88	1.14	6.04	0.21	1.08
144.00	1144.97	1.23	6.29	0.23	1.09

(Revised))

Tailwater Channel Data - 929+00 - Culvert 10 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1143.74 ft

Roadway Data for Crossing: 929+00 - Culvert 10 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1148.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 15 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 127.5 cfs

Maximum Flow: 144 cfs

Table 1 - Summary of Culvert Flows at Crossing: 937+00 - Culvert 15 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 15 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1144.00	0.00	0.00	0.00	1
1146.30	14.40	14.40	0.00	1
1148.75	28.80	23.84	4.75	22
1148.85	43.20	24.12	18.95	6
1148.92	57.60	24.35	33.18	5
1148.98	72.00	24.55	47.35	4
1149.04	86.40	24.70	61.64	4
1149.09	100.80	24.87	75.77	3
1149.14	115.20	25.00	90.12	3
1149.18	127.50	25.12	102.32	3
1149.23	144.00	25.28	118.70	3
1148.69	23.64	23.64	0.00	Overtopping

Rating Curve Plot for Crossing: 937+00 - Culvert 15 (Revised)

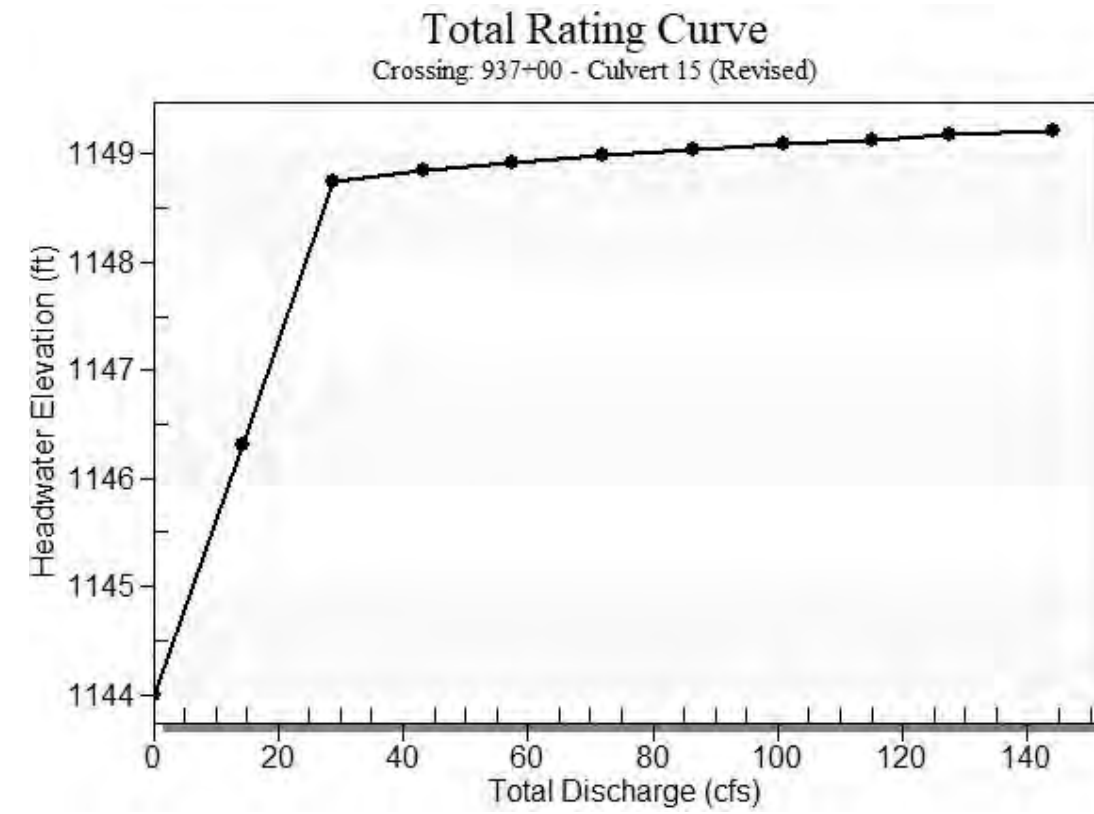
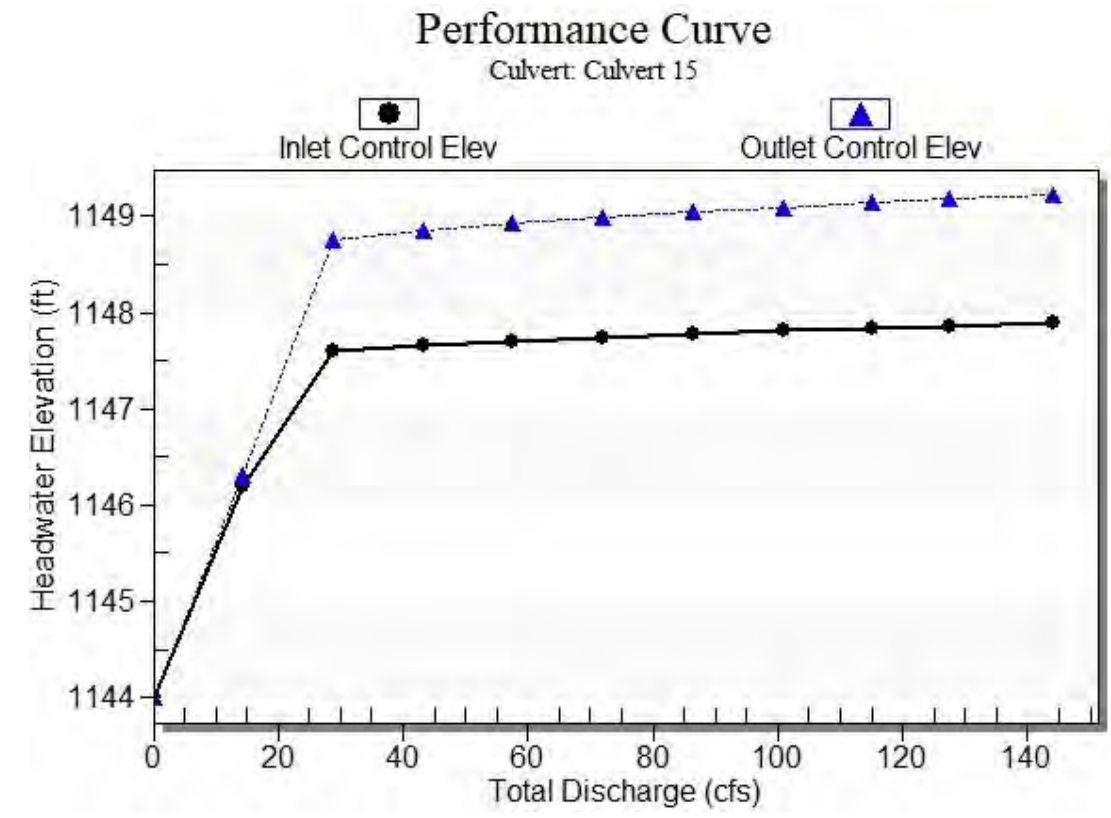


Table 2 - Culvert Summary Table: Culvert 15

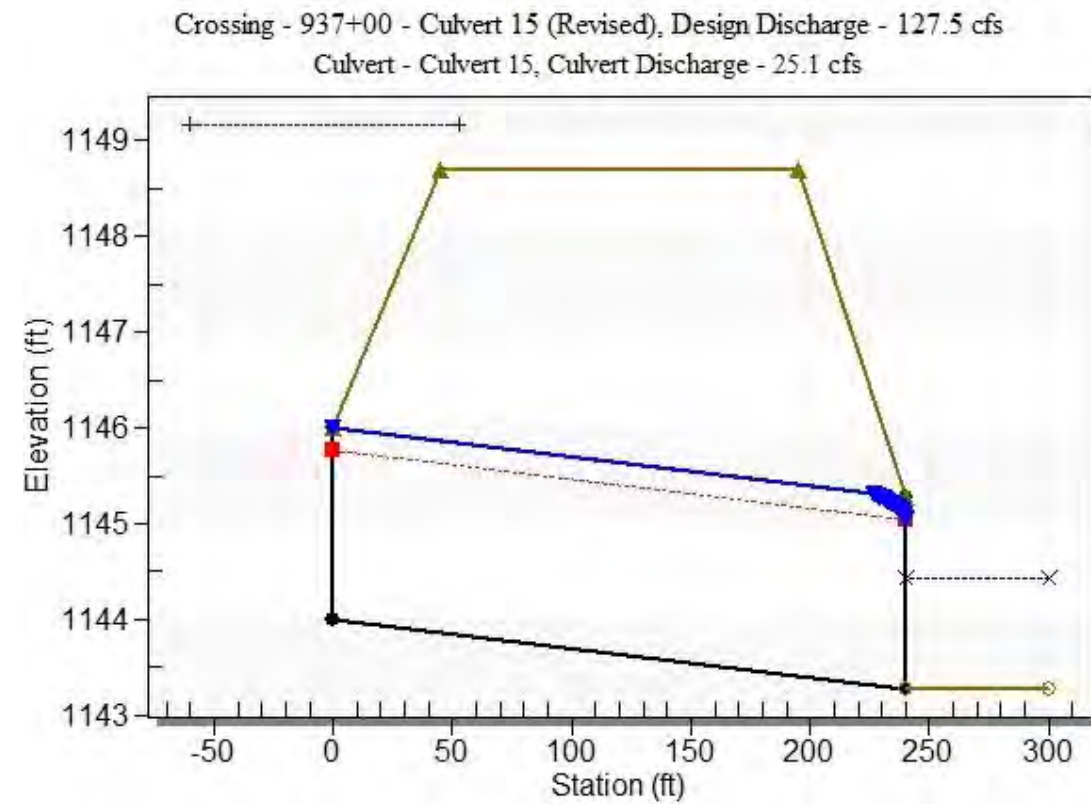
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1144.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
14.40	14.40	1146.30	2.185	2.302	7-M2c	2.000	1.363	1.363	0.321	6.312	2.812
28.80	23.84	1148.75	3.607	4.754	7-M2c	2.000	1.730	1.730	0.483	8.254	3.624
43.20	24.12	1148.85	3.661	4.851	7-M2c	2.000	1.738	1.738	0.613	8.321	4.187
57.60	24.35	1148.92	3.706	4.924	7-M2c	2.000	1.744	1.744	0.725	8.375	4.628
72.00	24.55	1148.98	3.744	4.982	7-M2c	2.000	1.750	1.750	0.825	8.423	4.996
86.40	24.70	1149.04	3.774	5.037	7-M2c	2.000	1.754	1.754	0.916	8.459	5.314
100.80	24.87	1149.09	3.808	5.088	7-M2c	2.000	1.758	1.758	1.001	8.501	5.595
115.20	25.00	1149.14	3.835	5.137	7-M2c	2.000	1.762	1.762	1.080	8.533	5.847
127.50	25.12	1149.18	3.859	5.177	7-M2c	2.000	1.765	1.765	1.144	8.562	6.044
144.00	25.28	1149.23	3.892	5.226	7-M2c	2.000	1.769	1.769	1.226	8.602	6.288

 Straight Culvert
 Inlet Elevation (invert): 1144.00 ft, Outlet Elevation (invert): 1143.28 ft
 Culvert Length: 240.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 15



Water Surface Profile Plot for Culvert: Culvert 15



Site Data - Culvert 15

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1144.00 ft
 Outlet Station: 240.00 ft
 Outlet Elevation: 1143.28 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 15

Barrel Shape: Circular
 Barrel Diameter: 2.00 ft
 Barrel Material: Smooth HDPE
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 937+00 - Culvert 15

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1143.28	0.00	0.00	0.00	0.00
14.40	1143.60	0.32	2.81	0.06	0.90
28.80	1143.76	0.48	3.62	0.09	0.96
43.20	1143.89	0.61	4.19	0.11	0.99
57.60	1144.00	0.72	4.63	0.14	1.02
72.00	1144.10	0.82	5.00	0.15	1.04
86.40	1144.20	0.92	5.31	0.17	1.05
100.80	1144.28	1.00	5.59	0.19	1.06
115.20	1144.36	1.08	5.85	0.20	1.08
127.50	1144.42	1.14	6.04	0.21	1.08
144.00	1144.51	1.23	6.29	0.23	1.09

(Revised))

Tailwater Channel Data - 937+00 - Culvert 15 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1143.28 ft

Roadway Data for Crossing: 937+00 - Culvert 15 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1148.69 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 20 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 945+10 - Culvert 20 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 20 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1144.00	0.00	0.00	0.00	1
1145.34	6.88	6.88	0.00	1
1145.96	13.76	13.76	0.00	1
1146.49	20.64	20.64	0.00	1
1147.06	27.52	27.52	0.00	1
1148.06	34.40	34.40	0.00	1
1149.20	41.28	40.84	0.34	34
1149.27	48.16	41.20	6.83	6
1149.30	52.80	41.38	11.25	4
1149.36	61.92	41.65	20.15	4
1149.39	68.80	41.81	26.95	4
1149.19	40.75	40.75	0.00	Overtopping

Rating Curve Plot for Crossing: 945+10 - Culvert 20 (Revised)

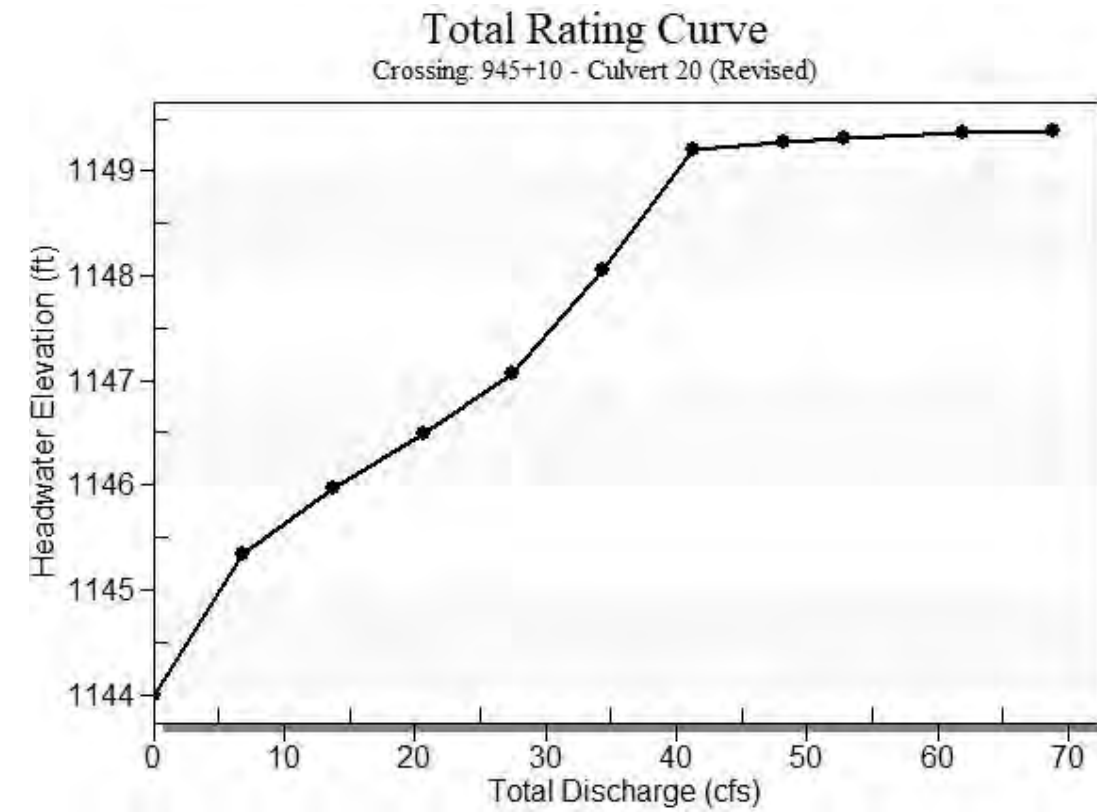
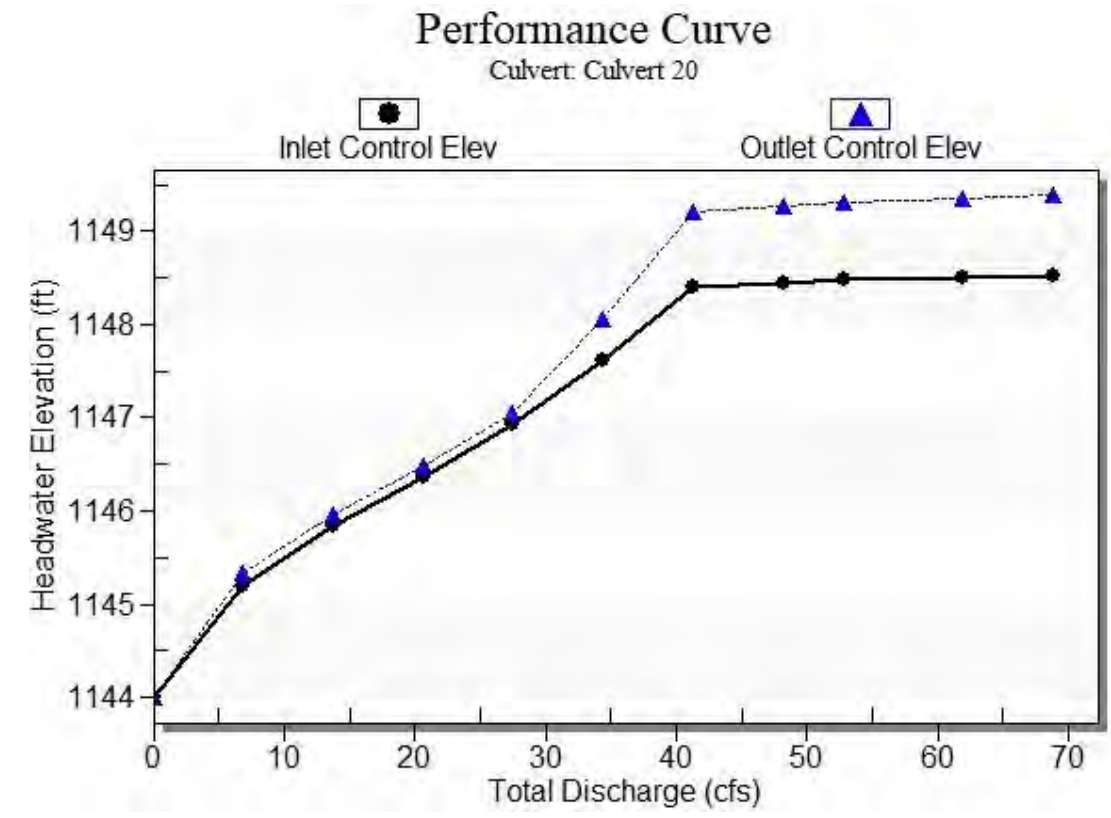


Table 2 - Culvert Summary Table: Culvert 20

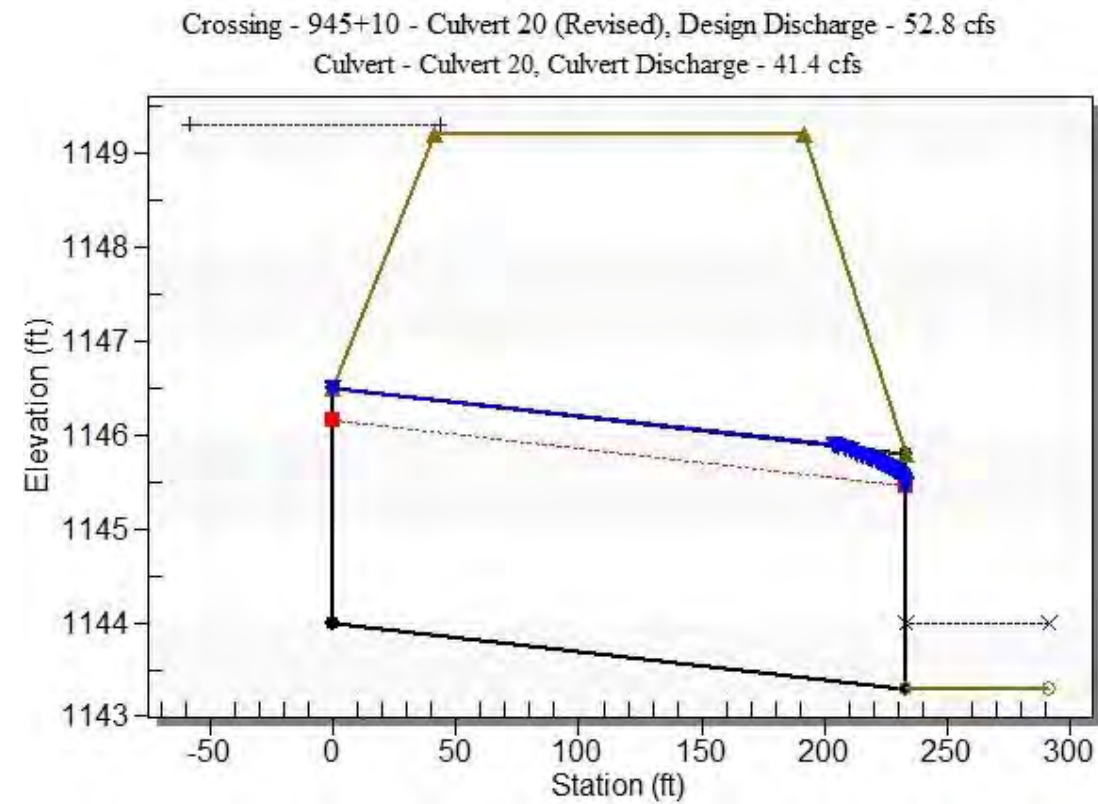
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1144.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1145.34	1.200	1.342	2-M2c	0.885	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1145.96	1.838	1.961	2-M2c	1.309	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1146.49	2.371	2.486	2-M2c	1.719	1.541	1.541	0.397	6.502	3.211
27.52	27.52	1147.06	2.935	3.057	7-M2c	2.500	1.787	1.787	0.470	7.332	3.564
34.40	34.40	1148.06	3.616	4.060	7-M2c	2.500	1.991	1.991	0.536	8.206	3.861
41.28	40.84	1149.20	4.400	5.201	7-M2c	2.500	2.146	2.146	0.597	9.108	4.120
48.16	41.20	1149.27	4.448	5.269	7-M2c	2.500	2.153	2.153	0.653	9.162	4.349
52.80	41.38	1149.30	4.473	5.304	7-M2c	2.500	2.157	2.157	0.689	9.189	4.491
61.92	41.65	1149.36	4.510	5.355	7-M2c	2.500	2.163	2.163	0.756	9.230	4.745
68.80	41.81	1149.39	4.531	5.392	7-M2c	2.500	2.166	2.166	0.803	9.253	4.920

 Straight Culvert
 Inlet Elevation (invert): 1144.00 ft, Outlet Elevation (invert): 1143.30 ft
 Culvert Length: 233.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 20



Water Surface Profile Plot for Culvert: Culvert 20



Site Data - Culvert 20

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1144.00 ft
 Outlet Station: 233.00 ft
 Outlet Elevation: 1143.30 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 20

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Smooth HDPE
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 945+10 - Culvert 20)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1143.30	0.00	0.00	0.00	0.00
6.88	1143.51	0.21	2.13	0.04	0.84
13.76	1143.61	0.31	2.76	0.06	0.90
20.64	1143.70	0.40	3.21	0.07	0.93
27.52	1143.77	0.47	3.56	0.09	0.95
34.40	1143.84	0.54	3.86	0.10	0.97
41.28	1143.90	0.60	4.12	0.11	0.99
48.16	1143.95	0.65	4.35	0.12	1.00
52.80	1143.99	0.69	4.49	0.13	1.01
61.92	1144.06	0.76	4.75	0.14	1.02
68.80	1144.10	0.80	4.92	0.15	1.03

(Revised))

Tailwater Channel Data - 945+10 - Culvert 20 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1143.30 ft

Roadway Data for Crossing: 945+10 - Culvert 20 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1149.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 25 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 948+00 - Culvert 25 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 25 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1144.50	0.00	0.00	0.00	1
1145.84	6.88	6.88	0.00	1
1146.46	13.76	13.76	0.00	1
1146.99	20.64	20.64	0.00	1
1147.56	27.52	27.52	0.00	1
1148.53	34.40	34.40	0.00	1
1149.69	41.28	41.10	0.00	51
1149.77	48.16	41.54	6.46	6
1149.80	52.80	41.71	10.90	4
1149.86	61.92	41.96	19.82	4
1149.89	68.80	42.18	26.42	3
1149.69	41.11	41.11	0.00	Overtopping

Rating Curve Plot for Crossing: 948+00 - Culvert 25 (Revised)

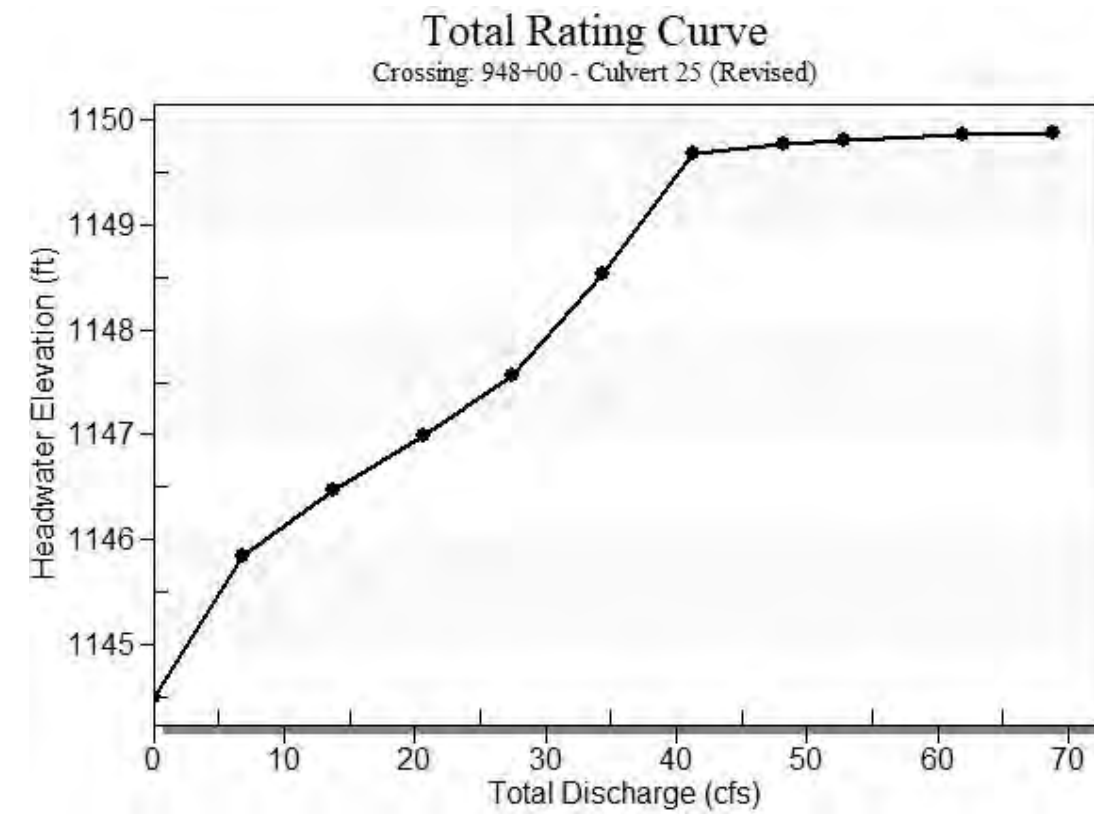
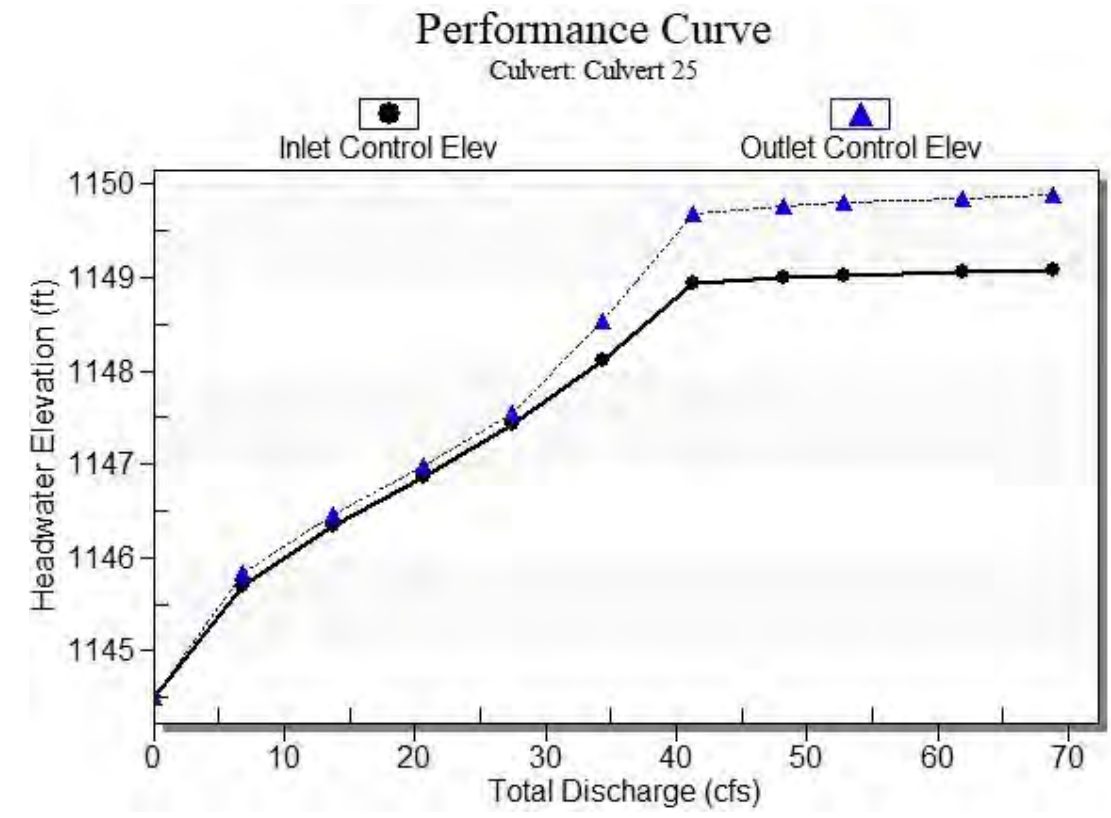


Table 2 - Culvert Summary Table: Culvert 25

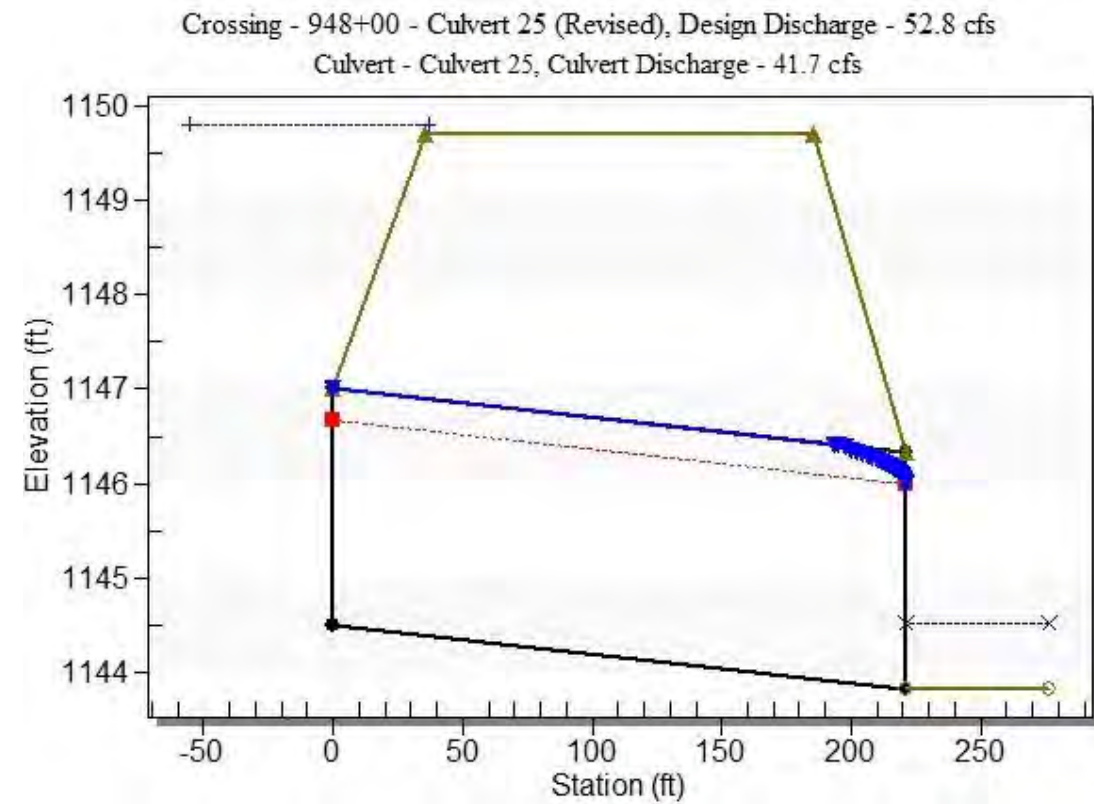
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1144.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1145.84	1.200	1.341	2-M2c	0.886	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1146.46	1.838	1.960	2-M2c	1.311	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1146.99	2.371	2.486	2-M2c	1.723	1.541	1.541	0.397	6.502	3.211
27.52	27.52	1147.56	2.935	3.055	7-M2c	2.500	1.787	1.787	0.470	7.332	3.564
34.40	34.40	1148.53	3.616	4.029	7-M2c	2.500	1.991	1.991	0.536	8.206	3.861
41.28	41.10	1149.69	4.434	5.188	7-M2c	2.500	2.151	2.151	0.597	9.146	4.120
48.16	41.54	1149.77	4.494	5.269	7-M2c	2.500	2.160	2.160	0.653	9.212	4.349
52.80	41.71	1149.80	4.518	5.301	7-M2c	2.500	2.164	2.164	0.689	9.238	4.491
61.92	41.96	1149.86	4.552	5.356	7-M2c	2.500	2.169	2.169	0.756	9.276	4.745
68.80	42.18	1149.89	4.583	5.389	7-M2c	2.500	2.173	2.173	0.803	9.310	4.920

 Straight Culvert
 Inlet Elevation (invert): 1144.50 ft, Outlet Elevation (invert): 1143.84 ft
 Culvert Length: 221.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 25



Water Surface Profile Plot for Culvert: Culvert 25



Site Data - Culvert 25

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1144.50 ft
 Outlet Station: 221.00 ft
 Outlet Elevation: 1143.84 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 25

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Smooth HDPE
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 948+00 - Culvert 25

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1143.84	0.00	0.00	0.00	0.00
6.88	1144.05	0.21	2.13	0.04	0.84
13.76	1144.15	0.31	2.76	0.06	0.90
20.64	1144.24	0.40	3.21	0.07	0.93
27.52	1144.31	0.47	3.56	0.09	0.95
34.40	1144.38	0.54	3.86	0.10	0.97
41.28	1144.44	0.60	4.12	0.11	0.99
48.16	1144.49	0.65	4.35	0.12	1.00
52.80	1144.53	0.69	4.49	0.13	1.01
61.92	1144.60	0.76	4.75	0.14	1.02
68.80	1144.64	0.80	4.92	0.15	1.03

(Revised))

Tailwater Channel Data - 948+00 - Culvert 25 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (1:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1143.84 ft

Roadway Data for Crossing: 948+00 - Culvert 25 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1149.69 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 30 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 954+25 - Culvert 30 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 30 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1145.50	0.00	0.00	0.00	1
1146.84	6.88	6.88	0.00	1
1147.46	13.76	13.76	0.00	1
1147.99	20.64	20.64	0.00	1
1148.55	27.52	27.52	0.00	1
1149.51	34.40	34.40	0.00	1
1149.75	41.28	35.75	5.33	10
1149.80	48.16	36.09	12.00	5
1149.83	52.80	36.28	16.44	4
1149.87	61.92	36.61	25.26	4
1149.91	68.80	36.80	31.86	3
1149.68	35.46	35.46	0.00	Overtopping

Rating Curve Plot for Crossing: 954+25 - Culvert 30 (Revised)

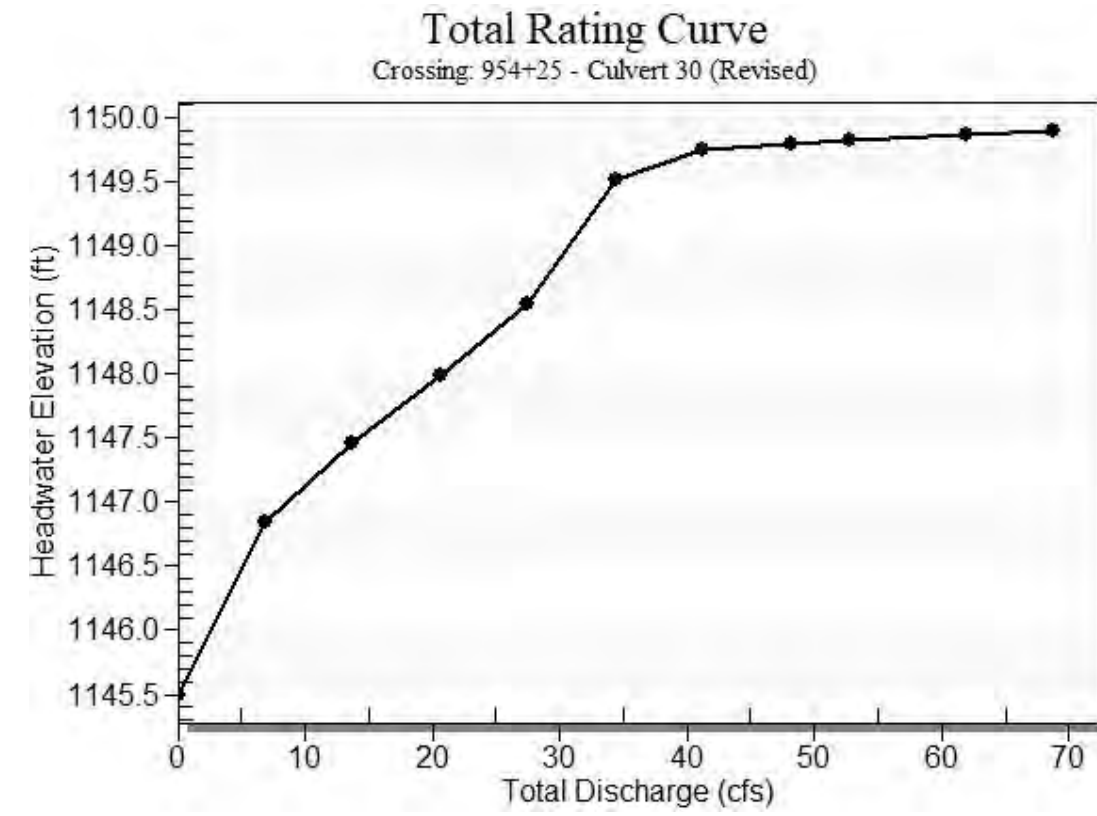
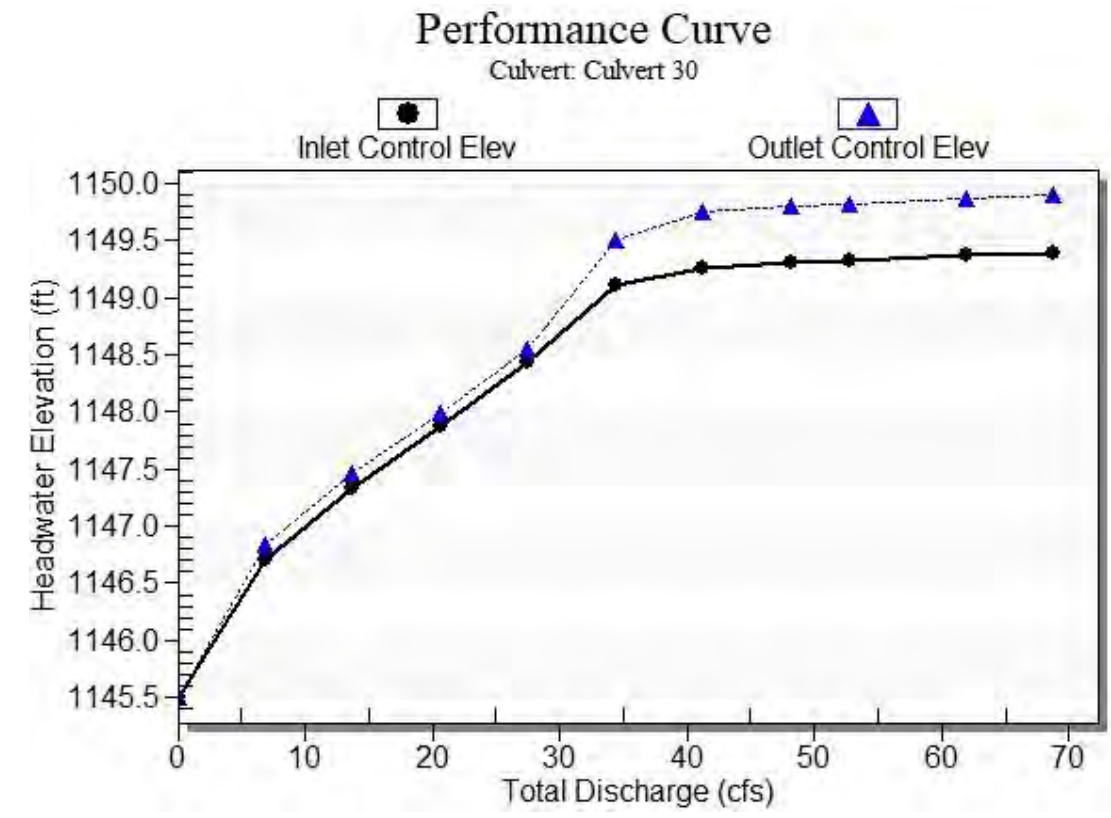


Table 2 - Culvert Summary Table: Culvert 30

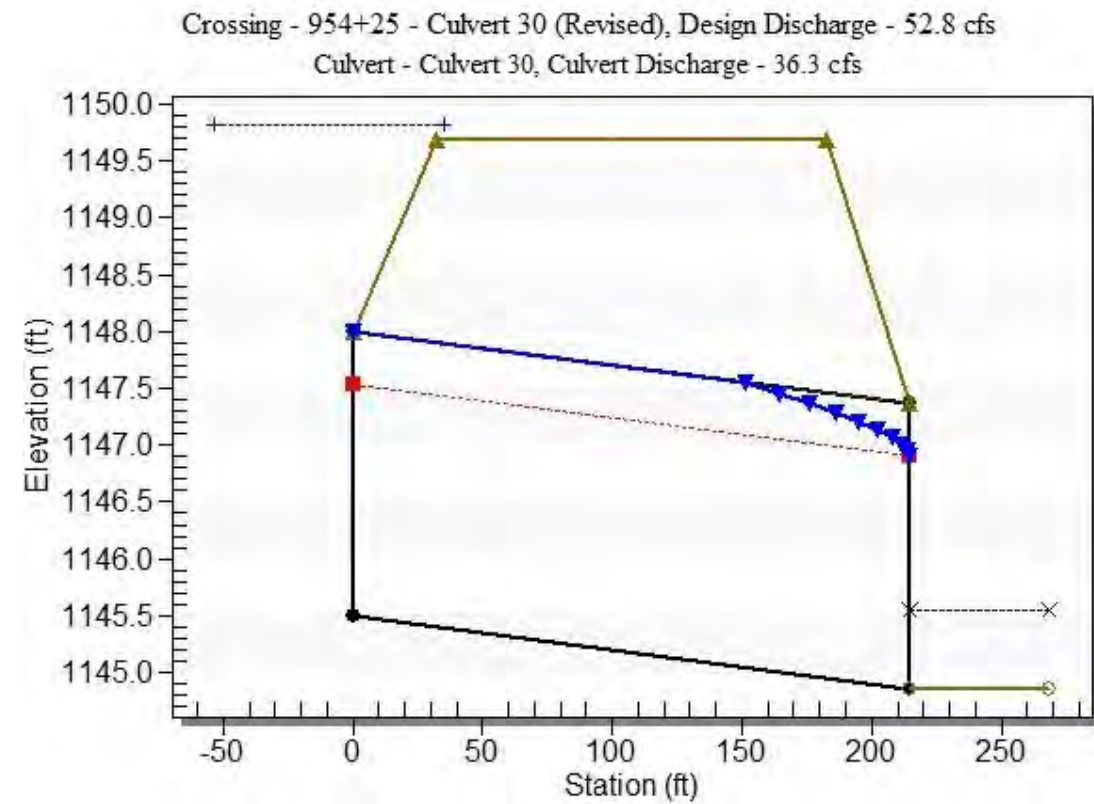
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1145.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1146.84	1.200	1.341	2-M2c	0.887	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1147.46	1.838	1.960	2-M2c	1.312	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1147.99	2.371	2.486	2-M2c	1.725	1.541	1.541	0.397	6.502	3.211
27.52	27.52	1148.55	2.935	3.055	7-M2c	2.500	1.787	1.787	0.470	7.332	3.564
34.40	34.40	1149.51	3.616	4.013	7-M2c	2.500	1.991	1.991	0.536	8.206	3.861
41.28	35.75	1149.75	3.768	4.250	7-M2c	2.500	2.027	2.027	0.597	8.388	4.120
48.16	36.09	1149.80	3.807	4.298	7-M2c	2.500	2.035	2.035	0.653	8.433	4.349
52.80	36.28	1149.83	3.829	4.326	7-M2c	2.500	2.040	2.040	0.689	8.459	4.491
61.92	36.61	1149.87	3.868	4.373	7-M2c	2.500	2.048	2.048	0.756	8.504	4.745
68.80	36.80	1149.91	3.890	4.405	7-M2c	2.500	2.053	2.053	0.803	8.531	4.920

 Straight Culvert
 Inlet Elevation (invert): 1145.50 ft, Outlet Elevation (invert): 1144.86 ft
 Culvert Length: 215.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 30



Water Surface Profile Plot for Culvert: Culvert 30



Site Data - Culvert 30

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1145.50 ft
 Outlet Station: 215.00 ft
 Outlet Elevation: 1144.86 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 30

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Smooth HDPE
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 954+25 - Culvert 30)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1144.86	0.00	0.00	0.00	0.00
6.88	1145.07	0.21	2.13	0.04	0.84
13.76	1145.17	0.31	2.76	0.06	0.90
20.64	1145.26	0.40	3.21	0.07	0.93
27.52	1145.33	0.47	3.56	0.09	0.95
34.40	1145.40	0.54	3.86	0.10	0.97
41.28	1145.46	0.60	4.12	0.11	0.99
48.16	1145.51	0.65	4.35	0.12	1.00
52.80	1145.55	0.69	4.49	0.13	1.01
61.92	1145.62	0.76	4.75	0.14	1.02
68.80	1145.66	0.80	4.92	0.15	1.03

(Revised))

Tailwater Channel Data - 954+25 - Culvert 30 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1144.86 ft

Roadway Data for Crossing: 954+25 - Culvert 30 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1149.68 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 35 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 959+00 - Culvert 35 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 35 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1145.70	0.00	0.00	0.00	1
1147.04	6.88	6.88	0.00	1
1147.66	13.76	13.76	0.00	1
1148.19	20.64	20.64	0.00	1
1148.76	27.52	27.52	0.00	1
1149.74	34.40	34.40	0.00	1
1150.25	41.28	37.36	3.80	17
1150.30	48.16	37.66	10.38	5
1150.33	52.80	37.71	14.97	4
1150.38	61.92	38.02	23.83	4
1150.41	68.80	38.23	30.41	3
1150.19	37.05	37.05	0.00	Overtopping

Rating Curve Plot for Crossing: 959+00 - Culvert 35 (Revised)

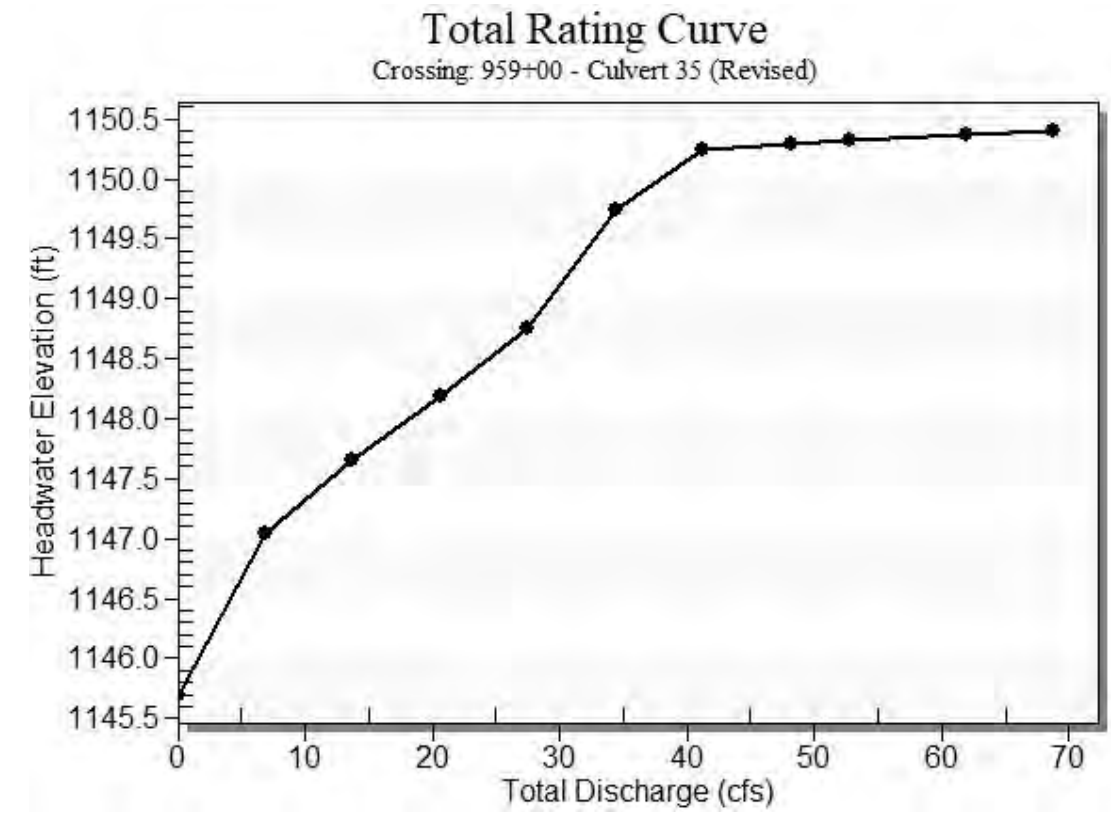
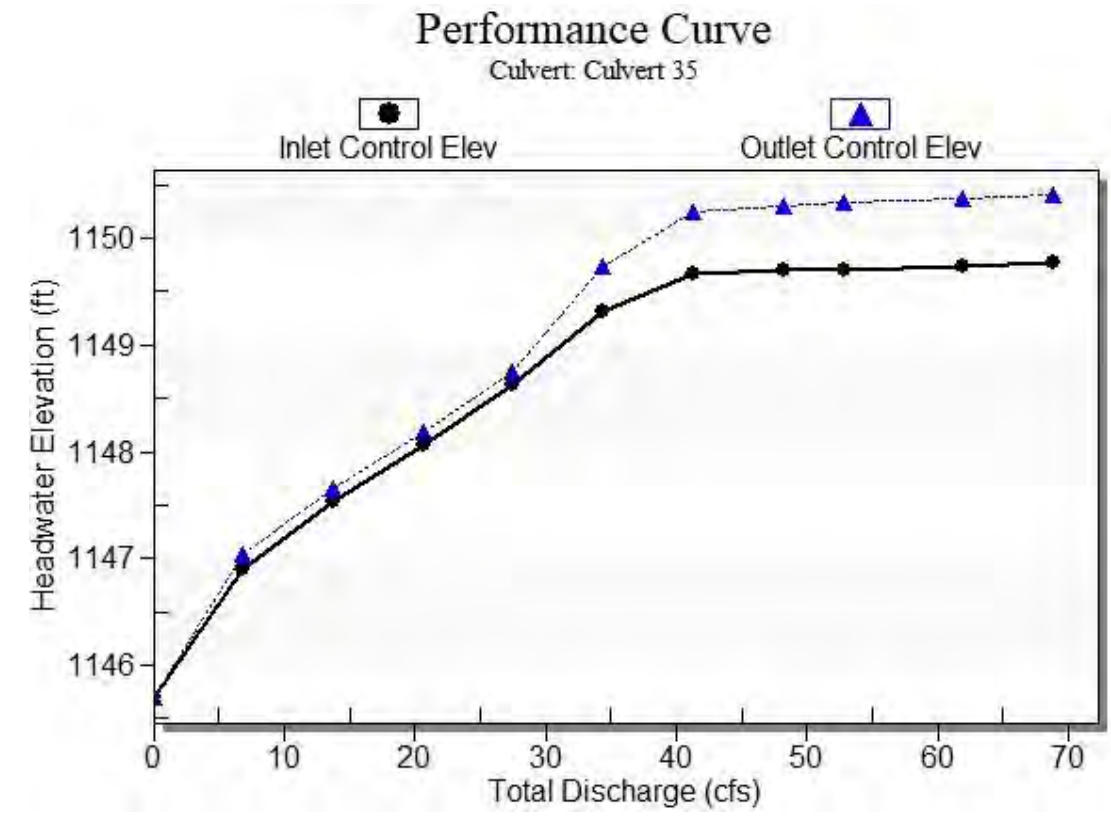


Table 2 - Culvert Summary Table: Culvert 35

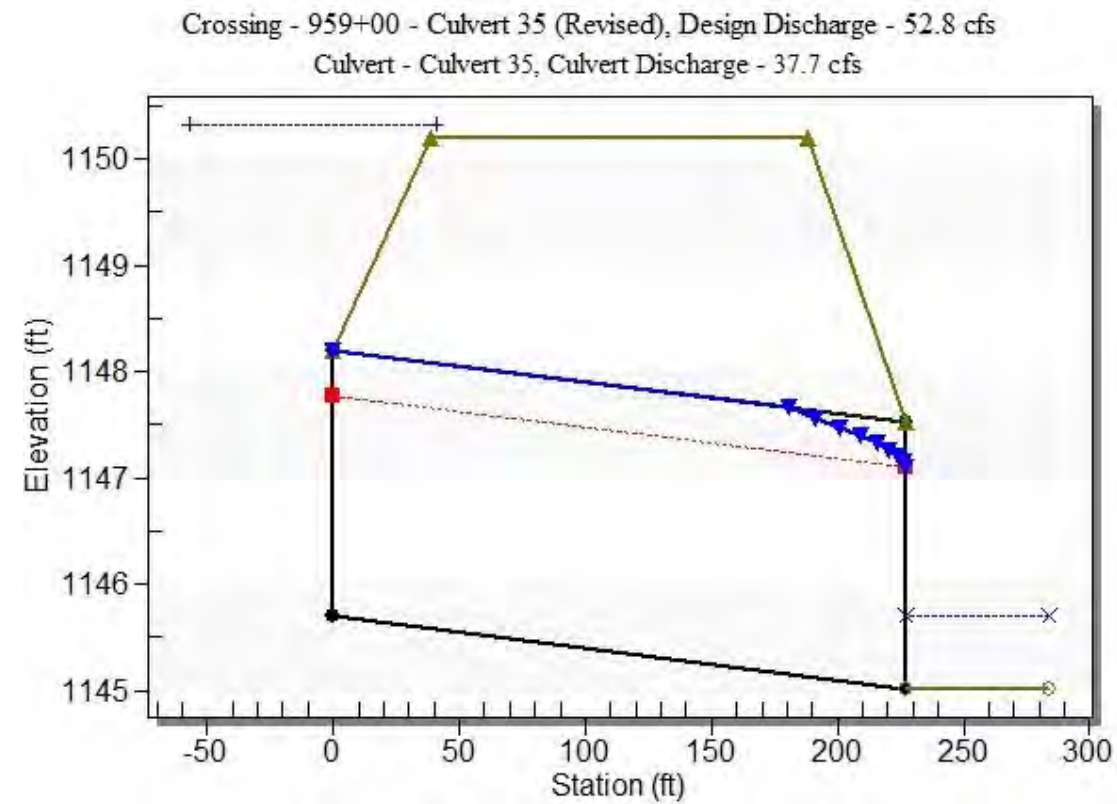
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1145.70	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1147.04	1.200	1.341	2-M2c	0.885	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1147.66	1.838	1.961	2-M2c	1.310	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1148.19	2.371	2.486	2-M2c	1.721	1.541	1.541	0.397	6.502	3.211
27.52	27.52	1148.76	2.935	3.056	7-M2c	2.500	1.787	1.787	0.470	7.332	3.564
34.40	34.40	1149.74	3.616	4.044	7-M2c	2.500	1.991	1.991	0.536	8.206	3.861
41.28	37.36	1150.25	3.958	4.545	7-M2c	2.500	2.067	2.067	0.597	8.609	4.120
48.16	37.66	1150.30	3.994	4.597	7-M2c	2.500	2.074	2.074	0.653	8.651	4.349
52.80	37.71	1150.33	3.999	4.628	7-M2c	2.500	2.075	2.075	0.689	8.657	4.491
61.92	38.02	1150.38	4.038	4.676	7-M2c	2.500	2.083	2.083	0.756	8.701	4.745
68.80	38.23	1150.41	4.063	4.708	7-M2c	2.500	2.088	2.088	0.803	8.730	4.920

 Straight Culvert
 Inlet Elevation (invert): 1145.70 ft, Outlet Elevation (invert): 1145.02 ft
 Culvert Length: 227.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 35



Water Surface Profile Plot for Culvert: Culvert 35



Site Data - Culvert 35

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1145.70 ft
 Outlet Station: 227.00 ft
 Outlet Elevation: 1145.02 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 35

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Smooth HDPE
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 959+00 - Culvert 35)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1145.02	0.00	0.00	0.00	0.00
6.88	1145.23	0.21	2.13	0.04	0.84
13.76	1145.33	0.31	2.76	0.06	0.90
20.64	1145.42	0.40	3.21	0.07	0.93
27.52	1145.49	0.47	3.56	0.09	0.95
34.40	1145.56	0.54	3.86	0.10	0.97
41.28	1145.62	0.60	4.12	0.11	0.99
48.16	1145.67	0.65	4.35	0.12	1.00
52.80	1145.71	0.69	4.49	0.13	1.01
61.92	1145.78	0.76	4.75	0.14	1.02
68.80	1145.82	0.80	4.92	0.15	1.03

(Revised))

Tailwater Channel Data - 959+00 - Culvert 35 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1145.02 ft

Roadway Data for Crossing: 959+00 - Culvert 35 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1150.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 40 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 52.8 cfs

Maximum Flow: 68.8 cfs

Table 1 - Summary of Culvert Flows at Crossing: 964+00 - Culvert 40 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 40 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1146.00	0.00	0.00	0.00	1
1147.34	6.88	6.88	0.00	1
1147.96	13.76	13.76	0.00	1
1148.49	20.64	20.64	0.00	1
1149.06	27.52	27.52	0.00	1
1150.07	34.40	34.40	0.00	1
1150.74	41.28	38.20	2.89	21
1150.79	48.16	38.55	9.47	5
1150.82	52.80	38.73	13.95	4
1150.87	61.92	39.01	22.83	4
1150.90	68.80	39.19	29.43	3
1150.69	37.91	37.91	0.00	Overtopping

Rating Curve Plot for Crossing: 964+00 - Culvert 40 (Revised)

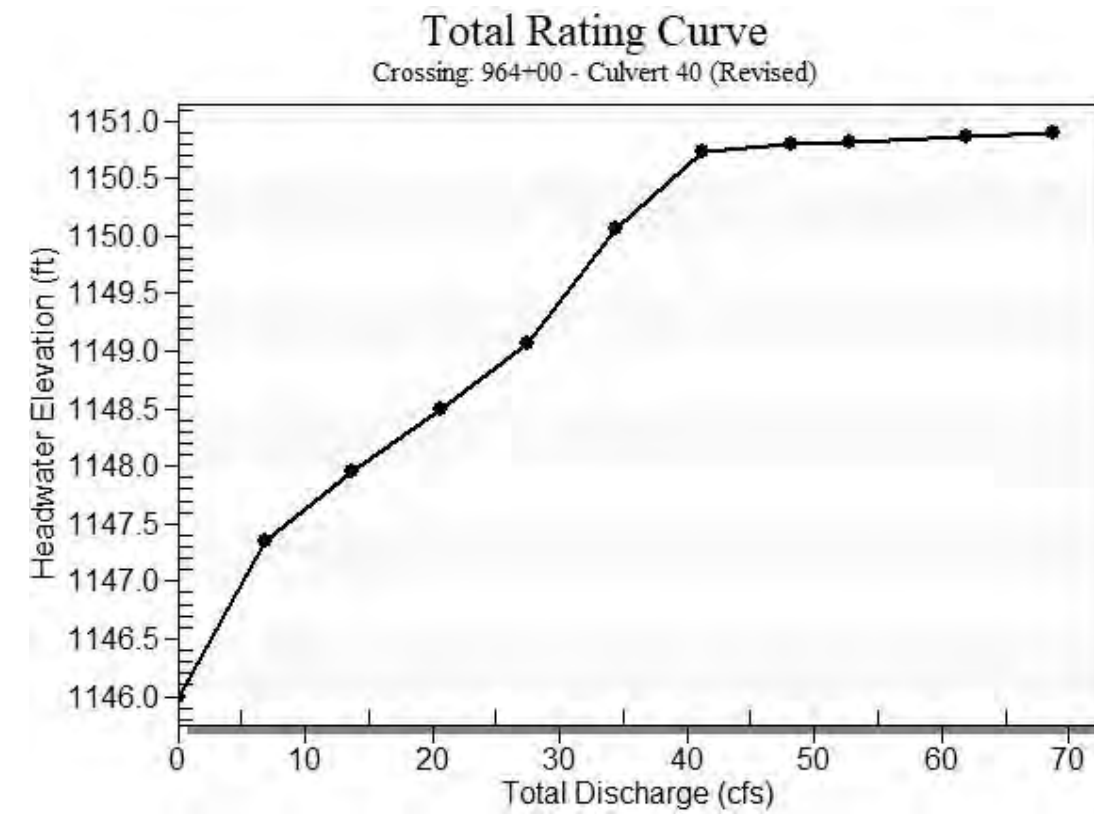
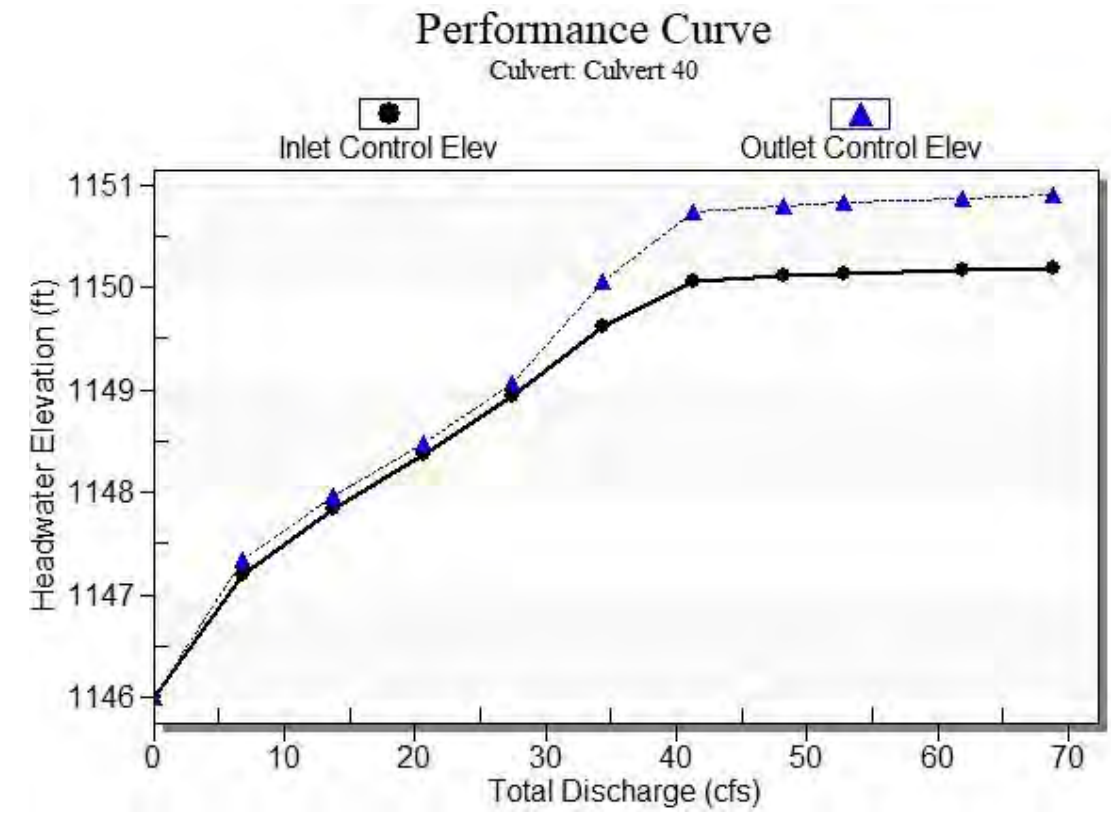


Table 2 - Culvert Summary Table: Culvert 40

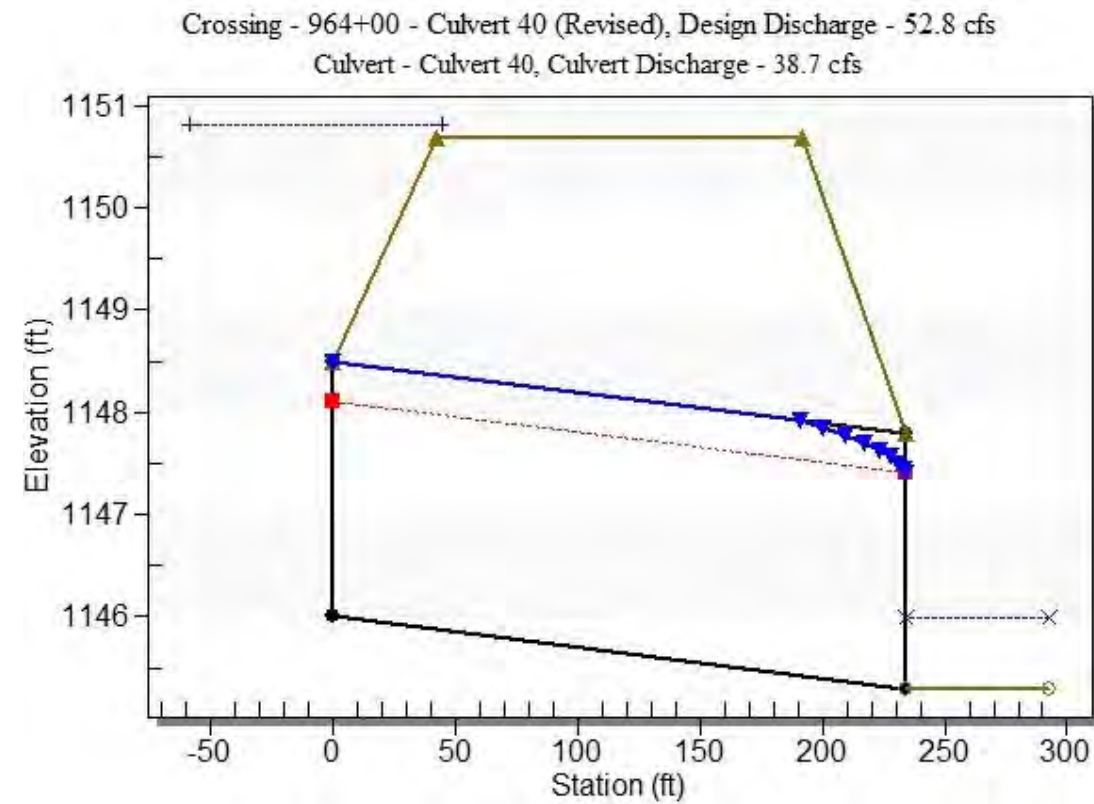
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1146.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.88	6.88	1147.34	1.200	1.341	2-M2c	0.886	0.864	0.864	0.207	4.569	2.128
13.76	13.76	1147.96	1.838	1.961	2-M2c	1.310	1.248	1.248	0.312	5.617	2.763
20.64	20.64	1148.49	2.371	2.486	2-M2c	1.721	1.541	1.541	0.397	6.502	3.211
27.52	27.52	1149.06	2.935	3.059	7-M2c	2.500	1.787	1.787	0.470	7.332	3.564
34.40	34.40	1150.07	3.616	4.066	7-M2c	2.500	1.991	1.991	0.536	8.206	3.861
41.28	38.20	1150.74	4.060	4.735	7-M2c	2.500	2.087	2.087	0.597	8.726	4.120
48.16	38.55	1150.79	4.104	4.791	7-M2c	2.500	2.095	2.095	0.653	8.775	4.349
52.80	38.73	1150.82	4.126	4.821	7-M2c	2.500	2.099	2.099	0.689	8.801	4.491
61.92	39.01	1150.87	4.161	4.871	7-M2c	2.500	2.106	2.106	0.756	8.841	4.745
68.80	39.19	1150.90	4.185	4.904	7-M2c	2.500	2.110	2.110	0.803	8.867	4.920

 Straight Culvert
 Inlet Elevation (invert): 1146.00 ft, Outlet Elevation (invert): 1145.30 ft
 Culvert Length: 234.00 ft, Culvert Slope: 0.0030

Culvert Performance Curve Plot: Culvert 40



Water Surface Profile Plot for Culvert: Culvert 40



Site Data - Culvert 40

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1146.00 ft
 Outlet Station: 234.00 ft
 Outlet Elevation: 1145.30 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 40

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Smooth HDPE
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 964+00 - Culvert 40)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1145.30	0.00	0.00	0.00	0.00
6.88	1145.51	0.21	2.13	0.04	0.84
13.76	1145.61	0.31	2.76	0.06	0.90
20.64	1145.70	0.40	3.21	0.07	0.93
27.52	1145.77	0.47	3.56	0.09	0.95
34.40	1145.84	0.54	3.86	0.10	0.97
41.28	1145.90	0.60	4.12	0.11	0.99
48.16	1145.95	0.65	4.35	0.12	1.00
52.80	1145.99	0.69	4.49	0.13	1.01
61.92	1146.06	0.76	4.75	0.14	1.02
68.80	1146.10	0.80	4.92	0.15	1.03

(Revised))

Tailwater Channel Data - 964+00 - Culvert 40 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1145.30 ft

Roadway Data for Crossing: 964+00 - Culvert 40 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1150.69 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 65 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 67 cfs

Maximum Flow: 83 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1008+10 - Culvert 65 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 65 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1150.97	0.00	0.00	0.00	1
1154.24	8.30	5.30	2.95	23
1154.30	16.60	5.36	11.17	6
1154.35	24.90	5.41	19.31	4
1154.40	33.20	5.45	27.67	4
1154.43	41.50	5.48	35.80	3
1154.47	49.80	5.52	44.15	3
1154.50	58.10	5.55	52.49	3
1154.54	66.40	5.57	60.80	3
1154.54	67.00	5.58	61.37	2
1154.59	83.00	5.62	77.14	2
1154.19	5.25	5.25	0.00	Overtopping

Rating Curve Plot for Crossing: 1008+10 - Culvert 65 (Revised)

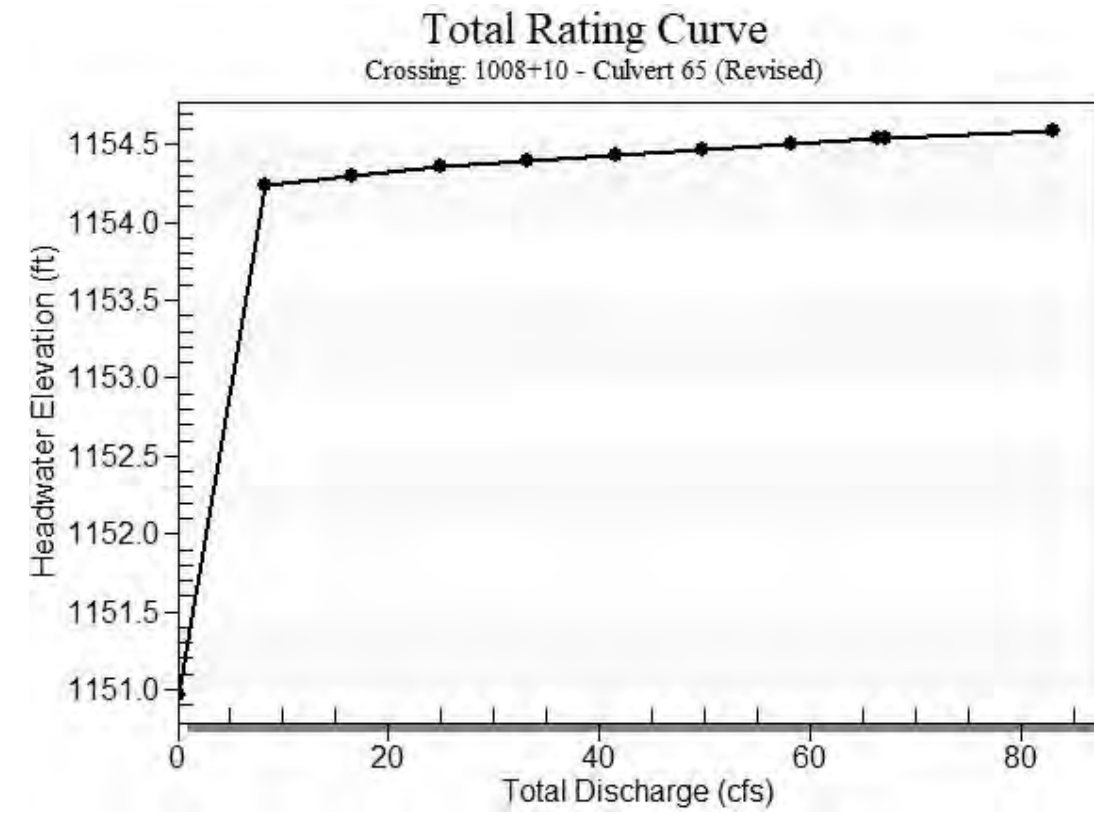
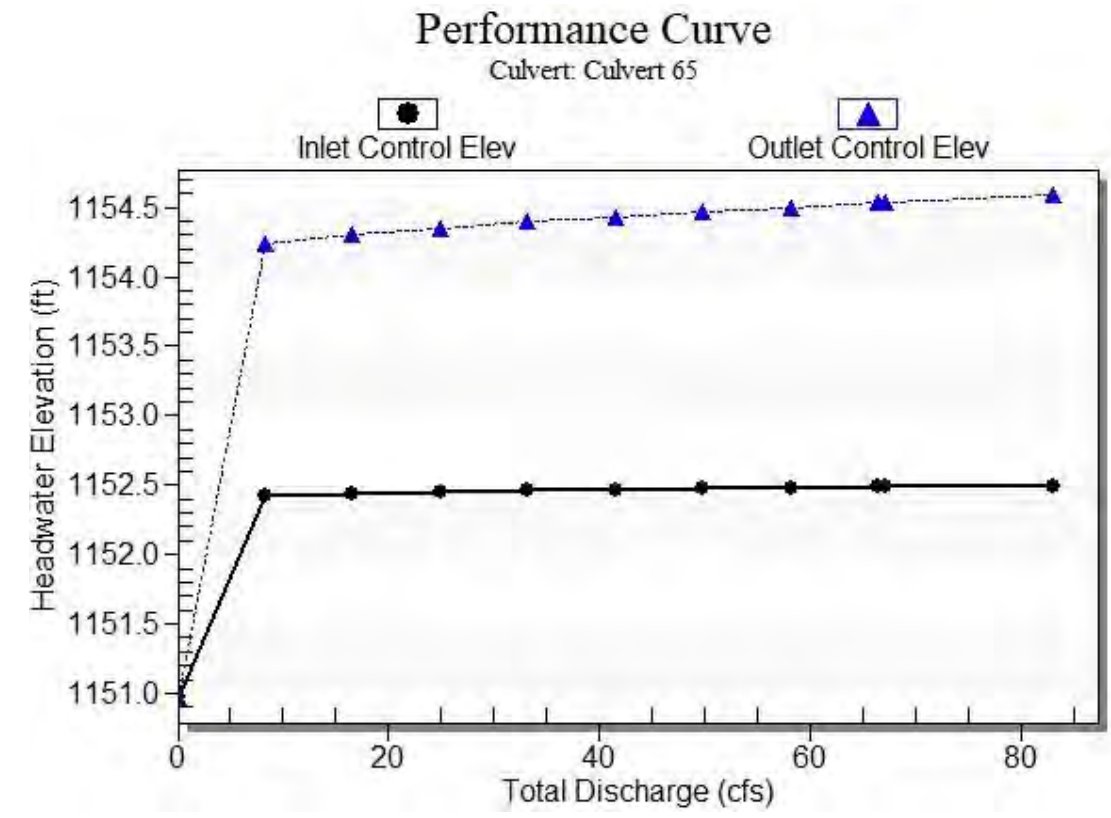


Table 2 - Culvert Summary Table: Culvert 65

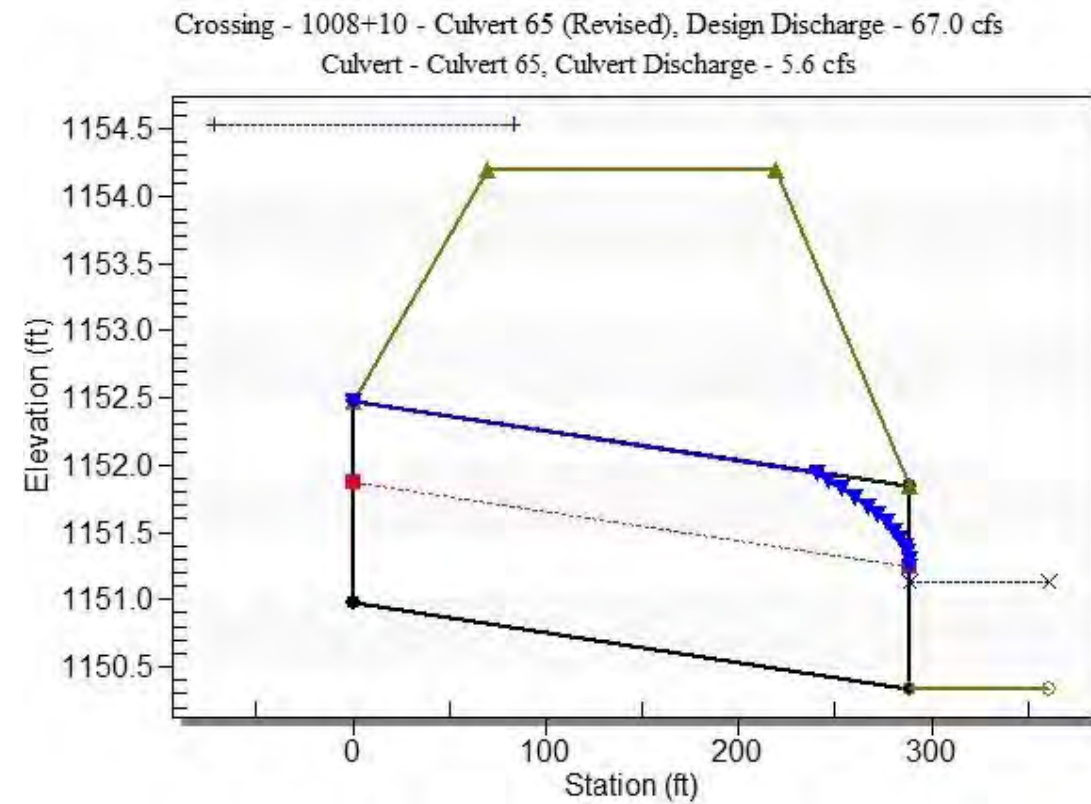
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1150.97	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
8.30	5.30	1154.24	1.458	3.266	7-M2c	1.500	0.884	0.884	0.231	4.888	2.285
16.60	5.36	1154.30	1.471	3.333	7-M2c	1.500	0.890	0.890	0.349	4.911	2.964
24.90	5.41	1154.35	1.481	3.382	7-M2c	1.500	0.894	0.894	0.444	4.928	3.437
33.20	5.45	1154.40	1.489	3.425	7-M2c	1.500	0.897	0.897	0.525	4.943	3.812
41.50	5.48	1154.43	1.496	3.463	7-M2c	1.500	0.900	0.900	0.599	4.955	4.128
49.80	5.52	1154.47	1.503	3.499	7-M2c	1.500	0.903	0.903	0.666	4.966	4.400
58.10	5.55	1154.50	1.509	3.533	7-M2c	1.500	0.905	0.905	0.728	4.977	4.642
66.40	5.57	1154.54	1.514	3.565	7-M2c	1.500	0.907	0.907	0.787	4.987	4.860
67.00	5.58	1154.54	1.515	3.567	7-M2c	1.500	0.907	0.907	0.791	4.987	4.875
83.00	5.62	1154.59	1.525	3.623	7-M2c	1.500	0.911	0.911	0.895	5.005	5.243

 Straight Culvert
 Inlet Elevation (invert): 1150.97 ft, Outlet Elevation (invert): 1150.34 ft
 Culvert Length: 289.00 ft, Culvert Slope: 0.0022

Culvert Performance Curve Plot: Culvert 65



Water Surface Profile Plot for Culvert: Culvert 65



Site Data - Culvert 65

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1150.97 ft
 Outlet Station: 289.00 ft
 Outlet Elevation: 1150.34 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 65

Barrel Shape: Circular
 Barrel Diameter: 1.50 ft
 Barrel Material: Corrugated Steel
 Embedment: 0.00 in
 Barrel Manning's n: 0.0240
 Culvert Type: Straight
 Inlet Configuration: Thin Edge Projecting
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1008+10 - Culvert 65

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1150.34	0.00	0.00	0.00	0.00
8.30	1150.57	0.23	2.29	0.04	0.86
16.60	1150.69	0.35	2.96	0.07	0.91
24.90	1150.78	0.44	3.44	0.08	0.95
33.20	1150.87	0.53	3.81	0.10	0.97
41.50	1150.94	0.60	4.13	0.11	0.99
49.80	1151.01	0.67	4.40	0.12	1.00
58.10	1151.07	0.73	4.64	0.14	1.02
66.40	1151.13	0.79	4.86	0.15	1.03
67.00	1151.13	0.79	4.88	0.15	1.03
83.00	1151.24	0.90	5.24	0.17	1.05

(Revised))

Tailwater Channel Data - 1008+10 - Culvert 65 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1150.34 ft

Roadway Data for Crossing: 1008+10 - Culvert 65 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1154.19 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

HY-8 Culvert Analysis Report Structure 90 (Revised)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 46 cfs

Maximum Flow: 56 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1041+00 - Culvert 90 (Revised)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 90 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1154.03	0.00	0.00	0.00	1
1155.35	5.60	5.60	0.00	1
1156.06	11.20	11.20	0.00	1
1156.83	16.80	15.73	0.94	30
1156.89	22.40	15.94	6.27	5
1156.93	28.00	16.15	11.70	4
1156.96	33.60	16.32	17.22	4
1156.99	39.20	16.46	22.58	3
1157.02	44.80	16.58	28.12	3
1157.02	46.00	16.60	29.16	2
1157.07	56.00	16.78	39.15	3
1156.81	15.65	15.65	0.00	Overtopping

Rating Curve Plot for Crossing: 1041+00 - Culvert 90 (Revised)

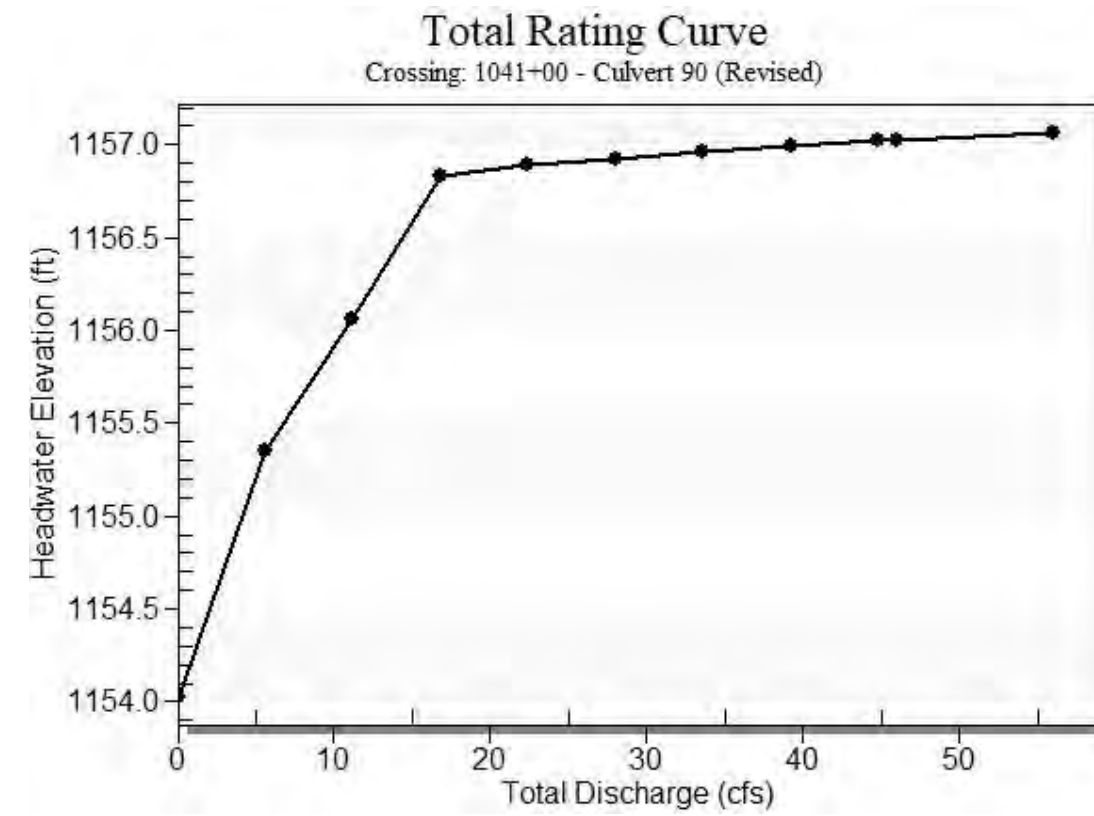
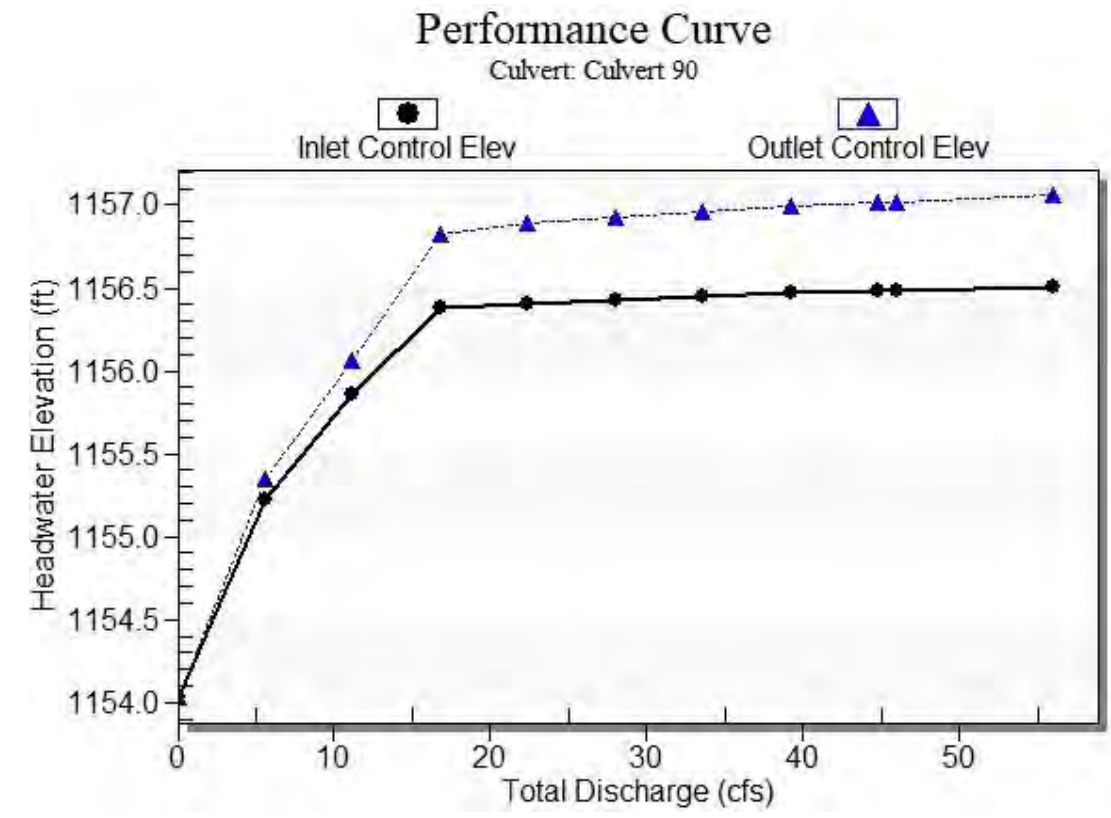


Table 2 - Culvert Summary Table: Culvert 90

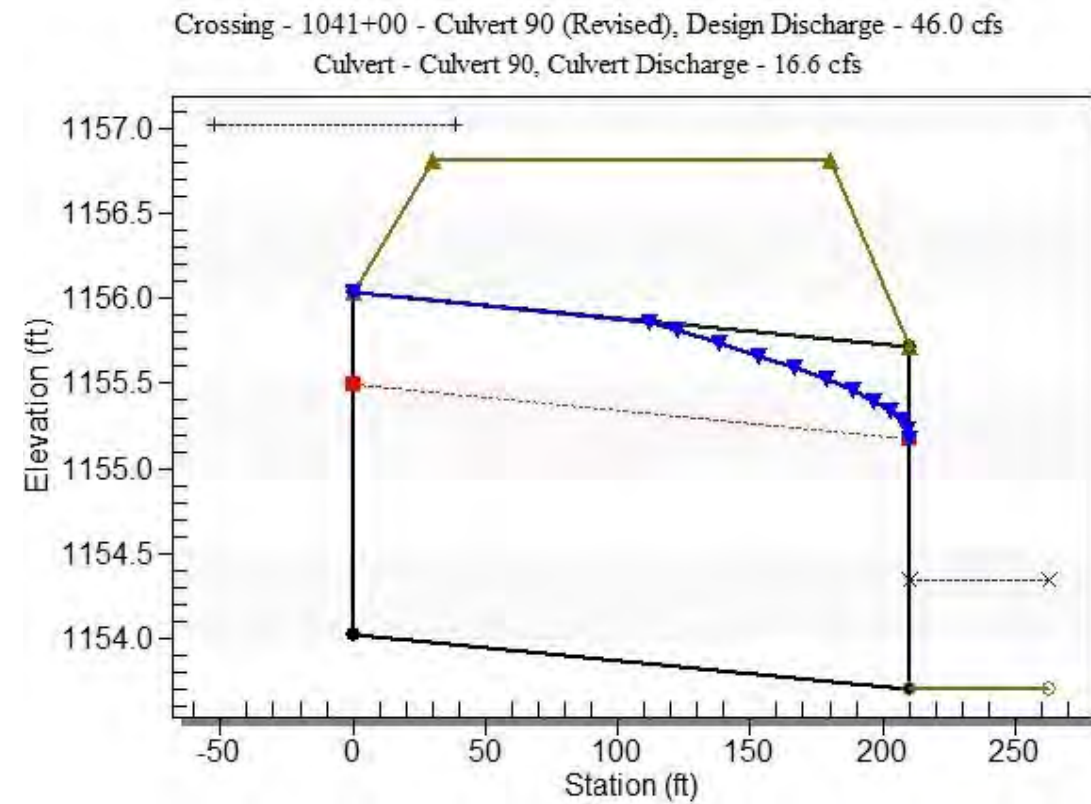
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1154.03	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.60	5.60	1155.35	1.193	1.320	2-M2c	1.071	0.833	0.833	0.183	4.520	1.968
11.20	11.20	1156.06	1.833	2.032	7-M2c	2.000	1.197	1.197	0.276	5.710	2.560
16.80	15.73	1156.83	2.346	2.796	7-M2c	2.000	1.425	1.425	0.352	6.568	2.975
22.40	15.94	1156.89	2.373	2.858	7-M2c	2.000	1.435	1.435	0.417	6.610	3.308
28.00	16.15	1156.93	2.399	2.896	7-M2c	2.000	1.444	1.444	0.475	6.650	3.586
33.60	16.32	1156.96	2.421	2.930	7-M2c	2.000	1.452	1.452	0.529	6.684	3.828
39.20	16.46	1156.99	2.438	2.960	7-M2c	2.000	1.457	1.457	0.579	6.710	4.045
44.80	16.58	1157.02	2.454	2.987	7-M2c	2.000	1.466	1.466	0.626	6.717	4.240
46.00	16.60	1157.02	2.457	2.992	7-M2c	2.000	1.467	1.467	0.636	6.722	4.280
56.00	16.78	1157.07	2.481	3.033	7-M2c	2.000	1.475	1.475	0.713	6.757	4.583

 Straight Culvert
 Inlet Elevation (invert): 1154.03 ft, Outlet Elevation (invert): 1153.71 ft
 Culvert Length: 210.50 ft, Culvert Slope: 0.0015

Culvert Performance Curve Plot: Culvert 90



Water Surface Profile Plot for Culvert: Culvert 90



Site Data - Culvert 90

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 1154.03 ft
 Outlet Station: 210.50 ft
 Outlet Elevation: 1153.71 ft
 Number of Barrels: 1

Culvert Data Summary - Culvert 90

Barrel Shape: Circular
 Barrel Diameter: 2.00 ft
 Barrel Material: Smooth HDPE
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: 1041+00 - Culvert 90)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1153.71	0.00	0.00	0.00	0.00
5.60	1153.89	0.18	1.97	0.03	0.82
11.20	1153.99	0.28	2.56	0.05	0.88
16.80	1154.06	0.35	2.98	0.07	0.91
22.40	1154.13	0.42	3.31	0.08	0.94
28.00	1154.19	0.48	3.59	0.09	0.96
33.60	1154.24	0.53	3.83	0.10	0.97
39.20	1154.29	0.58	4.05	0.11	0.98
44.80	1154.34	0.63	4.24	0.12	1.00
46.00	1154.35	0.64	4.28	0.12	1.00
56.00	1154.42	0.71	4.58	0.13	1.01

(Revised))

Tailwater Channel Data - 1041+00 - Culvert 90 (Revised)

Tailwater Channel Option: Trapezoidal Channel
 Bottom Width: 15.00 ft
 Side Slope (H:V): 3.00 (_:1)
 Channel Slope: 0.0030
 Channel Manning's n: 0.0130
 Channel Invert Elevation: 1153.71 ft

Roadway Data for Crossing: 1041+00 - Culvert 90 (Revised)

Roadway Profile Shape: Constant Roadway Elevation
 Crest Length: 100.00 ft
 Crest Elevation: 1156.81 ft
 Roadway Surface: Paved
 Roadway Top Width: 150.00 ft

Appendix H. Bridge Inspection Reports

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BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 02612 Structure Name : Wild Horse Pass Blvd TI UP Feature Under : I 10
Route : 10 MP : 162.54 Road Name : Wild Horse Pass BI Agency: ADOT Location : Gila River Indi

Table with multiple sections: LOCATION INFORMATION, DIMENSIONS, PROPOSED IMPROVEMENTS, CONSTRUCTION PROJECT DATA, INSPECTION, CRITICAL FEATURES, CULVERT INFORMATION, BRIDGE RAILING, SUFFICIENCY RATING, BRIDGE SCOUR DATA, LOAD, RATE, and POST, GENERAL DATA, SERVICE, TYPE, and SPAN INFORMATION, CONDITION RATINGS, APPRAISAL RATINGS, RESPONSIBILITY, NAVIGATION.

BRIDGE GROUP

Inspection Report



Structure No.: 02612 Structure Name: Wild Horse Pass Blvd TI UP Inspected by: ADOT-Carreño/Casteel
Route : 10 Road Name: Wild Horse Pass BI Inspection Type: Routine
MP : 162.54 Agency: ADOT Inspection Date : Thursday, January 28, 2021
ADOT District: Central Next Insp. Due By : January 2023

NBI Condition Ratings table with columns for N58 Deck, N59 Superstructure, N60 Substructure, N61 Channel, N62 Culvert, and N N/A (NBI).

Appraisal Ratings table with columns for N67 Structural Evaluation, N68 Deck Geometry, N69 Vert. & Horiz. Clearances, N71 Waterway Adequacy, N72 Approach Roadway Align., and N Not Over Waterway.

Inspection Notes: Roadway/Safety
1. Minimum vertical clearances, as measured under the structure, are 16.88 ft. and 16.84 ft. for I-10 EB and WB traffic respectively (see the attached vertical clearance diagram). Per current ADOT signing policy, overhead clearance signs are not required.

Superstructure:
1. Sign structure attached to exterior Girder 1 on the eastbound above Lane 3.
2. Two soffit-mounted lights attached to bridge.

Substructure:
1. Wingwalls exhibit a few hairline horizontal cracks.
2. Slope paving is in good condition.

Superstructure:
1. Both concrete sidewalks have narrow map cracks.

Miscellaneous:
1. Repairs: There were no previous or current repair recommendations.
2. Maintenance: There were no previous or current recommended maintenance repair items.

Photos:
1. Roadway ID looking E
2. Elevation ID looking N
3. Deck Top
4. Soffit
5. Joint at W abutment

Table with columns: Element No., Element Description, Quantity, Units, Env., and Condition State (1, 2, 3, 4). Includes rows for Re Concrete Deck, Cracking (RC and Other), Pre Opn Conc Girder/Beam, Delamination/Spall/Patched Area, Re Conc Column, and Re Conc Abutment.

Abutment 1 and 2 are supported by 60" diameter drilled shaft footing. Abut. 1 (NE); Abut. 2 (SW).

BRIDGE GROUP

Inspection Report

Structure No. : **02612** Structure Name : **Wild Horse Pass Blvd TI UP** Inspected by : **ADOT-Carreno/Casteel**
 Route : **10** Road Name : **Wild Horse Pass Bl** Inspection Type: **Routine**
 MP : **162.54** Agency : **ADOT** Inspection Date : **Thursday, January 28, 2021**
 ADOT District: **Central** Next Insp. Due By : **January 2023**

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
1120	Efflorescence/Rust Staining	43.00	ft	2.00	0	0	43	0
1. Both abutment walls exhibits heavy water leakage stains.								
1130	Cracking (RC and Other)	26.00	ft	2.00	0	26	0	0
1. There are hairline to narrow vertical and horizontal cracks in abutments.								
234	Re Conc Pier Cap	106.00	ft	2.00	106	0	0	0
1. There were no observed deficiencies.								
302	Compressn Joint Seal	207.00	ft	2.00	0	27	90	90
1. Deck joint openings measured at 70 deg. F are: - E abut: South side: 2-3/4", North side: 2-3/4" - W abut: South side: 2-7/8", North side: 2-3/4"								
2320	Seal Adhesion	180.00	ft	2.00	0	0	90	90
1. The expansion joints are partially debonded.								
2350	Debris Impaction	27.00	ft	2.00	0	27	0	0
1. The expansion joints are partially filled with dirt and debris.								
310	Elastomeric Bearing	60.00	each	2.00	60	0	0	0
Elastomeric bearing pads are concealed and not visible for inspection								
321	Re Conc Approach Slab	3,102.00	sq.ft	2.00	2940	162	0	0
Bare concrete approach slabs.								
1130	Cracking (RC and Other)	162.00	sq.ft	2.00	0	162	0	0
1. Approach slabs exhibit hairline to narrow transverse cracks.								
330	Metal Bridge Railing	558.00	ft	2.00	558	0	0	0
Metal pedestrian fence on top of concrete railing.								
331	Re Conc Bridge Railing	558.00	ft	2.00	456	100	2	0
Concrete barrier with fence on top								
1080	Delamination/Spall/Patched Area	2.00	ft	2.00	0	0	2	0
1. Minor spall with exposed rebar on south barrier over VWB lanes.								
1130	Cracking (RC and Other)	100.00	ft	2.00	0	100	0	0
1. Concrete parapet exhibits hairline vertical cracks. 2. Southwest ramp barrier has large crack and spall close to the joint.								

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : **02612** Structure Name : **Wild Horse Pass Blvd TI UP** Inspected by : **ADOT-Carreno/Casteel**
 Route : **10** Road Name : **Wild Horse Pass Bl** Inspection Type: **Routine**
 MP : **162.54** Agency : **ADOT** Inspection Date : **Thursday, January 28, 2021**
 ADOT District: **Central** Next Insp. Due By : **01/28/2023**



File Name : 02612-2021-01-28-Photo-1.jpg

Description : Roadway ID looking E

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	02612	Structure Name :	Wild Horse Pass Blvd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Wild Horse Pass BI	Inspection Type:	Routine
MP :	162.54	Agency :	ADOT	Inspection Date :	Thursday, January 28, 2021
ADOT District:	Central	Next Insp. Due By :	01/28/2023		



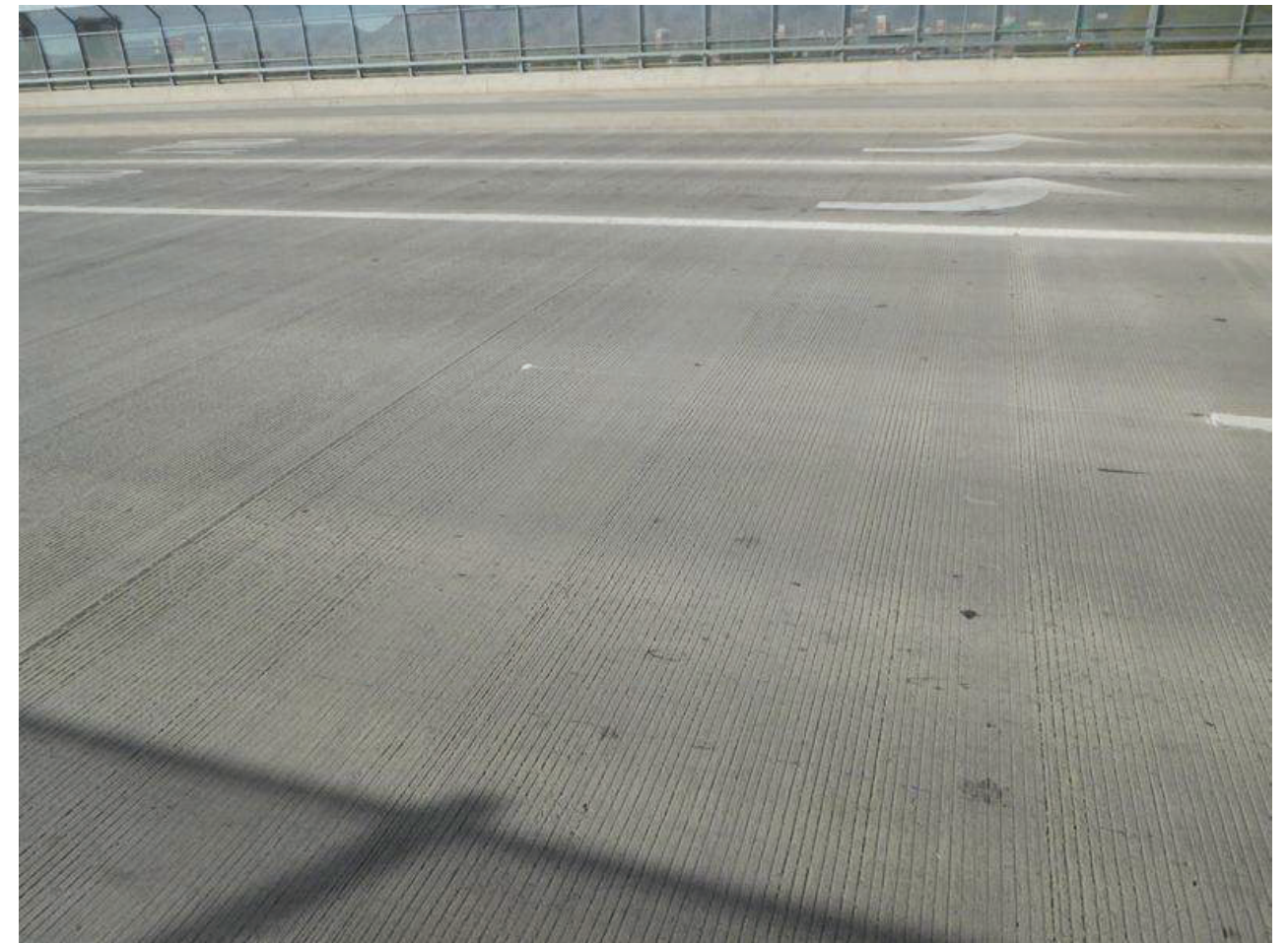
File Name : 02612-2021-01-28-Photo-2.jpg

Description : Elevation ID looking N

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	02612	Structure Name :	Wild Horse Pass Blvd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Wild Horse Pass BI	Inspection Type:	Routine
MP :	162.54	Agency :	ADOT	Inspection Date :	Thursday, January 28, 2021
ADOT District:	Central	Next Insp. Due By :	01/28/2023		



File Name : 02612-2021-01-28-Photo-3.jpg

Description : Deck Top

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	02612	Structure Name :	Wild Horse Pass Blvd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Wild Horse Pass BI	Inspection Type:	Routine
MP :	162.54	Agency :	ADOT	Inspection Date :	Thursday, January 28, 2021
ADOT District:	Central			Next Insp. Due By :	01/28/2023



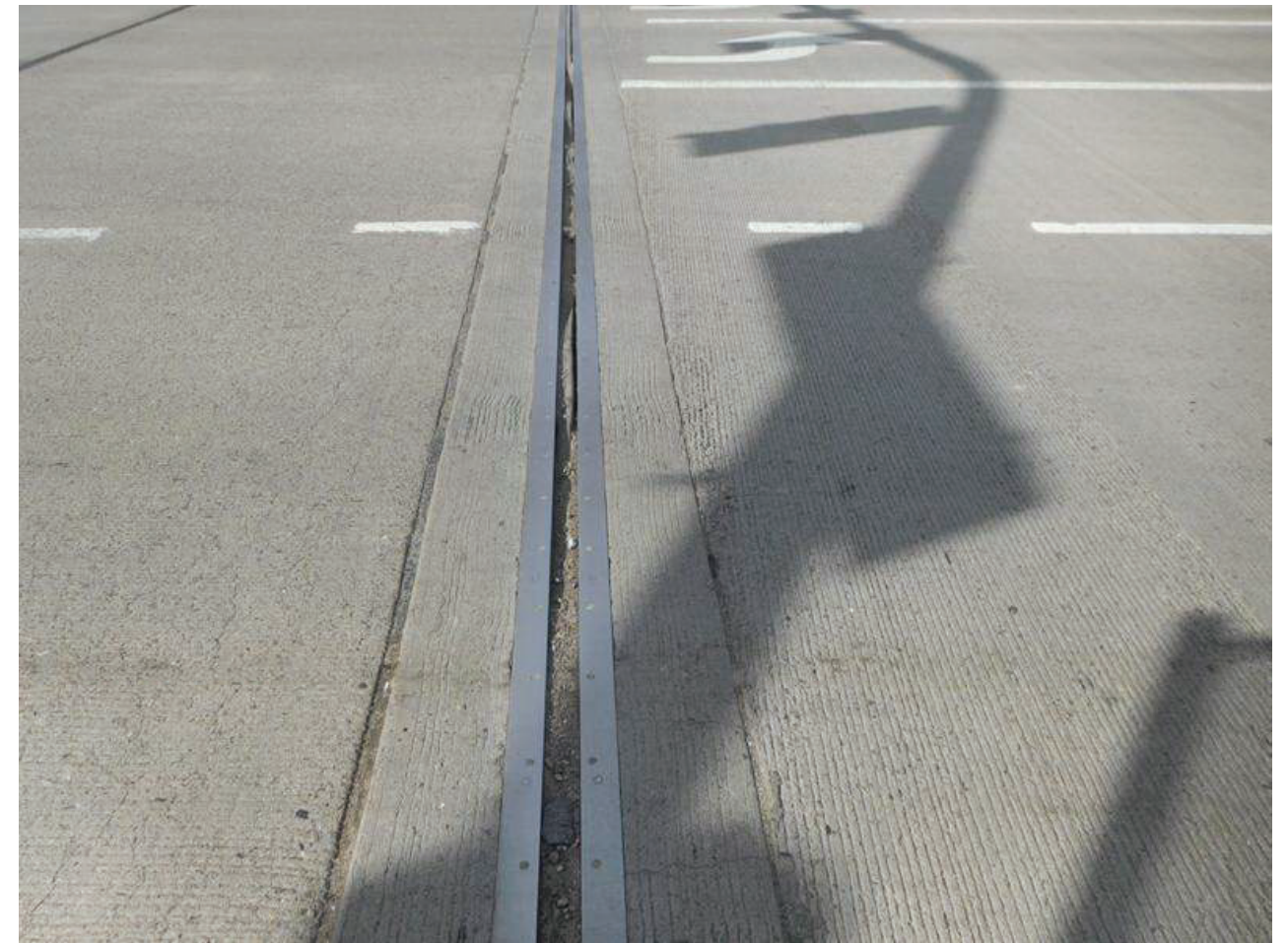
File Name : 02612-2021-01-28-Photo-4.jpg

Description : Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	02612	Structure Name :	Wild Horse Pass Blvd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Wild Horse Pass BI	Inspection Type:	Routine
MP :	162.54	Agency :	ADOT	Inspection Date :	Thursday, January 28, 2021
ADOT District:	Central			Next Insp. Due By :	01/28/2023



File Name : 02612-2021-01-28-Photo-5.jpg

Description : Joint at W abutment

ARIZONA DEPARTMENT OF TRANSPORTATION
STRUCTURE SECTION
SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

STRUCTURE NAME: Wild Horse Pass TI UP

STRUCTURE NUMBER: 2612

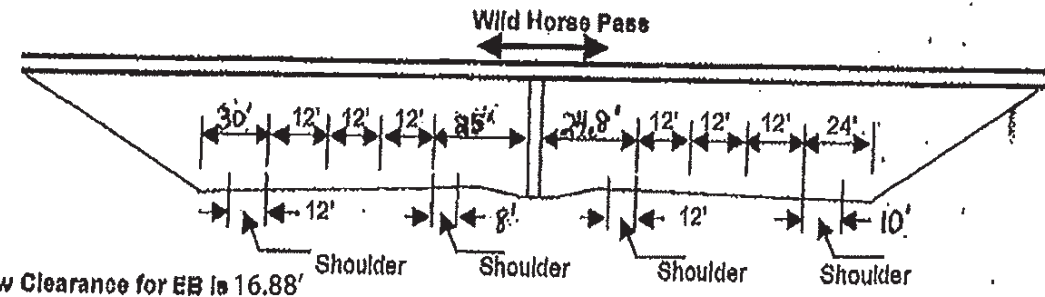
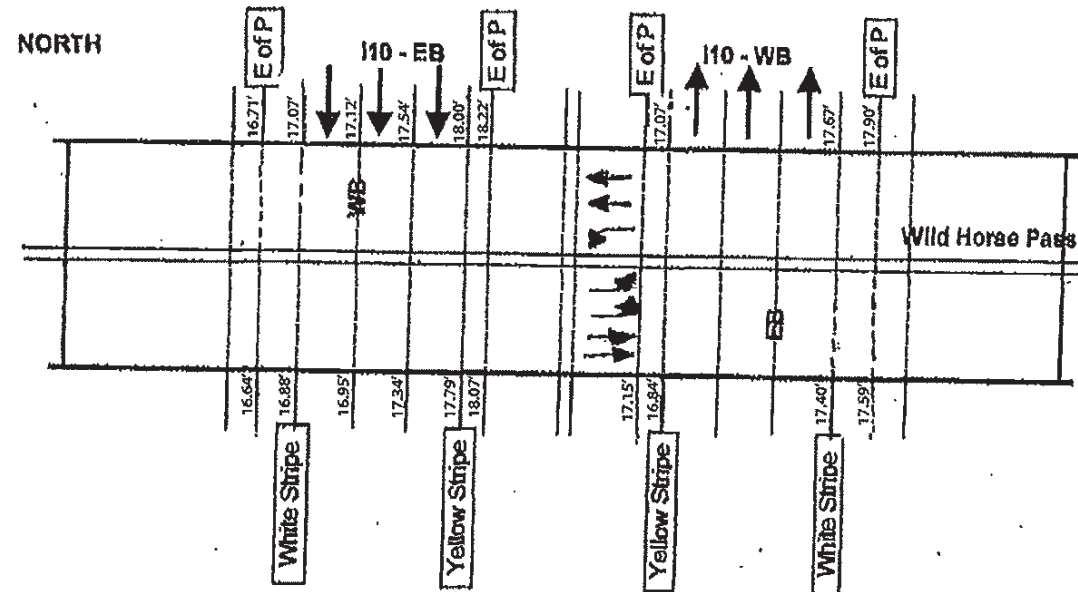
LOCATION: 110 ROUTE

162.54 MILEPOST

Inspection						
Date	1/24/17	1-28-21				
Initial	WR/JE	RC AC				
New / Revised Diagram	REV	NSC				



VERTICAL CLEARANCE



Low Clearance for EB is 16.88'
 Low Clearance for WB is 16.84'

Unable to measure center inclines (white dash) due to heavy traffic - same on 2/25/09

HORIZONTAL CLEARANCE
 LOOKING NORTH

BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 02302 Structure Name : Queen Creek Rd TI UP Feature Under : I 10
 Route : 10 MP : 164.5 Road Name : Queen Creek Rd Agency: ADOT Location : 8.1 mi S of Jct US 60

LOCATION INFORMATION		DIMENSIONS		PROPOSED IMPROVEMENTS	
N1-State Code :	049	N32:Appr Rdwy Width (feet):	96	N75-Type of Work:	
N2-State Hwy District :	Central	N48-Max Span Length (feet):	130	N76-Length of Str Imp (feet):	0
N3-County Code :	Maricopa	N49-Structure Length (feet):	264	N94-Br Improv Cost (x1000):	\$0
N4-Place Code :	ila River Indian Reser	N50a-Lt Curb/Swlk Width (feet):	0.0	N95-Rdwy Improv Cost (x1000):	\$0
N16-Latitude:	33 Deg 15 Min 18.00 Sec	N50b-Rt Curb/Swlk Width (feet):	0.0	N96-Total Project Cost (x1000):	\$0
N17-Longitude :	111 Deg 56 Min 57.12 Sec	N51-Br Width Curb-Curb (feet):	96.0	N97-Year of Cost Estimate:	
N98-Border St Code - % Resp:		N52-Deck Width Out-Out (feet):	99.2	CONSTRUCTION PROJECT DATA	
N99-Border Bridge Number:		N112-NBIS Br Length?	Y	N27-Year Built:	1991
INVENTORY ROUTE DATA		VERTICAL & HORIZONTAL CLEARANCE		N106-Year of Reconstruction:	
N19-Detour Length (miles):	6	N53-Min Vert Over Clr (feet):	99.99	A204-Orig Project Number:	IR-10-3(325)
N20-Toll:	3	N54-Min Vert Under Clr (feet):	H 16.71	A205-Orig Project Station:	1020+84.17
ROADWAY RECORD ON UNDER		N55-Min Lat Under Clr Rt (feet):	H 24.5	A223-TRACS Number:	H228901C
N5-Inv Rte:	1 3 1 00347 0 2 1 1 00010 0	N56-Min Lat Under Clr Lt (feet):	38.4	A225-Deck Area (sq. feet):	26189
N28-Lanes:	7 4	SERVICE, TYPE, and SPAN INFORMATION		INSPECTION	
N10-Inv Rte Min Vert Clr (feet):	99.99 16.91	N42-Service Type:	6 1	N90-Inspection Date:	01/28/2021
N11-Inv Rte Milepoint:	189.30 164.50	N43-Str Type, Main:	6 2	N91-Insp Freq (months):	24
N26-Functional Class:	06 01	N44-Str Type, Appr:	0 0	A207-Inspection Quarter:	5
N29-Avg Daily Traffic:	27400 104778	N45-Number of Main Spans:	2	Inspection Type:	Routine
N30-Year of ADT:	2015 2017	N46-Number of Appr Spans:	0	A228-Next Insp Date:	January 2023
N47-Inv Rte Tot Horiz Clr (feet):	46.0 89.70	CONDITION RATINGS		CRITICAL FEATURES	
N100-Defense Hwy:	0 1	N58-Deck:	7	N92A-Fracture Critical:	N
N101-Parallel Bridge:	N	N59-Superstructure:	7	N92B-Underwater Insp:	N
N102-Direction of Traffic:	2 2	N60-Substructure:	7	N92C-Special Insp:	N
N104-Hwy System:	0 1	N61-Channel:	N	N93A-Date Fract Crit Insp:	
N109-Percent Truck Traffic:	5 11	N62-Culvert:	N	N93B-Date Underwater Insp:	
N110-National Truck Network:	0 1	APPRAISAL RATINGS		N93C-Date Spec Insp:	
N114-Future ADT:	27410 104788	N67-Struct Evaluation:	7	A234-Steel In-Depth Insp Freq(months):	0
N115-Year of Future ADT:	2035 2037	N68-Deck Geometry:	5	CULVERT INFORMATION	
A200-Is N5 the Princ. Rte?	N Y	N69-Underclearance Rtg:	6	A217-Culv Barrel Height(feet):	0
RESPONSIBILITY		N71-Waterway Adequacy:	N	A218-Culv Length (feet):	0
N21-Maint Responsibility:	01	N72-Appr Rdw Align:	8	A219-Culv Fill Height (feet):	0
N22-Bridge Owner:	01	N36-Traffic Safety Features:	1 N N N	BRIDGE RAILING	
A229-Agency:	ADOT	BRIDGE SCOUR DATA		A206a,b,c-	
NAVIGATION		N113-Scour Critical Rtg:	N	Bridge Rail Type,	911
N38-Navigation Control:	N	A202-Foundation Type:	91	Geometric Conform, and	
N39-Nav Vert clr (feet):	0.00	A220-Found Embed (feet):		Structural Conform:	
N40-Nav Horiz Clr (feet):	0.00	A221-Scour Countermeasure:		SUFFICIENCY RATING	
N111-Nav Pier/Abut Prot:		LOAD, RATE, and POST		Sufficiency Rating:	86.40
N116-Nav Min Vert Clr (feet):		N31-Design Loading:	5	BRIDGE CONDITION	
GENERAL DATA		N41-Open, Post, Close:	A	Bridge Condition:	Good
N33-Bridge Median:	2	N63-Method Used for Oper. Rtg:	1	A300 - GENERAL COMMENTS	
N34-Skew:	0	N64-Operating Load Rtg/Factor:	99		
N35-Structure Flared:	0	N65-Method Used for Inv. Rtg:	1		
N37-Historical Significance:	5	N66-Inventory Load Rtg/Factor:	41		
N107-Deck Str Type:	1	N70-Bridge Posting:	5		
N108-Wear Surf Prot System:	1 0 0	N103-Temp Str Designation:			
A201-Wear Surf Thickness (inches)		A211-Posted Limit (Tons):			
		A222-Date of Load Rtg:	05/25/2012		
		A233-Posted Vert Clr NB/EB (ft-in):	0-0		
		A233-Posted Vert Clr SB/WB (ft-in):	0-0		

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 02302 Structure Name : Queen Creek Rd TI UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name : Queen Creek Rd Inspection Type : Routine
 MP : 164.5 Agency : ADOT Inspection Date : Thursday, January 28, 2021
 ADOT District: Central Next Insp. Due By : January 2023

Work Candidate ID:	8E20D42-A40F-042219-24EF95513E	A216 - Actual Completion Cost	\$
Action:	1075 Substructure-Scour Mitigate	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Repair the embankment erosion on both sides of abutments			

BRIDGE GROUP

Inspection Report



Structure No.: **02302** Structure Name: **Queen Creek Rd TI UP** Inspected by : **ADOT-Carreno/Casteel**
 Route : **10** Road Name: **Queen Creek Rd** Inspection Type: **Routine**
 MP : **164.5** Agency: **ADOT** Inspection Date : **Thursday, January 28, 2021**
 ADOT District: **Central** Next Insp. Due By : **January 2023**

NBI Condition Ratings			
N58 Deck :	7 Good	N61 Channel:	N N/A (NBI)
N59 Superstructure :	7 Good	N62 Culvert :	N N/A (NBI)
N60 Substructure :	7 Good		

Appraisal Ratings			
N67 Structural Evaluation:	7 Above Min Criteria	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	5 Above Tolerable	N72 Approach Roadway Align.:	8 Equal Desirable Crit
N69 Vert. & Horiz. Clearances:	6 Equal Minimum	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

Roadway / Safety:
 1. The minimum vertical clearance distance as measured under the structure are 16.71 ft. and 16.91 ft. for I-10 EB and WB traffic respectively. (See the attached vertical clearance diagram). Per current ADOT signing policy, overhead clearance signs are not required.

Superstructure:
 1. The pier diaphragm exhibits spalling with exposed rebar at every bay.

Substructure:
 1. The west abutment wingwalls exhibit hairline map cracking.
 2. Slope paving in good condition.
 3. There is embankment erosion on both sides of the abutments. See Maintenance Report.
 4. West abutment diaphragm exhibits a 21 inch by 14 inch by 3 inch spall with exposed rebar between girders 11 and 12 and a 9 inch by 9 inch by 1-1/2 inch spall between Girders 10 and 11. A similar condition exists between girders 11 and 12.
 5. East abutment diaphragm exhibits 84 inch by 10 inch by 2-1/2 inch spall with 94 inch by 20 inch hollow sounding area between Girders 10 and 11.

Miscellaneous:
 1. Repair: There were no previous or current repair recommendations.
 2. Maintenance: There was 1 previous maintenance recommendation, which is repeated. There are 0 new maintenance items added in this inspection.

Photos:
 1. Roadway ID looking W
 2. Elevation ID looking N
 3. Deck Top
 4. Soffit
 5. Joint at E abutment

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
12	Re Concrete Deck	26,189.00	sq.ft	2.00	24616	1310	263	0

Bare concrete deck
 1. Soffit has no visible defects.

1080	Delamination/Spall/Patched Area	263.00	sq.ft	2.00	0	0	263	0
The top of deck has minor spalls in patches where original median was located.								
1130	Cracking (RC and Other)	1,310.00	sq.ft	2.00	0	1310	0	0
The top of deck has hairline to narrow cracks.								

109	Pre Opn Conc Girder/Beam	3,124.00	ft	2.00	3122	2	0	0
Continuous, 2-span ~263' long with 12-prestressed I-girders.								

1080	Delamination/Spall/Patched Area	2.00	ft	2.00	0	2	0	0
There are minor spalls on the bottom flange of EB Girder 1, Lane 2, up to 4" x 2" x 2", due to impact. There are minor scrapes on Girder 12 bottom flange over EB lanes.								

205	Re Conc Column	4.00	each	2.00	4	0	0	0
Pier 1 is supported by spread footing. 1. There were no observed deficiencies.								

BRIDGE GROUP

Inspection Report

Structure No. : **02302** Structure Name : **Queen Creek Rd TI UP** Inspected by : **ADOT-Carreno/Casteel**
 Route : **10** Road Name : **Queen Creek Rd** Inspection Type: **Routine**
 MP : **164.5** Agency : **ADOT** Inspection Date : **Thursday, January 28, 2021**
 ADOT District: **Central** Next Insp. Due By : **January 2023**

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
215	Re Conc Abutment	196.00	ft	2.00	196	0	0	0

Abutment 1 and 2 are supported by 36" diameter drilled shaft footing. Abut. 1 (SW); Abut. 2 (NE).

1130	Cracking (RC and Other)	18.00	ft	2.00	18	0	0	0
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1. Abutments have hairline horizontal and vertical cracks with minor water stains.

234	Re Conc Pier Cap	95.00	ft	2.00	95	0	0	0
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1. There were no observed deficiencies.

302	Compressn Joint Seal	197.00	ft	2.00	0	42	0	155
-----	----------------------	--------	----	------	---	----	---	-----

Joint openings measured at 70 deg. F are as follow:
 W. Abut. - south = 3-1/4"; north = 3"
 E. Abut. - south = 3-1/4"; north = 3"

2320	Seal Adhesion	155.00	ft	2.00	0	0	0	155
------	---------------	--------	----	------	---	---	---	-----

Both compression seals are mostly completely debonded.

2350	Debris Impaction	42.00	ft	2.00	0	42	0	0
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Joints are filled with dirt and debris.

310	Elastomeric Bearing	48.00	each	2.00	48	0	0	0
-----	---------------------	-------	------	------	----	---	---	---

Elastomeric bearing pads are concealed and not visible for inspection.

321	Re Conc Approach Slab	2,880.00	sq.ft	2.00	2600	180	100	0
-----	-----------------------	----------	-------	------	------	-----	-----	---

Concrete approach slabs

1130	Cracking (RC and Other)	280.00	sq.ft	2.00	0	180	100	0
------	-------------------------	--------	-------	------	---	-----	-----	---

The approach slabs exhibit narrow to wide longitudinal cracks and minor scaling in the old raised median location.

330	Metal Bridge Railing	528.00	ft	2.00	528	0	0	0
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Metal pedestrian fence on top of concrete barrier.

331	Re Conc Bridge Railing	527.00	ft	2.00	407	120	0	0
-----	------------------------	--------	----	------	-----	-----	---	---

Concrete barriers with chain link fence on top.

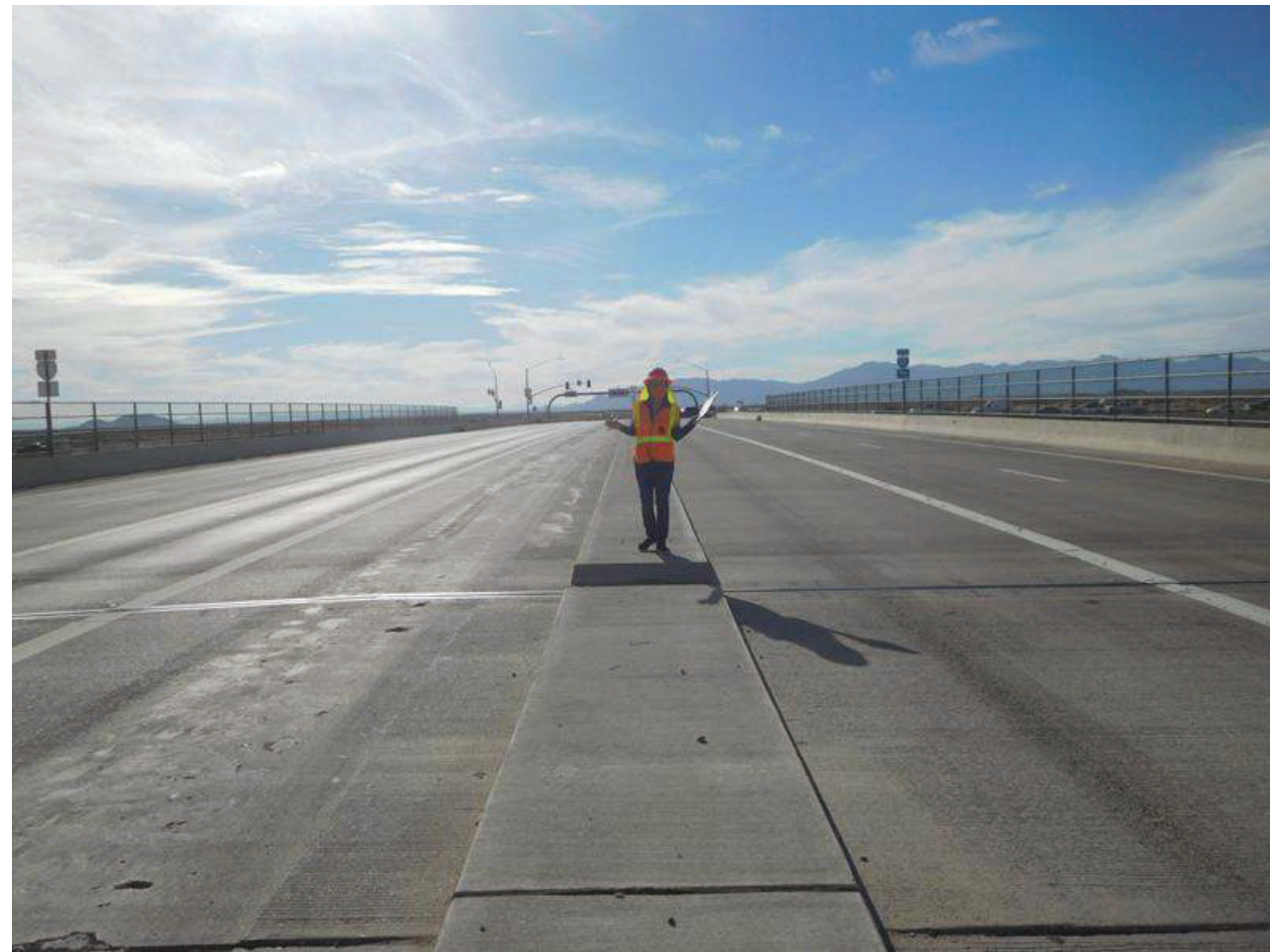
1130	Cracking (RC and Other)	120.00	ft	2.00	0	120	0	0
------	-------------------------	--------	----	------	---	-----	---	---

Concrete barriers have hairline to narrow vertical cracks.

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	02302	Structure Name :	Queen Creek Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Queen Creek Rd	Inspection Type:	Routine
MP :	164.5	Agency :	ADOT	Inspection Date :	Thursday, January 28, 2021
ADOT District:	Central			Next Insp. Due By :	01/28/2023



File Name : 02302-2021-01-28-Photo-1.jpg

Description : Roadway ID looking W

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	02302	Structure Name :	Queen Creek Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Queen Creek Rd	Inspection Type:	Routine
MP :	164.5	Agency :	ADOT	Inspection Date :	Thursday, January 28, 2021
ADOT District:	Central			Next Insp. Due By :	01/28/2023



File Name : 02302-2021-01-28-Photo-2.jpg

Description : Elevation ID looking N

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	02302	Structure Name :	Queen Creek Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Queen Creek Rd	Inspection Type:	Routine
MP :	164.5	Agency :	ADOT	Inspection Date :	Thursday, January 28, 2021
ADOT District:	Central			Next Insp. Due By :	01/28/2023



File Name : 02302-2021-01-28-Photo-3.jpg

Description : Deck Top

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	02302	Structure Name :	Queen Creek Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Queen Creek Rd	Inspection Type:	Routine
MP :	164.5	Agency :	ADOT	Inspection Date :	Thursday, January 28, 2021
ADOT District:	Central			Next Insp. Due By :	01/28/2023



File Name : 02302-2021-01-28-Photo-4.jpg

Description : Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 02302	Structure Name : Queen Creek Rd TI UP	Inspected by : ADOT-Carreno/Casteel
Route : 10	Road Name : Queen Creek Rd	Inspection Type: Routine
MP : 164.5	Agency : ADOT	Inspection Date : Thursday, January 28, 2021
ADOT District: Central		Next Insp. Due By : 01/28/2023



File Name : 02302-2021-01-28-Photo-5.jpg

Description : Joint at E abutment

ARIZONA DEPARTMENT OF TRANSPORTATION
STRUCTURE SECTION
 SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
 VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

STRUCTURE NAME: Queen Creek Road TI UP

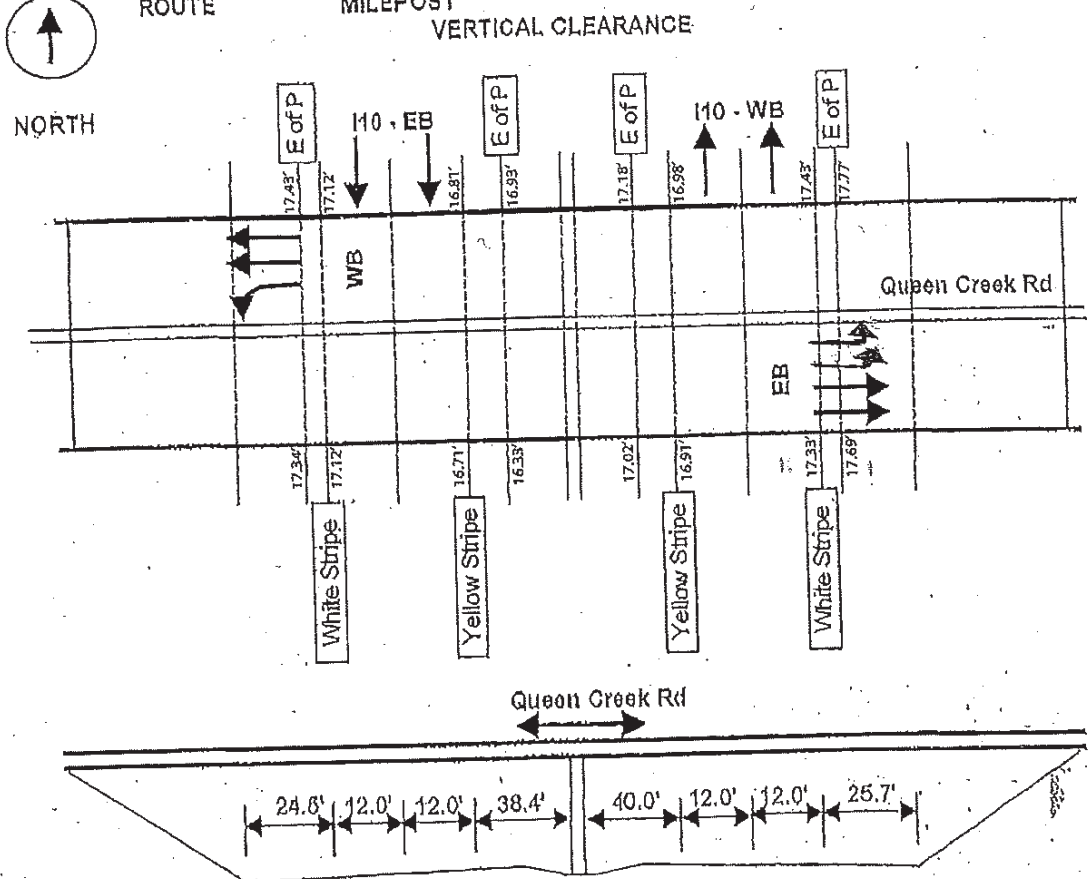
Inspection Date	1/24/17	124-21				
Initial	WR/JE	RC AC				
New / Revised Diagram	REV	NSC				

STRUCTURE NUMBER: 2302

LOCATION: 110 ROUTE 164.5 MILEPOST



NORTH



Low Clearance for EB is 16.71'
 Low Clearance for WB is 16.91'

Measurements at white dashed line could not be taken due to heavy traffic

BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 01148 Structure Name : Riggs Rd TI UP Feature Under : I 10; EB & WB
Route : 10 MP : 167.47 Road Name : IRR Riggs Road Agency: ADOT Location : 12.6 mi S of Jct US 60

Table with multiple columns: LOCATION INFORMATION, DIMENSIONS, PROPOSED IMPROVEMENTS, INVENTORY ROUTE DATA, VERTICAL & HORIZONTAL CLEARANCE, CONSTRUCTION PROJECT DATA, SERVICE, TYPE, and SPAN INFORMATION, INSPECTION, CONDITION RATINGS, CRITICAL FEATURES, APPRAISAL RATINGS, CULVERT INFORMATION, RESPONSIBILITY, BRIDGE SCOUR DATA, BRIDGE RAILING, NAVIGATION, SUFFICIENCY RATING, LOAD, RATE, and POST, BRIDGE CONDITION, GENERAL DATA, A300 - GENERAL COMMENTS.

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 01148 Structure Name : Riggs Rd TI UP Inspected by : ADOT-Carreno/Casteel
Route : 10 Road Name : IRR Riggs Road Inspection Type: Routine
MP : 167.47 Agency : ADOT Inspection Date : Tuesday, May 18, 2021
ADOT District: Central Next Insp. Due By : May 2023

Work Candidate ID: 9D51F67-F6BD-062019-AD147D80C9
Action: 1070 Substructure-Patch spalls
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 3-Can be scheduled
Repair broken concrete slope paving at the SE & SW corners.

Work Candidate ID: 9D51F67-F6BD-062019-1B4441C229
Action: 1000 Approach Railing-Repair
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 3-Can be scheduled
Replace guardrail broken wood spacer at various locations.

Work Candidate ID: 9D51F67-F6BD-062019-DD8C8689BC
Action: 1061 Paint-Misc. Activity
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 3-Can be scheduled
Repaint girders at various locations where paint system is damaged.

Work Candidate ID: 9D51F67-F6BD-062019-AA07C7CC4D
Action: 1015 Bridge Rail-Repair
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 3-Can be scheduled
Repair large spall with exposed rebar at barrier under the bridge, adjacent to Pier 1 (WB lanes).

Work Candidate ID: 9D51F67-F6BD-061919-AC2764BB26
Action: 1041 Drainage-Repair Washouts / Erosion
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 2-Priority over routine
Repair major erosion and undermining at the SE & SW slope paving, and erosion rills at NW embankment slope.

BRIDGE GROUP

Bridge Repair Report

Structure Number : **01148** Structure Name : **Riggs Rd TI UP** Inspected by : **ADOT-Carreno/Casteel**
 Route : **10** Road Name : **IRR Riggs Road** Inspection Type: **Routine**
 MP : **167.47** Agency : **ADOT** Inspection Date : **Tuesday, May 18, 2021**
 ADOT District: **Central** Next Insp. Due By : **May 2023**

Work Candidate ID: 9D51F67-F6BD-062019-D552A37158
Action: 1079 Superstructure-Repair Steel **A216 - Actual Completion Cost** \$
Estimated Quantity: **A215 - Completion Date:**
Estimated Cost: \$0.00
A212 - Repair Priority: 2-Priority over routine

Repair / straighten the girder 4 (Northmost) and repair bent steel members in span 3 (over EB traffic), including crack in the diaphragm weld. See Photo 6.

BRIDGE GROUP

Inspection Report

Structure No.: **01148** Structure Name: **Riggs Rd TI UP** Inspected by : **ADOT-Carreno/Casteel**
 Route : **10** Road Name: **IRR Riggs Road** Inspection Type: **Routine**
 MP : **167.47** Agency: **ADOT** Inspection Date : **Tuesday, May 18, 2021**
 ADOT District: **Central** Next Insp. Due By : **May 2023**

NBI Condition Ratings			
N58 Deck :	6 Satisfactory	N61 Channel:	N N/A (NBI)
N59 Superstructure :	5 Fair	N62 Culvert :	N N/A (NBI)
N60 Substructure :	7 Good		

Appraisal Ratings			
N67 Structural Evaluation:	5 Above Min Tolerable	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	3 Intolerable - Correct	N72 Approach Roadway Align.:	8 Equal Desirable Crit
N69 Vert. & Horiz. Clearances:	4 Tolerable	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

**This inspection has been moved to month of May to optimize the schedule.

Roadway/Safety:

- At barrier under the bridge, adjacent to Pier 1 (WB lanes), there is a large spall with exposed rebar. See Maintenance Report.
- Approach roadway at West and East of bridge has settled at end of approach slab.
- Minimum vertical clearances, as measured under the structure, are 16.03 ft. and 16.02 ft. for EB and WB traffic respectively. See the attached vertical clearance diagram. Current vertical clearance signs read 15 ft.-9 in. Per current ADOT signing policy the vertical signs are correct.
- At approaches, W-beam guardrail attached and stiffened in the transition area with rub rails. There are a few damaged wood spacers. See Maintenance Report.

Substructure::

- Major erosion and undermining exists at the SE & SW slope paving with large erosion rills at NW embankment slope. See Maintenance Report.
- Concrete slope paving is broken at the SE & SW corners. See Maintenance Report.
- Wingwalls exhibit minor hairline cracks.

Miscellaneous:

- Repairs: There was 1 previous repair item to verify, it is repeated. There are 0 new repairs added.
- Maintenance: There were 5 maintenance items to verify, all 5 are repeated. There are 0 new items added.

Photos:

- Roadway ID looking W
- Elevation ID looking N
- Deck Top
- Soffit
- Joint at E abutment
- Impact damage, Span 3, Beam 4
- Eroded slope southeast corner

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
12	Re Concrete Deck	9,391.00	sq.ft	2.00	216	8165	1010	0

Description: R/C Deck - 4 spans:

- Tire rut in the N. lane.
- Vibration noted under heavy truck traffic

1120	Efflorescence/Rust Staining	35.00	sq.ft	2.00	0	35	0	0
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- Efflorescence exists on soffit of overhang.

1130	Cracking (RC and Other)	9,140.00	sq.ft	2.00	0	8130	1010	0
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- Deck has hairline to medium and transverse cracks of moderate density.
- Hairline transverse cracks with efflorescence exist on the soffit of overhang.

107	Steel Opn Girder/Beam	1,191.00	ft	2.00	1175	15	1	0
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Description: 4 lines of continuous steel girders over 4 spans; numbered South to North. Spans numbered East to West.

- Secondary members: Intermediate & pier diaphragms- bolted steel diaphragms with crossed diagonal and horizontal angles. Abutment diaphragms- bolted steel plate diaphragms.
- Fatigue prone details include welded diaphragm connections to girder webs and welded vertical stiffeners.
- There are no fracture critical members on this structure.

BRIDGE GROUP

Inspection Report

Structure No. : 01148 Structure Name : Riggs Rd TI UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name : IRR Riggs Road Inspection Type : Routine
 MP : 167.47 Agency : ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District : Central Next Insp. Due By : May 2023

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
515	Steel Protective Coating	10.00	sq.ft	2.00	0	10	0	0
1. The girders/diaphragm paint system exhibits damage/graffiti or is missing mainly near the West abutment and on Girder 4 web over EB lanes (near impact damage). See Maintenance Report.								
1010	Cracking	1.00	ft	2.00	0	0	1	0
1. Girder 4 (Northmost) over EB lanes has sustained impact damage in span 3. The diaphragm weld has cracked and there is a gouge in the web of the girder from the diaphragm bolt head. See Repair Report.								
1900	Distortion	15.00	ft	2.00	0	15	0	0
1. Girder 4 (Northmost) over EB lanes has sustained impact damage in span 3. The bottom flange is 3" out of alignment to the south. The stiffener plate is bent along with the diaphragm gusset plate. See photo 6 and Repair Report.								
205	Re Conc Column	12.00	each	2.00	12	0	0	0
Description: Three rigid frame piers numbered East to West, with 4 RC columns per pier. Piers founded on spread footing: 1. No defects noted. 2. Columns at all piers are protected with concrete barriers. Additionally, Pier 2 columns protected by sand-filled barrels at both ends.								
215	Re Conc Abutment	70.00	ft	2.00	65	5	0	0
Description: R/C stub abutment on 10BP42 piles. Abut. 1 (East), Abut. 2 (West).								
1130	Cracking (RC and Other)	5.00	ft	2.00	0	5	0	0
1. Abutments exhibit minor hairline cracks.								
234	Re Conc Pier Cap	91.00	ft	2.00	85	6	0	0
Description: RC pier caps at 3 piers, supported by 4 rectangular columns:								
1130	Cracking (RC and Other)	6.00	ft	2.00	0	6	0	0
1. There are minor hairline cracks in the pier caps.								
304	Open Expansion Joint	74.00	ft	2.00	64	10	0	0
Description: RJ-3 sliding plate at abutments 1 & 2. Abut. 1 (East), Abut. 2 (West). 1. Deck joint openings measured at 84° F: -Abut. 1 (East): North side = 2"; South side = 2" -Abut. 2 (West): North side = 1-7/8"; South side = 2-1/8"								
2350	Debris Impaction	10.00	ft	2.00	0	10	0	0
1. The deck joints are partially filled with debris in some places.								
311	Moveable Bearing	16.00	each	2.00	14	2	0	0
Description: Steel rocker bearings; 4 per bent at Abut. 1, Abut. 2, Pier 1, & Pier 3. 1. The rocker bearing tilt measurements at abutments 1 & 2 are from 0° to 5°. Pier rockers not measured								
1000	Corrosion	2.00	each	2.00	0	2	0	0
1. Surface rust was observed on the abutment bearings.								
313	Fixed Bearing	4.00	each	2.00	4	0	0	0
Description: Steel fixed bearings at Pier 2. 1. No defects noted.								
321	Re Conc Approach Slab	520.00	sq.ft	2.00	320	200	0	0
Description: Reinforced concrete approach slabs - Bare Concrete								
1130	Cracking (RC and Other)	200.00	sq.ft	2.00	0	200	0	0
1. RC approach slabs exhibit minor hairline to narrow longitudinal and map cracks.								
330	Metal Bridge Railing	602.00	ft	2.00	602	0	0	0
Description: H-1-1 metal rail on top of concrete parapet. 1. No defects noted.								
331	Re Conc Bridge Railing	602.00	ft	2.00	534	68	0	0
Description: 9" curb plus concrete parapet (18" high).								

BRIDGE GROUP

Inspection Report

Structure No. : 01148 Structure Name : Riggs Rd TI UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name : IRR Riggs Road Inspection Type : Routine
 MP : 167.47 Agency : ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District : Central Next Insp. Due By : May 2023

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
1130	Cracking (RC and Other)	68.00	ft	2.00	0	68	0	0
1. Bridge railing has hairline vertical and transverse cracks.								

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01148	Structure Name :	Riggs Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	IRR Riggs Road	Inspection Type:	Routine
MP :	167.47	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01148-2021-05-18-Photo-1.jpg

Description : Roadway ID looking W

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01148	Structure Name :	Riggs Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	IRR Riggs Road	Inspection Type:	Routine
MP :	167.47	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01148-2021-05-18-Photo-2.jpg

Description : Elevation ID looking N

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01148	Structure Name :	Riggs Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	IRR Riggs Road	Inspection Type:	Routine
MP :	167.47	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central	Next Insp. Due By :	05/18/2023		



File Name : 01148-2021-05-18-Photo-3.jpg

Description : Deck Top

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01148	Structure Name :	Riggs Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	IRR Riggs Road	Inspection Type:	Routine
MP :	167.47	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central	Next Insp. Due By :	05/18/2023		



File Name : 01148-2021-05-18-Photo-4.jpg

Description : Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01148	Structure Name :	Riggs Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	IRR Riggs Road	Inspection Type:	Routine
MP :	167.47	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01148-2021-05-18-Photo-5.jpg

Description : Joint at E abutment

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01148	Structure Name :	Riggs Rd TI UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	IRR Riggs Road	Inspection Type:	Routine
MP :	167.47	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01148-2021-05-18-Photo-6.jpg

Description : Impact damage, Span 3, Beam 4

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01148	Structure Name : Riggs Rd TI UP	Inspected by : ADOT-Carreno/Casteel
Route : 10	Road Name : IRR Riggs Road	Inspection Type: Routine
MP : 167.47	Agency : ADOT	Inspection Date : Tuesday, May 18, 2021
ADOT District: Central		Next Insp. Due By : 05/18/2023



File Name : 01148-2021-05-18-Photo-7.jpg

Description : Eroded slope southeast corner

BRIDGE GROUP

**SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
VERTICAL & HORIZONTAL CLEARANCE DIAGRAM**

STRUCTURE NAME **RIGGS ROAD**

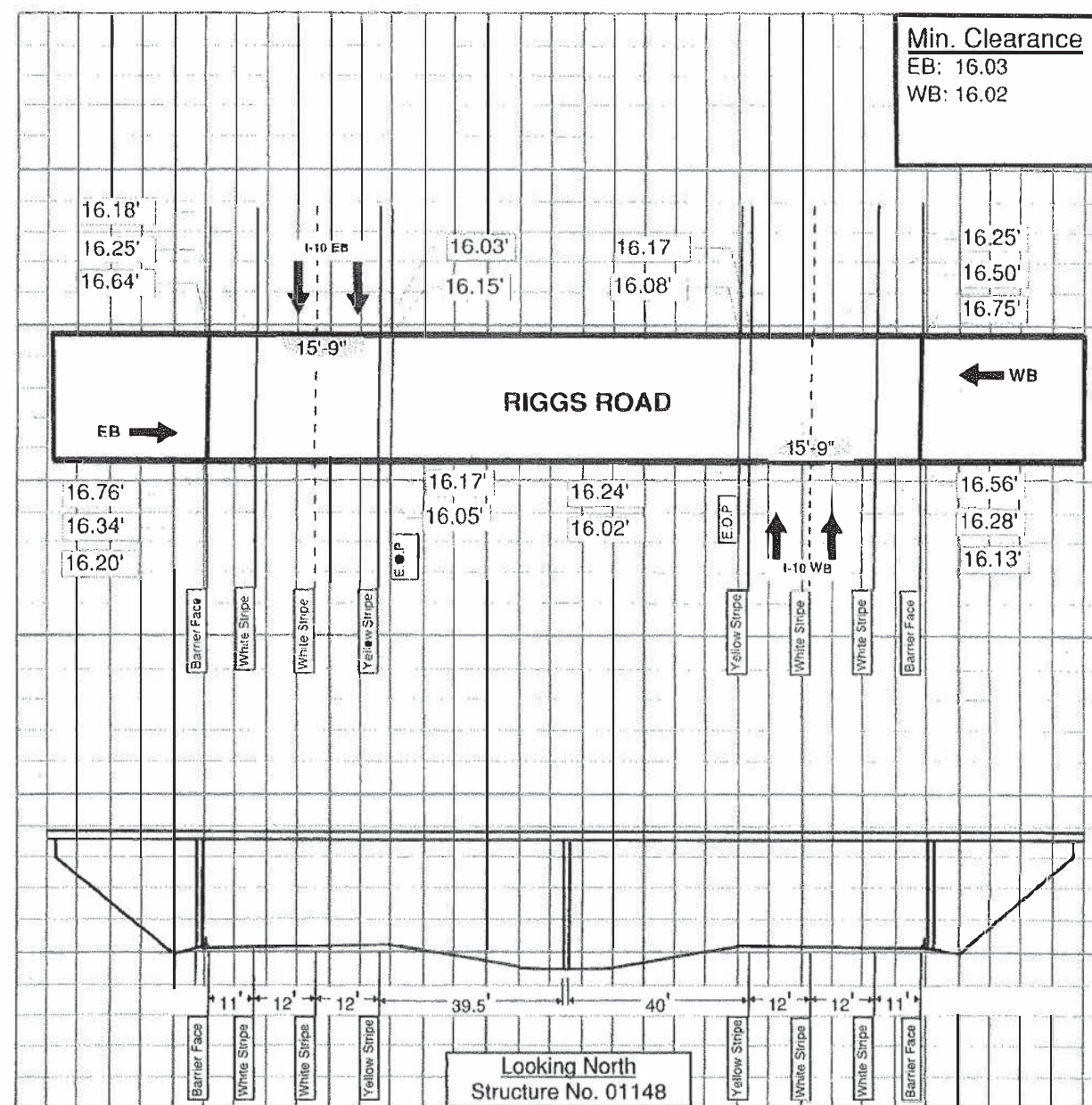
STRUCTURE NO. **1148**

LOCATION **I-10 167.47**
ROUTE MILEPOST



NORTH

INSPECTION				
DATE	2/05/19	5/18/21		
INITIAL	KA/ZS	RC/AC		
NEW / REVISED DIAGRAM	New	NSC		



BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 01149 Structure Name : Goodyear Rd UP Feature Under : I 10
 Route : 10 MP : 169.85 Road Name : Goodyear Rd Agency: ADOT Location : 29.3 mi N of Jct I 8

LOCATION INFORMATION		DIMENSIONS		PROPOSED IMPROVEMENTS	
N1-State Code :	049	N32:Appr Rdwy Width (feet):	26	N75-Type of Work:	
N2-State Hwy District :	Central	N48-Max Span Length (feet):	93	N76-Length of Str Imp (feet):	0
N3-County Code :	Pinal	N49-Structure Length (feet):	301	N94-Br Improv Cost (x1000):	\$0
N4-Place Code :	Unknown	N50a-Lt Curb/Swlk Width (feet):	1.5	N95-Rdwy Improv Cost (x1000):	\$0
N16-Latitude:	33 Deg 11 Min 24.72 Sec	N50b-Rt Curb/Swlk Width (feet):	1.5	N96-Total Project Cost (x1000):	\$0
N17-Longitude :	111 Deg 53 Min 53.88 Sec	N51-Br Width Curb-Curb (feet):	26.0	N97-Year of Cost Estimate:	
N98-Border St Code - % Resp:		N52-Deck Width Out-Out (feet):	31.2	CONSTRUCTION PROJECT DATA	
N99-Border Bridge Number:		N112-NBIS Br Length?	Y	N27-Year Built:	1967
INVENTORY ROUTE DATA		VERTICAL & HORIZONTAL CLEARANCE		N106-Year of Reconstruction:	
N19-Detour Length (miles):	4	N53-Min Vert Over Clr (feet):	99.99	A204-Orig Project Number:	I-10-3(38)
N20-Toll:	3	N54-Min Vert Under Clr (feet):	H 16.12	A205-Orig Project Station:	1304+29.67
ROADWAY RECORD ON UNDER		N55-Min Lat Under Clr Rt (feet):	H 16.1	A223-TRACS Number:	
N5-Inv Rte:	1 4 0 00000 0 2 1 1 00010 0	N56-Min Lat Under Clr Lt (feet):	16.2	A225-Deck Area (sq. feet):	9391
N28-Lanes:	2 4	SERVICE, TYPE, and SPAN INFORMATION		INSPECTION	
N10-Inv Rte Min Vert Clr (feet):	99.99 16.42	N42-Service Type:	1 1	N90-Inspection Date:	05/18/2021
N11-Inv Rte Milepoint:	0.00 169.85	N43-Str Type, Main:	4 2	N91-Insp Freq (months):	24
N26-Functional Class:	09 01	N44-Str Type, Appr:	0 0	A207-Inspection Quarter:	6
N29-Avg Daily Traffic:	100 57768	N45-Number of Main Spans:	4	Inspection Type:	Routine
N30-Year of ADT:	2019 2018	N46-Number of Appr Spans:	0	A228-Next Insp Date:	May 2023
N47-Inv Rte Tot Horiz Clr (feet):	26.0 73.50	CONDITION RATINGS		CRITICAL FEATURES	
N100-Defense Hwy:	0 1	N58-Deck:	7	N92A-Fracture Critical:	N
N101-Parallel Bridge:	N	N59-Superstructure:	7	N92B-Underwater Insp:	N
N102-Direction of Traffic:	2 2	N60-Substructure:	6	N92C-Special Insp:	N
N104-Hwy System:	0 1	N61-Channel:	N	N93A-Date Fract Crit Insp:	
N109-Percent Truck Traffic:	5 11	N62-Culvert:	N	N93B-Date Underwater Insp:	
N110-National Truck Network:	0 1	APPRAISAL RATINGS		N93C-Date Spec Insp:	
N114-Future ADT:	110 57778	N67-Struct Evaluation:	6	A234-Steel In-Depth Insp Freq(months):	48
N115-Year of Future ADT:	2039 2038	N68-Deck Geometry:	6	CULVERT INFORMATION	
A200-Is N5 the Princ. Rte?	N Y	N69-Underclearance Rtg:	5	A217-Culv Barrel Height(feet):	0
RESPONSIBILITY		N71-Waterway Adequacy:	N	A218-Culv Length (feet):	0
N21-Maint Responsibility:	01	N72-Appr Rdw Align:	8	A219-Culv Fill Height (feet):	0
N22-Bridge Owner:	01	N36-Traffic Safety Features:	1 0 1 1	BRIDGE RAILING	
A229-Agency:	ADOT	BRIDGE SCOUR DATA		A206a,b,c-	
NAVIGATION		N113-Scour Critical Rtg:	N	Bridge Rail Type,	311
N38-Navigation Control:	N	A202-Foundation Type:	4 1	Geometric Conform, and	
N39-Nav Vert clr (feet):	0.00	A220-Found Embed (feet):		Structural Conform:	
N40-Nav Horiz Clr (feet):	0.00	A221-Scour Countermeasure:		SUFFICIENCY RATING	
N111-Nav Pier/Abut Prot:		LOAD, RATE, and POST		Sufficiency Rating:	99.00
N116-Nav Min Vert Clr (feet):		N31-Design Loading:	5	BRIDGE CONDITION	
GENERAL DATA		N41-Open, Post, Close:	A	Bridge Condition:	Fair
N33-Bridge Median:	0	N63-Method Used for Oper. Rtg:	1	A300 - GENERAL COMMENTS	
N34-Skew:	33	N64-Operating Load Rtg/Factor:	59		
N35-Structure Flared:	0	N65-Method Used for Inv. Rtg:	1		
N37-Historical Significance:	5	N66-Inventory Load Rtg/Factor:	36		
N107-Deck Str Type:	1	N70-Bridge Posting:	5		
N108-Wear Surf Prot System:	1 0 0	N103-Temp Str Designation:			
A201-Wear Surf Thickness (inches)		A211-Posted Limit (Tons):			
		A222-Date of Load Rtg:	09/24/2008		
		A233-Posted Vert Clr NB/EB (ft-in):	15-9		
		A233-Posted Vert Clr SB/WB (ft-in):	15-9		

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 01149 Structure Name : Goodyear Rd UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name : Goodyear Rd Inspection Type: Routine
 MP : 169.85 Agency : ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District: Central Next Insp. Due By : May 2023

Work Candidate ID:	C69666A-8CAA-062019-A12FEB2B2C	A216 - Actual Completion Cost	\$
Action:	1071 Substructure-Rehab	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Rehab the slope paving at SE, NW, & SW corners.			

BRIDGE GROUP

Inspection Report

Structure No.: 01149 Structure Name: Goodyear Rd UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name: Goodyear Rd Inspection Type: Routine
 MP : 169.85 Agency: ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District: Central Next Insp. Due By : May 2023

NBI Condition Ratings			
N58 Deck :	7 Good	N61 Channel:	N N/A (NBI)
N59 Superstructure :	7 Good	N62 Culvert :	N N/A (NBI)
N60 Substructure :	6 Satisfactory		

Appraisal Ratings			
N67 Structural Evaluation:	6 Equal Min Criteria	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	6 Equal Min Criteria	N72 Approach Roadway Align.:	8 Equal Desirable Crit
N69 Vert. & Horiz. Clearances:	5 Above Tolerable	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

Roadway/Safety:
 1. AC Approach roadway has extensive narrow to wide sized map cracks. The ride is somewhat rough.
 2. Minimum vertical clearances, as measured under the structure, are 16.12 ft. and 16.23 ft. for EB and WB traffic respectively (see the attached vertical clearance diagram). Current vertical clearance signing reads 15 ft.-9 in. Per current ADOT signing policy the vertical signs are correct.
 3. Approach W-beam guardrail is not attached to dados.

Superstructure:
 1. The concrete curb has narrow sized to wide horizontal cracks (adjacent to top deck) at NE corner.

Substructure:
 1. Wingwalls exhibit hairline random cracks.
 2. Slope paving has large cracks throughout with undermining and failing in localized areas at both abutments. NW, SW, & SE corners exhibit major slope paving failure. The damage is so widespread that a new slope paving would be a better option. See Maintenance Report.

Miscellaneous:
 1. Repairs: There were 0 previous repair items to verify & there are 0 new repairs added.
 2. Maintenance: There were 2 maintenance items to verify, 1 was completed, 1 is repeated. There are 0 new items added.

Photos:
 1. Roadway ID looking E
 2. Elevation ID looking S
 3. Deck Top
 4. Soffit
 5. Joint at W abutment
 6. Eroded slope pave at E and W abutments

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
12	Re Concrete Deck	9,391.00	sq.ft	2.00	7493	1898	0	0
Description: Concrete deck - bare concrete:								
	1120 Efflorescence/Rust Staining	20.00	sq.ft	2.00	0	20	0	0
1. Soffit has hairline transverse cracks with isolated areas of efflorescence.								
	1130 Cracking (RC and Other)	1,878.00	sq.ft	2.00	0	1878	0	0
1. Deck exhibits hairline to narrow transverse and map cracks mostly over the piers. 2. Deck soffit exhibits hairline transverse cracks.								
107	Steel Opn Girder/Beam	1,191.00	ft	2.00	1191	0	0	0
Description: 4 lines of continuous steel girders over 4 spans; numbered North to South. Spans numbered West to East. 1. Secondary members: Intermediate & pier diaphragms- bolted steel diaphragms with crossed diagonal and horizontal angles. Abutment diaphragms- bolted steel plate diaphragms. 2. Fatigue-prone details include diaphragm connections welded to girder webs. There are no fracture critical members on this structure. 3. Girders exhibit minor sagging in spans 2 and 3, as documented in the previous inspection.								
	515 Steel Protective Coating	7,643.00	sq.ft	2.00	7623	20	0	0
1. Girders 1 & 4 in spans 2 and 3 have scrape marks on the bottom flange. Girder 1 web, North side, span 2, is missing paint.								
205	Re Conc Column	9.00	each	2.00	0	9	0	0

BRIDGE GROUP

Inspection Report

Structure No.: 01149 Structure Name: Goodyear Rd UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name: Goodyear Rd Inspection Type: Routine
 MP : 169.85 Agency: ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District: Central Next Insp. Due By : May 2023

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4

Description: 3' dia. circular concrete columns, 3 per pier, founded on spread footing:
 1. Columns in all piers are protected with concrete barrier. Additionally, Pier 2 columns protected with sand-filled barrels at both ends.
 2. Columns exhibit hairline random cracks.

215	Re Conc Abutment	73.00	ft	2.00	55	18	0	0
-----	------------------	-------	----	------	----	----	---	---

Description: Stub abutments are founded on a single row of 10BP42 alternating vertical and battered piles. Abut. 1 (West); Abut. 2 (East).
 1. Brown leakage stains are present on west abutment backwall.

	1130 Cracking (RC and Other)	10.00	ft	2.00	0	10	0	0
--	------------------------------	-------	----	------	---	----	---	---

1. Abutments exhibit hairline to narrow horizontal, vertical, and random cracks.

234	Re Conc Pier Cap	90.00	ft	2.00	84	6	0	0
-----	------------------	-------	----	------	----	---	---	---

Description: RC pier cap at 3 piers; 3 columns per pier

	1130 Cracking (RC and Other)	6.00	ft	2.00	0	6	0	0
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1. Pier caps exhibit hairline vertical and random cracks.

304	Open Expansion Joint	73.00	ft	2.00	63	10	0	0
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Description: R-J-3 metal sliding plate at abutments 1 & 2.
 1. Deck joint openings measured at 81° F:
 - West abutment: North = 1-3/8"; South = 1-1/2"
 - East abutment: North = 2"; South = 1-5/8"

	2350 Debris Impaction	10.00	ft	2.00	0	10	0	0
--	-----------------------	-------	----	------	---	----	---	---

1. Deck joints are filled with dirt and debris.

311	Moveable Bearing	16.00	each	2.00	8	8	0	0
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Description: Steel rockers at Abutments 1 & 2, Pier 1, and Pier 3
 1. Rocker bearing tilt measurements at Abut. 1 & 2 measure between 0° to 5° towards the west. Pier rockers not measured.

	1000 Corrosion	8.00	each	2.00	0	8	0	0
--	----------------	------	------	------	---	---	---	---

1. Surface rust was observed on the abutment rockers and bearing plates.

313	Fixed Bearing	4.00	each	2.00	4	0	0	0
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Description: Fixed steel bearings at pier 2.
 1. No defects noted.

321	Re Conc Approach Slab	624.00	sq.ft	2.00	324	300	0	0
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Description: Concrete approach slabs - bare concrete

	1130 Cracking (RC and Other)	300.00	sq.ft	2.00	0	300	0	0
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1. RC approach slabs exhibit hairline no narrow longitudinal cracks. Cracking is more severe at west approach slab.

330	Metal Bridge Railing	602.00	ft	2.00	402	200	0	0
-----	----------------------	--------	----	------	-----	-----	---	---

Description: Metal railings are H-1-1 on concrete parapets:
 1. Portion of railing has been painted over. Some surface corrosion on South side & West end of North side.

	1000 Corrosion	200.00	ft	2.00	0	200	0	0
--	----------------	--------	----	------	---	-----	---	---

1. The concrete parapet has hairline to narrow vertical and transverse cracks.

331	Re Conc Bridge Railing	602.00	ft	2.00	452	150	0	0
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Description: RC curb & parapet with metal railing on top.

	1130 Cracking (RC and Other)	150.00	ft	2.00	0	150	0	0
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1. The concrete parapet has hairline to narrow vertical and transverse cracks.

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01149	Structure Name :	Goodyear Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Goodyear Rd	Inspection Type:	Routine
MP :	169.85	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central	Next Insp. Due By :	05/18/2023		



File Name : 01149-2021-05-18-Photo-1.jpg

Description : Roadway ID looking E

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01149	Structure Name :	Goodyear Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Goodyear Rd	Inspection Type:	Routine
MP :	169.85	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central	Next Insp. Due By :	05/18/2023		



File Name : 01149-2021-05-18-Photo-2.jpg

Description : Elevation ID looking S

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01149	Structure Name :	Goodyear Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Goodyear Rd	Inspection Type:	Routine
MP :	169.85	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01149-2021-05-18-Photo-3.jpg

Description : Deck Top

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01149	Structure Name :	Goodyear Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Goodyear Rd	Inspection Type:	Routine
MP :	169.85	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01149-2021-05-18-Photo-4.jpg

Description : Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01149	Structure Name :	Goodyear Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Goodyear Rd	Inspection Type:	Routine
MP :	169.85	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01149-2021-05-18-Photo-5.jpg

Description : Joint at W abutment

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01149	Structure Name :	Goodyear Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Goodyear Rd	Inspection Type:	Routine
MP :	169.85	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01149-2021-05-18-Photo-6.jpg

Description : Eroded slope pave at E and W abutments

Arizona Department of Transportation
BRIDGE GROUP
SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

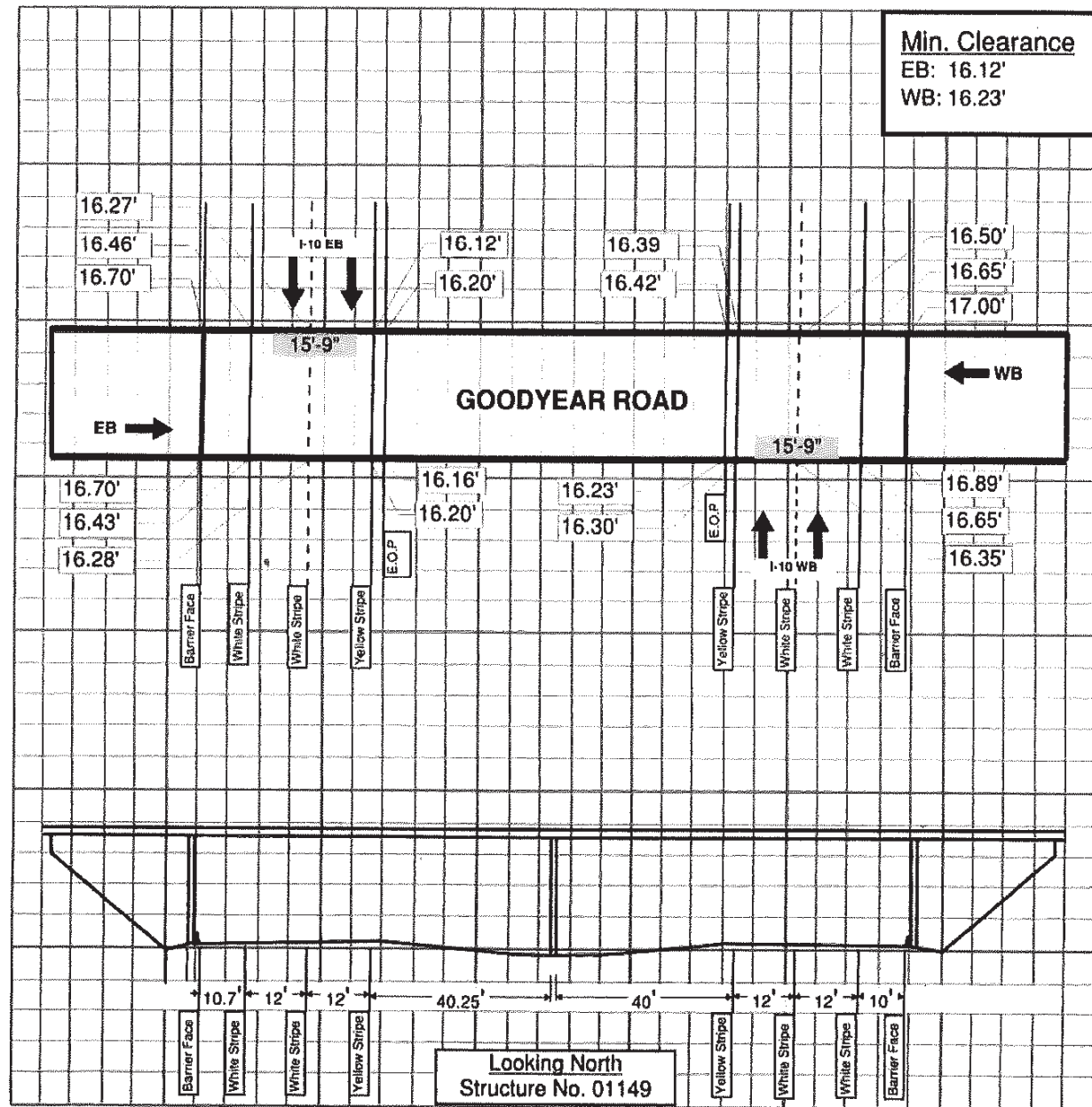
STRUCTURE NAME **GOODYEAR ROAD UP**

STRUCTURE NO. **1149**

LOCATION **I-10** **169.85**
ROUTE MILEPOST



INSPECTION				
DATE	2/06/19	51821		
INITIAL	KA/ZS	RC	AC	
NEW / REVISED DIAGRAM	New	NSC		



BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 01213 Structure Name : Nelson Rd UP Feature Under : I 10
 Route : 10 MP : 174.63 Road Name : Nelson Rd Agency: ADOT Location : 24.5 mi North Jct I 8

LOCATION INFORMATION		DIMENSIONS		PROPOSED IMPROVEMENTS	
N1-State Code :	049	N32:Appr Rdwy Width (feet):	26	N75-Type of Work:	
N2-State Hwy District :	Central	N48-Max Span Length (feet):	93	N76-Length of Str Imp (feet):	0
N3-County Code :	Pinal	N49-Structure Length (feet):	292	N94-Br Improv Cost (x1000):	\$0
N4-Place Code :	Unknown	N50a-Lt Curb/Swlk Width (feet):	1.5	N95-Rdwy Improv Cost (x1000):	\$0
N16-Latitude:	33 Deg 07 Min 55.92 Sec	N50b-Rt Curb/Swlk Width (feet):	1.5	N96-Total Project Cost (x1000):	\$0
N17-Longitude :	111 Deg 51 Min 12.60 Sec	N51-Br Width Curb-Curb (feet):	26.0	N97-Year of Cost Estimate:	
N98-Border St Code - % Resp:		N52-Deck Width Out-Out (feet):	31.2		
N99-Border Bridge Number:		N112-NBIS Br Length?	Y		
INVENTORY ROUTE DATA		VERTICAL & HORIZONTAL CLEARANCE		CONSTRUCTION PROJECT DATA	
N19-Detour Length (miles):	3	N53-Min Vert Over Clr (feet):	99.99	N27-Year Built:	1967
N20-Toll:	3	N54-Min Vert Under Clr (feet):	H 16.15	N106-Year of Reconstruction:	
ROADWAY RECORD	ON UNDER	N55-Min Lat Under Clr Rt (feet):	H 8.3	A204-Orig Project Number:	I-10-3(40)
N5-Inv Rte:	1 4 0 0000 0 2 1 1 00010 0	N56-Min Lat Under Clr Lt (feet):	41.3	A205-Orig Project Station:	1556+05.28
N28-Lanes:	2 4	SERVICE, TYPE, and SPAN INFORMATION		A223-TRACS Number:	
N10-Inv Rte Min Vert Clr (feet):	99.99 16.37	N42-Service Type:	1 1	A225-Deck Area (sq. feet):	9110
N11-Inv Rte Milepoint:	0.00 174.63	N43-Str Type, Main:	4 2		
N26-Functional Class:	07 01	N44-Str Type, Appr:	0 0	INSPECTION	
N29-Avg Daily Traffic:	200 57768	N45-Number of Main Spans:	4	N90-Inspection Date:	05/18/2021
N30-Year of ADT:	2019 2018	N46-Number of Appr Spans:	0	N91-Insp Freq (months):	24
N47-Inv Rte Tot Horiz Clr (feet):	26.0 73.30	CONDITION RATINGS		A207-Inspection Quarter:	6
N100-Defense Hwy:	0 1	N58-Deck:	7	Inspection Type:	Routine
N101-Parallel Bridge:	N	N59-Superstructure:	7	A228-Next Insp Date:	May 2023
N102-Direction of Traffic:	2 2	N60-Substructure:	6	CRITICAL FEATURES	
N104-Hwy System:	0 1	N61-Channel:	N	N92A-Fracture Critical:	N
N109-Percent Truck Traffic:	5 11	N62-Culvert:	N	N92B-Underwater Insp:	N
N110-National Truck Network:	0 1	APPRAISAL RATINGS		N92C-Special Insp:	N
N114-Future ADT:	210 57778	N67-Struct Evaluation:	6	N93A-Date Fract Crit Insp:	
N115-Year of Future ADT:	2039 2038	N68-Deck Geometry:	5	N93B-Date Underwater Insp:	
A200-Is N5 the Princ. Rte?	N Y	N69-Underclearance Rtg:	3	N93C-Date Spec Insp:	
RESPONSIBILITY		N71-Waterway Adequacy:	N	A234-Steel In-Depth Insp Freq(months):	48
N21-Maint Responsibility:	01	N72-Appr Rdw Align:	8	CULVERT INFORMATION	
N22-Bridge Owner:	01	N36-Traffic Safety Features:	1 0 1 1	A217-Culv Barrel Height(feet):	0
A229-Agency:	ADOT	BRIDGE SCOUR DATA		A218-Culv Length (feet):	0
		N113-Scour Critical Rtg:	N	A219-Culv Fill Height (feet):	0
		A202-Foundation Type:	4 1	BRIDGE RAILING	
		A220-Found Embed (feet):		A206a,b,c-	
		A221-Scour Countermeasure:		Bridge Rail Type,	311
		LOAD, RATE, and POST		Geometric Conform, and	
		N31-Design Loading:	5	Structural Conform:	
		N41-Open, Post, Close:	A	SUFFICIENCY RATING	
		N63-Method Used for Oper. Rtg:	1	Sufficiency Rating:	95.00
		N64-Operating Load Rtg/Factor:	60	BRIDGE CONDITION	
		N65-Method Used for Inv. Rtg:	1	Bridge Condition:	Fair
		N66-Inventory Load Rtg/Factor:	36	A300 - GENERAL COMMENTS	
		N70-Bridge Posting:	5		
		N103-Temp Str Designation:			
		A211-Posted Limit (Tons):			
		A222-Date of Load Rtg:	03/03/2010		
		A233-Posted Vert Clr NB/EB (ft-in):	15-11		
		A233-Posted Vert Clr SB/WB (ft-in):	16-0		

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 01213 Structure Name : Nelson Rd UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name : Nelson Rd Inspection Type: Routine
 MP : 174.63 Agency : ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District: Central Next Insp. Due By : May 2023

Work Candidate ID:	4ADB053-3C10-062019-A776CDE08D	A216 - Actual Completion Cost	\$
Action:	1071 Substructure-Rehab	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Repair slope paving at both abutments, especially at the SW corner. See Photo 6.			
Work Candidate ID:	4ADB053-3C10-062019-D46E85205A	A216 - Actual Completion Cost	\$
Action:	1041 Drainage-Repair Washouts / Erosion	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Repair erosion and sinkholes at all four corners of the bridge. See photo 6.			
Work Candidate ID:	4ADB053-3C10-062019-E01B66D3B3	A216 - Actual Completion Cost	\$
Action:	1004 Approach Roadway	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Repair the rough AC patch at end of West approach slab. See photo 7.			
Work Candidate ID:	4ADB053-8AC5-062019-EA6EAC8747	A216 - Actual Completion Cost	\$
Action:	1063 Paint-Wash	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Remove graffiti from barriers and other locations.			

BRIDGE GROUP

Bridge Repair Report

Structure Number : 01213 Structure Name : Nelson Rd UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name : Nelson Rd Inspection Type : Routine
 MP : 174.63 Agency : ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District: Central Next Insp. Due By : May 2023

Work Candidate ID: 4ADB053-3C10-062019-B6CD6F84A4
Action: 1001 Approach Railing **A216 - Actual Completion Cost** \$
Estimated Quantity: **A215 - Completion Date:**
Estimated Cost: \$0.00
A212 - Repair Priority: 2-Priority over routine

Raise W-beam approach guardrail to ADOT standard.

BRIDGE GROUP

Inspection Report

Structure No.: 01213 Structure Name: Nelson Rd UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name: Nelson Rd Inspection Type: Routine
 MP : 174.63 Agency: ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District: Central Next Insp. Due By : May 2023

NBI Condition Ratings			
N58 Deck :	7 Good	N61 Channel:	N N/A (NBI)
N59 Superstructure :	7 Good	N62 Culvert :	N N/A (NBI)
N60 Substructure :	6 Satisfactory		

Appraisal Ratings			
N67 Structural Evaluation:	6 Equal Min Criteria	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	5 Above Tolerable	N72 Approach Roadway Align.:	8 Equal Desirable Crit
N69 Vert. & Horiz. Clearances:	3 Intolerable - Correct	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

Roadway/Safety:
 1. Approach guardrail is too low (15" high). Raise guardrail to ADOT standard. See Repair Report.
 2. AC approach roadway exhibits narrow to wide map and random cracks.
 3. Minimum vertical clearances, as measured under the structure, are 16.24 ft. and 16.15 ft. for EB and WB traffic respectively (see the attached vertical clearance diagram). EB is posted 15'-11" and WB is posted 16'-0". Per current ADOT policy, there is no need to change current clearance signs.
 4. AC transition at W. end has a rough patch. See Maintenance Report.

Substructure:
 1. Erosion & sinkholes exist at all corners of the bridge. Major erosion rills at NWC. See Maintenance Report.
 2. Wingwalls exhibit hairline vertical & random cracks.
 3. Slope paving exhibits hairline to wide random & transverse cracks; also damage at both abutments, especially at SW corner which exhibits extreme damage. See Maintenance Report.

Miscellaneous:
 1. Repairs: There was 1 repair item to verify, it is repeated. There are 0 new repairs added.
 2. Maintenance: There were 4 maintenance item to verify; all 4 are repeated. There are 0 new maintenance items added.
 3. In-Depth inspection comments and repairs is still valid.

Photos:
 1. Roadway ID looking E
 2. Elevation ID looking N
 3. Deck Top
 4. Soffit
 5. Joint at W abutment
 6. Eroded slope pave at E and W abutments
 7. AC deterioration, east approach, with settlement

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
12	Re Concrete Deck	9,110.00	sq.ft	2.00	6985	2125	0	0

Description: Reinforced concrete deck - Bare concrete
 1. West end of north curb has a small spall. South curb exhibits minor spalling at gutter line. All curbs have hairline to narrow vertical and transverse cracks.
 2. Tire rut in the outer lane. Top deck has numerous narrow sized transverse cracks.
 3. Vibration felt under truck load.

1080	Delamination/Spall/Patched Area	10.00	sq.ft	2.00	0	10	0	0
1. Top of deck has small random spalls.								
1120	Efflorescence/Rust Staining	115.00	sq.ft	2.00	0	115	0	0
1. The underside of the deck has hairline transverse cracks with minor efflorescence.								
1130	Cracking (RC and Other)	2,000.00	sq.ft	2.00	0	2000	0	0
1. Deck has hairline to medium transverse, random, and map cracks.								

107	Steel Opn Girder/Beam	1,158.00	ft	2.00	1158	0	0	0
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BRIDGE GROUP

Inspection Report

Structure No. : 01213 Structure Name : Nelson Rd UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name : Nelson Rd Inspection Type: Routine
 MP : 174.63 Agency : ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District: Central Next Insp. Due By : May 2023

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
Description: 4 lines of continuous steel girders over 4 spans; numbered South to North. Spans numbered East to West. 1. Secondary members: Intermediate & pier diaphragms- bolted steel diaphragms with crossed diagonal and horizontal angles. Abutment diaphragms- bolted steel plate diaphragms. 2. Fatigue prone details include welded diaphragm connections to girder webs and welded vertical stiffeners. There are no fracture critical members in this structure. 1. The girders exhibit a slight sag in spans 2 and 3.								
515	Steel Protective Coating	7,431.00	sq.ft	2.00	7429	2	0	0
1. Girder 1 web, span 2, South side, coating missing.								
210	Re Conc Pier Wall	54.00	ft	2.00	51	3	0	0
Description: Reinforced concrete hammerhead pier walls on spread footings. 1. Previously noted- Pier 3 has narrow vertical cracks. Pier 3 is now coated with shotcrete on the East side.								
1130	Cracking (RC and Other)	3.00	ft	2.00	0	3	0	0
1. Pier 1, 2, & 3 exhibit hairline random cracks.								
215	Re Conc Abutment	77.00	ft	2.00	53	24	0	0
Description: Reinforced concrete stub abutments on a single row of 10BP42 with vertical piles in the middle and battered piles on the two ends. Abut. 1 (East); Abut. 2 (West).								
1080	Delamination/Spall/Patched Area	3.00	ft	2.00	0	3	0	0
1. NW corner has hairline to narrow diagonal and random cracks with delamination and spalls. 2. There is an 8"x6" delamination in the SE corner. 3. Beam seats on abutments have hairline longitudinal and random cracks with minor delamination.								
1130	Cracking (RC and Other)	21.00	ft	2.00	0	21	0	0
1. There are hairline to narrow vertical, horizontal, and random cracks in the abutment backwalls with brown staining. 2. Beam seats on abutments have hairline longitudinal and random cracks.								
234	Re Conc Pier Cap	96.00	ft	2.00	96	0	0	0
Description: Reinforced concrete pier caps 1. Pier caps have no visible defects.								
304	Open Expansion Joint	75.00	ft	2.00	0	75	0	0
Description: Steel R-J-3 sliding plate 1. Deck joint openings measured at 81° F: - East Abutment: North = 2-7/8"; South = 1-7/8" - West Abutment: North = 1"; South = 2" 2. The joints had been filled with bituminous joint filler, 50% of filler is missing.								
2350	Debris Impaction	75.00	ft	2.00	0	75	0	0
1. Partially filled with debris.								
311	Moveable Bearing	16.00	each	2.00	8	8	0	0
Description: Steel rocker bearings are located at Abutments, Pier 1, and Pier 3. Abut. 1 (East); Abut. 2 (West). 1. Rockers at both abutments tilted up to 5° towards the West.								
1000	Corrosion	8.00	each	2.00	0	8	0	0
1. Bearings at Abut. 1 & Pier 1 have surface corrosion.								
313	Fixed Bearing	4.00	each	2.00	4	0	0	0
Description: Fixed steel bearings at Pier 2. 1. No defects visible.								
321	Re Conc Approach Slab	624.00	sq.ft	2.00	424	200	0	0
R/C Approach Slab: 1. E. end has extensive hairline map cracks.								
1080	Delamination/Spall/Patched Area	20.00	sq.ft	2.00	0	20	0	0
1. There are spalls at the edges of the approach slabs.								

BRIDGE GROUP

Inspection Report

Structure No. : 01213 Structure Name : Nelson Rd UP Inspected by : ADOT-Carreno/Casteel
 Route : 10 Road Name : Nelson Rd Inspection Type: Routine
 MP : 174.63 Agency : ADOT Inspection Date : Tuesday, May 18, 2021
 ADOT District: Central Next Insp. Due By : May 2023

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
1130	Cracking (RC and Other)	180.00	sq.ft	2.00	0	180	0	0
1. The concrete approach slabs exhibit hairline to narrow longitudinal and map cracks, see Photo H.								
330	Metal Bridge Railing	584.00	ft	2.00	580	4	0	0
Description: Metal H-1-1 railings on top of 9 in. concrete curb and 1.5 ft. parapet on both sides.								
7000	Damage	4.00	ft	2.00	0	4	0	0
1. Metal bridge railing has a minor scrape on the northside.								
331	Re Conc Bridge Railing	584.00	ft	2.00	554	30	0	0
Description: 1.5 ft. parapet on a 9" concrete curb, both sides.								
1130	Cracking (RC and Other)	30.00	ft	2.00	0	30	0	0
1. Bridge railing has hairline to narrow random cracks throughout.								

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01213	Structure Name :	Nelson Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Nelson Rd	Inspection Type:	Routine
MP :	174.63	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central	Next Insp. Due By :	05/18/2023		



File Name : 01213-2021-05-18-Photo-1.jpg
 Description : Roadway ID looking E

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01213	Structure Name :	Nelson Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Nelson Rd	Inspection Type:	Routine
MP :	174.63	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central	Next Insp. Due By :	05/18/2023		



File Name : 01213-2021-05-18-Photo-2.jpg
 Description : Elevation ID looking N

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01213	Structure Name :	Nelson Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Nelson Rd	Inspection Type:	Routine
MP :	174.63	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01213-2021-05-18-Photo-3.jpg
 Description : Deck Top

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01213	Structure Name :	Nelson Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Nelson Rd	Inspection Type:	Routine
MP :	174.63	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01213-2021-05-18-Photo-4.jpg
 Description : Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01213	Structure Name :	Nelson Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Nelson Rd	Inspection Type:	Routine
MP :	174.63	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01213-2021-05-18-Photo-5.jpg

Description : Joint at W abutment

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01213	Structure Name :	Nelson Rd UP	Inspected by :	ADOT-Carreno/Casteel
Route :	10	Road Name :	Nelson Rd	Inspection Type:	Routine
MP :	174.63	Agency :	ADOT	Inspection Date :	Tuesday, May 18, 2021
ADOT District:	Central			Next Insp. Due By :	05/18/2023



File Name : 01213-2021-05-18-Photo-6.jpg

Description : Eroded slope pave at E and W abutments

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01213	Structure Name : Nelson Rd UP	Inspected by : ADOT-Carreno/Casteel
Route : 10	Road Name : Nelson Rd	Inspection Type: Routine
MP : 174.63	Agency : ADOT	Inspection Date : Tuesday, May 18, 2021
ADOT District: Central		Next Insp. Due By : 05/18/2023



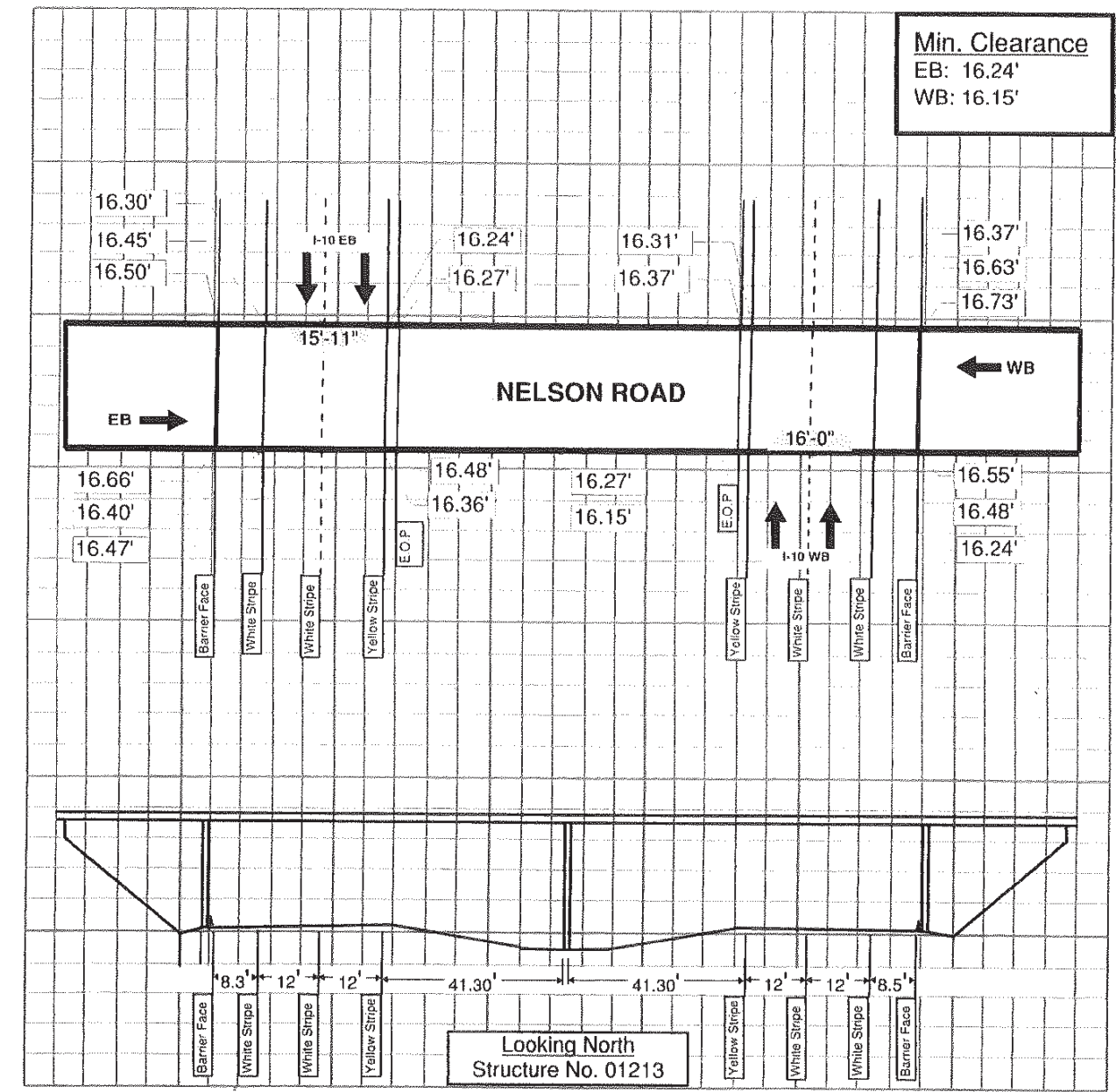
File Name : 01213-2021-05-18-Photo-7.jpg
 Description : AC deterioration, east approach, with settlement

Arizona Department of Transportation
BRIDGE GROUP
 SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
 VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

STRUCTURE NAME **NELSON ROAD UP**

STRUCTURE NO. **1213**
 LOCATION **I-10** **147.63**
 ROUTE MILEPOST

INSPECTION				
DATE	2/07/19	51821		
INITIAL	KA/ZS	RC	AC	
NEW / REVISED DIAGRAM	New	18C		



† 64-4505 R07/06

BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 01214 Structure Name : Casa Blanca TI UP Feature Under : I-10
 Route : 10 MP : 175.81 Road Name : IRR Casa Blanca Agency: ADOT Location : 9.5 mi NW Jct SR 187

LOCATION INFORMATION		DIMENSIONS		PROPOSED IMPROVEMENTS	
N1-State Code :	049	N32:Appr Rdwy Width (feet):	30	N75-Type of Work:	
N2-State Hwy District :	Southcentral	N48-Max Span Length (feet):	95	N76-Length of Str Imp (feet):	
N3-County Code :	Pinal	N49-Structure Length (feet):	298	N94-Br Improv Cost (x1000):	
N4-Place Code :	Unknown	N50a-Lt Curb/Swlk Width (feet):	0.0	N95-Rdwy Improv Cost (x1000):	
N16-Latitude:	33 Deg 07 Min 3.00 Sec	N50b-Rt Curb/Swlk Width (feet):	0.0	N96-Total Project Cost (x1000):	
N17-Longitude :	111 Deg 50 Min 31.92 Sec	N51-Br Width Curb-Curb (feet):	30.7	N97-Year of Cost Estimate:	
N98-Border St Code - % Resp:		N52-Deck Width Out-Out (feet):	35.2		
N99-Border Bridge Number:		N112-NBIS Br Length?	Y		
INVENTORY ROUTE DATA		VERTICAL & HORIZONTAL CLEARANCE		CONSTRUCTION PROJECT DATA	
N19-Detour Length (miles):	6	N53-Min Vert Over Clr (feet):	35.00	N27-Year Built:	1967
N20-Toll:	3	N54-Min Vert Under Clr (feet):	H 16.11	N106-Year of Reconstruction:	
ROADWAY RECORD ON UNDER		N55-Min Lat Under Clr Rt (feet):	H 8.0	A204-Orig Project Number:	I-10-3(40)
N5-Inv Rte:	1 3 1 00587 0 2 1 1 00010 0	N56-Min Lat Under Clr Lt (feet):	40.7	A205-Orig Project Station:	1618+00.00
N28-Lanes:	2 4	SERVICE, TYPE, and SPAN INFORMATION		A223-TRACS Number:	
N10-Inv Rte Min Vert Clr (feet):	35.00 16.20	N42-Service Type:	1 1	A225-Deck Area (sq. feet):	10490
N11-Inv Rte Milepoint:	225.23 175.81	N43-Str Type, Main:	4 2	INSPECTION	
N26-Functional Class:	02 01	N44-Str Type, Appr:	0 0	N90-Inspection Date:	05/31/2020
N29-Avg Daily Traffic:	6474 57768	N45-Number of Main Spans:	4	N91-Insp Freq (months):	24
N30-Year of ADT:	2019 2018	N46-Number of Appr Spans:	0	A207-Inspection Quarter:	2
N47-Inv Rte Tot Horiz Clr (feet):	30.0 72.70	CONDITION RATINGS		Inspection Type:	In-Depth
N100-Defense Hwy:	0 1	N58-Deck:	6	A228-Next Insp Date:	May 2022
N101-Parallel Bridge:	N	N59-Superstructure:	6	CRITICAL FEATURES	
N102-Direction of Traffic:	2 2	N60-Substructure:	6	N92A-Fracture Critical:	N
N104-Hwy System:	1 1	N61-Channel:	N	N92B-Underwater Insp:	N
N109-Percent Truck Traffic:	15 14	N62-Culvert:	N	N92C-Special Insp:	N
N110-National Truck Network:	1 1	APPRAISAL RATINGS		N93A-Date Fract Crit Insp:	
N114-Future ADT:	6484 57778	N67-Struct Evaluation:	6	N93B-Date Underwater Insp:	
N115-Year of Future ADT:	2039 2038	N68-Deck Geometry:	4	N93C-Date Spec Insp:	
A200-Is N5 the Princ. Rte?	N Y	N69-Underclearance Rtg:	3	A234-Steel In-Depth Insp Freq(months):	48
RESPONSIBILITY		N71-Waterway Adequacy:	N	CULVERT INFORMATION	
N21-Maint Responsibility:	01	N72-Appr Rdw Align:	6	A217-Culv Barrel Height(feet):	0
N22-Bridge Owner:	01	N36-Traffic Safety Features:	1 1 1 1	A218-Culv Length (feet):	0
A229-Agency:	ADOT	BRIDGE SCOUR DATA		A219-Culv Fill Height (feet):	0
NAVIGATION		N113-Scour Critical Rtg:	N	BRIDGE RAILING	
N38-Navigation Control:	N	A202-Foundation Type:	55	A206a,b,c- Bridge Rail Type,	911
N39-Nav Vert clr (feet):	0.00	A220-Found Embed (feet):		Geometric Conform, and Structural Conform:	
N40-Nav Horiz Clr (feet):	0.00	A221-Scour Countermeasure:		SUFFICIENCY RATING	
N111-Nav Pier/Abut Prot:		LOAD, RATE, and POST		Sufficiency Rating:	80.40
N116-Nav Min Vert Clr (feet):		N31-Design Loading:	5	BRIDGE CONDITION	
GENERAL DATA		N41-Open, Post, Close:	A	Bridge Condition:	Fair
N33-Bridge Median:	0	N63-Method Used for Oper. Rtg:	1	A300 - GENERAL COMMENTS	
N34-Skew:	35	N64-Operating Load Rtg/Factor:	58		
N35-Structure Flared:	0	N65-Method Used for Inv. Rtg:	1		
N37-Historical Significance:	5	N66-Inventory Load Rtg/Factor:	36		
N107-Deck Str Type:	1	N70-Bridge Posting:	5		
N108-Wear Surf Prot System:	1 0 0	N103-Temp Str Designation:			
A201-Wear Surf Thickness (inches)		A211-Posted Limit (Tons):			
		A222-Date of Load Rtg:	09/24/2008		
		A233-Posted Vert Clr NB/EB (ft-in):	15-11		
		A233-Posted Vert Clr SB/WB (ft-in):	15-11		

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 01214 Structure Name : Casa Blanca TI UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Casa Blanca Inspection Type : In-Depth
 MP : 175.81 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentral Next Insp. Due By : May 2022

Work Candidate ID:	553337C-AE03-070620-63986797F6	A216 - Actual Completion Cost	\$
Action:	1061 Paint-Misc. Activity	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Remove graffiti on the bridge barriers, visible to the traveling public (see photo 10).			

Work Candidate ID:	553337C-AE03-062920-AC57B40565	A216 - Actual Completion Cost	\$
Action:	1059 Misc-Tighten Bolts and Nuts	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	1-Immediate action req		
Tighten all the loose mounting bolts on the "Wrong Way" sign mounted above EB I-10 (see photos 29 and 30). ADOT has been notified of the critical finding on 6-1-2020.			

Work Candidate ID:	553337C-AE03-062920-A9FBEB5DDB	A216 - Actual Completion Cost	\$
Action:	1000 Approach Railing-Repair	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Repair damaged guardrail and wood posts (1-6) at Southeast corner (see photo 9).			

Work Candidate ID:	553337C-AE03-062920-C94937B56B	A216 - Actual Completion Cost	\$
Action:	1059 Misc-Tighten Bolts and Nuts	A215 - Completion Date:	
Estimated Quantity:			
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Replace the two bottom field splice bolts that have been sheared off at Span 3 Girder 1 (see photo 21).			

BRIDGE GROUP

Inspection Report

Structure No.: **01214** Structure Name: **Casa Blanca TI UP** Inspected by: **AECOM-Muthart/Hatch**
 Route: **10** Road Name: **IRR Casa Blanca** Inspection Type: **In-Depth**
 MP: **175.81** Agency: **ADOT** Inspection Date: **Sunday, May 31, 2020**
 ADOT District: **Southcentral** Next Insp. Due By: **May 2022**

NBI Condition Ratings			
N58 Deck:	6 Satisfactory	N61 Channel:	N N/A (NBI)
N59 Superstructure:	6 Satisfactory	N62 Culvert:	N N/A (NBI)
N60 Substructure:	6 Satisfactory		

Appraisal Ratings			
N67 Structural Evaluation:	6 Equal Min Criteria	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	4 Tolerable	N72 Approach Roadway Align.:	6 Equal Min Criteria
N69 Vert. & Horiz. Clearances:	3 Intolerable - Correct	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

- This was an in-depth inspection by AECOM under Task Order 4 of contract #2019-10.01.
- The bridge was inspected during daytime and nighttime hours. The bridge was accessed using a bucket truck with phased single lane closures on I-10.
- Roadway:
 - The AC roadway is in good condition with some minor potholes. It appears to have been recently repaved.
 - The transitions are level.
 - The approach guardrails consist of w-beam sections with thrie-beam transitions (see photo 9).
 - There is impact damage to the approach guardrail, wood posts, and blocks at the SE corner (see photo 9 and the list of maintenance items). Post 1-6 have varying degrees of damage.
- Fills:
 - The slope protection is concrete slope paving at abutments.
 - Slope paving has insignificant to moderate random cracks with insignificant to wide cracks typically on top.
 - The top of the slope protections is heaving up approximately 2 to 3 inches in front of the abutment at the SW and NE corners. Foam appears to have been injected under slope paving to mitigate erosion/undermining.
 - There is some erosion along edge of the slope paving at the SW corner.
- Signs:
 - The "Wrong Way" sign mounted above EB I-10 has a loose anchor connection on the NE bottom leg (see photo 24). However, the missing washer and nut were located in the field and "hand tightened" on the sign anchor (see photo 25 and the maintenance report). ADOT has been notified of the critical finding on 6-1-2020.
- Clearance:

Minimum measured vertical underclearances are 16.11 feet (EB) and 16.12 feet (WB). Therefore, posted vertical clearance of 15'-11" for WB I-10 (see photo 29) and EB I-10 (see photo 30) are in accordance with the ADOT signing policy.
- Maintenance Items:

There are two previously recommended maintenance items which are repeated for this inspection. There are two new maintenance items added from this inspection for a total of four (see the maintenance report).
- Repair Items:

There are no previously recommended repairs to verify and no new repair items added from this inspection.
- Photos:

See the attached Inspection Report supplement.

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
12	Re Concrete Deck	10,490.00	sq.ft	2.00	0	10490	0	0

Top deck is bare concrete. Concrete overhangs.
 1. The deck is glossy and appears to be coated with a protective coating.
 2. Span 4, Bay 2, has minor honeycombing in the deck soffit.

521	Conc Prot Coating	9,149.00	sq.ft	2.00	4578	4571	0	0
Concrete protective coating (approximate installation date May 2018)								
1. The deck protective coating appears to be deteriorating in the wheel lines (see photo 7). 4571SF CS2 Wearing								
1090	Exposed Rebar	2.00	sq.ft	2.00	0	2	0	0
1. Bay 1 of Span 2 has honeycombing with exposed rebar.								
2. Bay 3, Span 2, has a 3' x 3' of honeycombing with an exposed rebar (see photo 28).								
1120	Efflorescence/Rust Staining	6.00	sq.ft	2.00	0	6	0	0
1. The deck overhangs exhibit insignificant to moderate transverse cracks with efflorescence.								
1130	Cracking (RC and Other)	9,482.00	sq.ft	2.00	0	9482	0	0
1. Deck top has insignificant to moderate transverse, longitudinal and map cracks of moderate density and light wear typically in the wheel paths (see photo 6). Cracks have been sealed, however the coating is beginning to deteriorate (see photo 7).								

BRIDGE GROUP

Inspection Report

Structure No.: **01214** Structure Name: **Casa Blanca TI UP** Inspected by: **AECOM-Muthart/Hatch**
 Route: **10** Road Name: **IRR Casa Blanca** Inspection Type: **In-Depth**
 MP: **175.81** Agency: **ADOT** Inspection Date: **Sunday, May 31, 2020**
 ADOT District: **Southcentr** Next Insp. Due By: **May 2022**

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
1190	Abrasion(PSC/RC)	1,000.00	sq.ft	2.00	0	1000	0	0
1. There is insignificant to moderate abrasion in the travel lanes.								

107	Steel Opn Girder/Beam	1,194.00	ft	2.00	1169	25	0	0
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4-span continuous with 4-steel plate girders. Secondary members: staggered steel diaphragms bolted to stiffeners.
 1. This bridge is considered North/South. The spans are numbered from North to South. The girders are numbered from East to West, in accordance with plans.
 2. There are no fracture critical members on this structure. No non-destructive testing was performed.

515	Steel Protective Coating	12,715.00	sq.ft	2.00	11423	1272	0	20
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Paint System: silver paint on steel members. Paint contains lead.
 1. Span 3, Girder 4, there is paint peeling off around bolts of bottom splice plate, on web and bottom flange.
 2. Span 3, Girder 1, there is paint peeling off the exterior web at field splice.

1000	Corrosion	20.00	ft	2.00	0	20	0	0
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1. Span 2, Girder 1, there is minor scrape mark in the bottom flange over the left shoulder (see photo 20).
 2. Span 2, Girder 2, there is minor scrape mark in the bottom flange over the right shoulder (see photo 20).
 3. Span 2 and 3, Girder 1 and Girder 4, over the left lane, has minor impact scrape marks on the bottom flange (see photo 20).

1900	Distortion	5.00	ft	2.00	0	5	0	0
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1. Span 3, Girder 1, there is impact damage to the south bottom splice plate. Two bottom flange splice bolts are sheared off (see photo 21 the maintenance report).
 2. Span 3, Girder 1, at the south splice plate, has a bent vertical stiffener up to 0.5" (see photo 22).
 3. Span 3, Girder 1, over the left lane has 2 gouges in the bottom flange.
 4. Span 3, Girder 3, over the right lane, has a gouge in the bottom flange.
 5. Span 3, Girder 4, over the left lane, has a gouge in the bottom flange (see photo 23).

205	Re Conc Column	3.00	each	2.00	1	2	0	0
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Concrete pier hammerheads on 14 inch diameter CIP piles.

1130	Cracking (RC and Other)	2.00	each	2.00	0	2	0	0
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1. Pier columns have insignificant to moderate vertical cracks.

215	Re Conc Abutment	85.00	ft	2.00	49	36	0	0
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Concrete stub abutments on 14 inch diameter CIP piles. Concrete wingwalls.
 1. Abutments have water stains on the backwall and abutment seat (see photos 11 and 19).
 2. Wingwalls have insignificant to moderate vertical, random and map cracks propagating to abutment backwall corners.
 3. There is a 2 foot by 1 foot by 6 inch deep spall with exposed rebar at end of Southeast wingwall. This appears to have been patched since the previous inspection.

1120	Efflorescence/Rust Staining	9.00	ft	2.00	0	9	0	0
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1. Abutments have insignificant to moderate vertical, horizontal, and random cracks with efflorescence.

1130	Cracking (RC and Other)	27.00	ft	2.00	0	27	0	0
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1. Abutments have insignificant to moderate vertical, horizontal, and random cracks.

234	Re Conc Pier Cap	128.00	ft	2.00	106	22	0	0
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Concrete pier hammerheads

1080	Delamination/Spall/Patched Area	1.00	ft	2.00	0	1	0	0
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1. Pier 1 cap, Bay 2, south side, has a 8" x 3" x 0.75" edge spall (see photo 26).

1130	Cracking (RC and Other)	21.00	ft	2.00	0	21	0	0
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1. Pier caps have insignificant to moderate vertical cracks (see photo 27).

304	Open Expansion Joint	85.00	ft	2.00	0	85	0	0
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Steel sliding plates at both abutments.
 1. Joint openings measured at 100 degrees F:
 North Abutment: West side 1-1/2 inches; East side 1-1/2 inches
 South Abutment: West side: 1-7/8 inches; East side 1-5/8 inches

BRIDGE GROUP

Inspection Report

Structure No. : 01214 Structure Name : Casa Blanca TI UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Casa Blanca Inspection Type: In-Depth
 MP : 175.81 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentr Next Insp. Due By : May 2022

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
2350	Debris Impaction	85.00	ft	2.00	0	85	0	0
1. Joints are mostly filled with debris.								
311	Moveable Bearing	16.00	each	2.00	6	10	0	0
Steel rocker bearings at abutments and Pier 1 and 3. 1. Rocker bearings measured at 80 degrees F at the following locations: North Abutment: G1 = 2 degrees (Exp); G2 = 2 degrees (Exp); G3 = 0 degrees; G4 = 2 degrees (Exp) Pier 1: G1 = 0 degrees; G2 = 0 degrees; G3 = 1 degree (Exp); G4 = 1 degree (Con) Pier 3: G1 = 1 degree (Exp); G2 = 1 degree (Exp); G3 = 0 degrees; G4 = 1 degree (Exp) South Abutment : G1 = 2 degrees (Exp); G2 = 0 degrees; G3 = 1 degree (Exp); G4 = 1 degrees (Exp)								
1000	Corrosion	10.00	each	2.00	0	10	0	0
1. Bearings at abutment and piers have surface corrosion on the steel bearings and masonry plates (see photos 12, 13, 17, and 18).								
313	Fixed Bearing	4.00	each	2.00	1	3	0	0
Fixed steel bearing at Pier 2.								
1000	Corrosion	2.00	each	2.00	0	2	0	0
1. Bearings at pier 3 have surface corrosion on the steel bearings and masonry plates (see photos 15 and 16).								
1020	Connection	1.00	each	2.00	0	1	0	0
1. Bearing 1, Pier 2, has a bent keeper plate (see photo 16).								
321	Re Conc Approach Slab	736.00	sq.ft	2.00	0	736	0	0
Concrete approach slabs with partial AC overlay and AC roadway. 1. Both slabs are partially covered with an AC wearing surface.								
510	Wearing Surfaces	368.00	sq.ft	2.00	364	0	0	4
A/C wearing surface. 1. The AC wearing surface covers approximately half of each approach slab. 2. The southwest wearing surface has areas of missing A/C (see photo 8). 4 SF CS4								
1130	Cracking (RC and Other)	736.00	sq.ft	2.00	0	736	0	0
1. Previous inspections noted insignificant to moderate longitudinal, and map cracks of moderate density on the approach slabs. 2. The condition states are retained from the previous inspection.								
331	Re Conc Bridge Railing	596.00	ft	2.00	596	0	0	0
32 inch concrete barrier with thrie-beam transitions at all 4 corners. 1. Barriers have graffiti visible to the traveling public (see photo 10 and maintenance report).								

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01214 Structure Name : Casa Blanca TI UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Casa Blanca Inspection Type: In-Depth
 MP : 175.81 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentral Next Insp. Due By : 05/31/2022



File Name : 01214-2020-05-31-Photo-1.JPG

Description : Roadway ID LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022

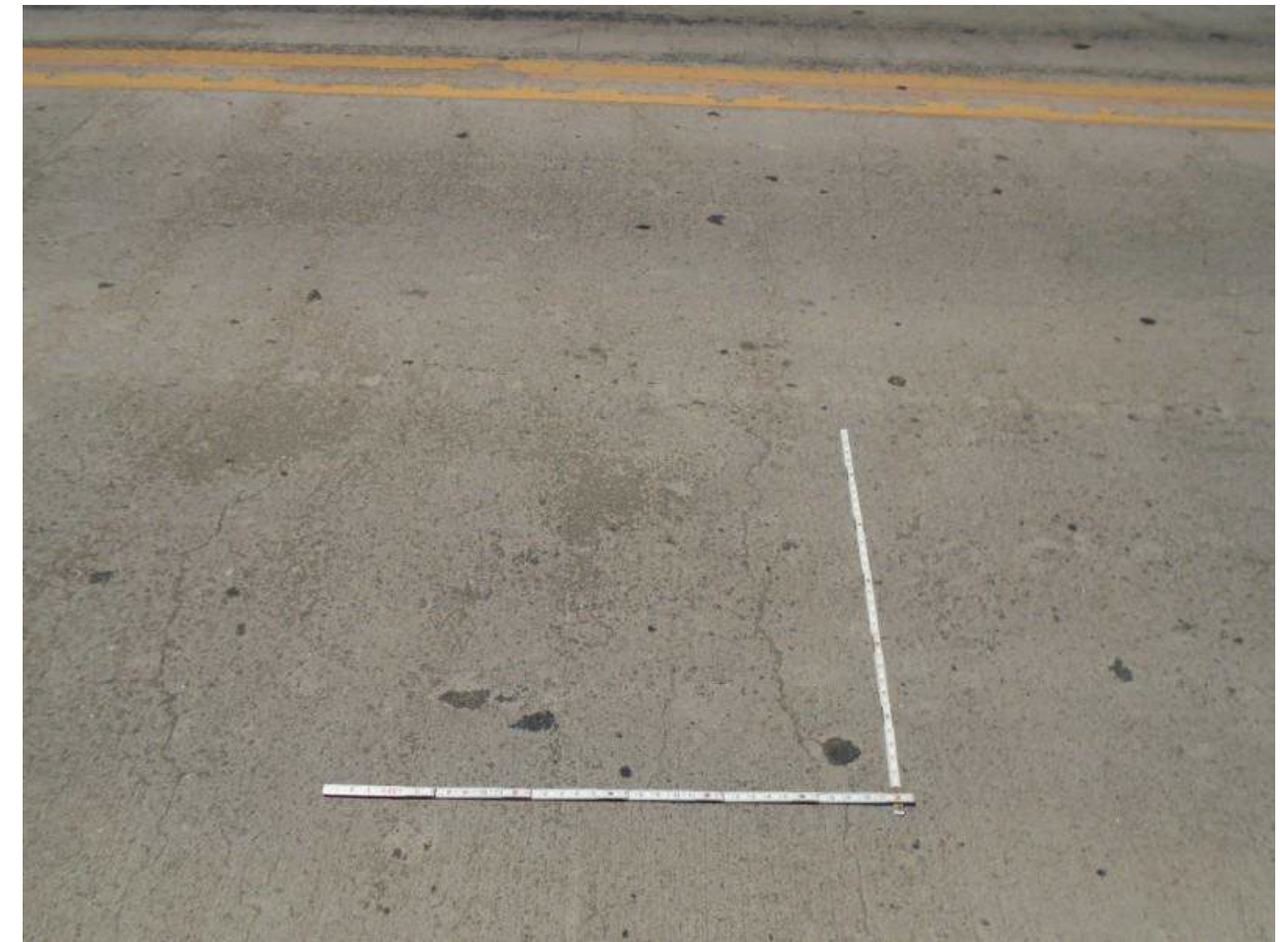


File Name : 01214-2020-05-31-Photo-2.JPG
 Description : Elevation ID LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-3.JPG
 Description : Typical Deck

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-4.JPG

Description : Typical Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-5.JPG

Description : Typical Joint, N Joint LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-6.JPG

Description : Typical Deck Cracking

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-7.JPG

Description : Typical Protective Coating Condition

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-8.JPG
 Description : Pothole, SW Approach Overlay, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-9.JPG
 Description : Impact Damage, SE Approach Transition, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-10.JPG
 Description : Typical Graffiti, E Concrete Bridge Barrier, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-11.JPG
 Description : North Abutment, LNE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-12.JPG
 Description : Typical Bearing, N Abutment, LNw

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		

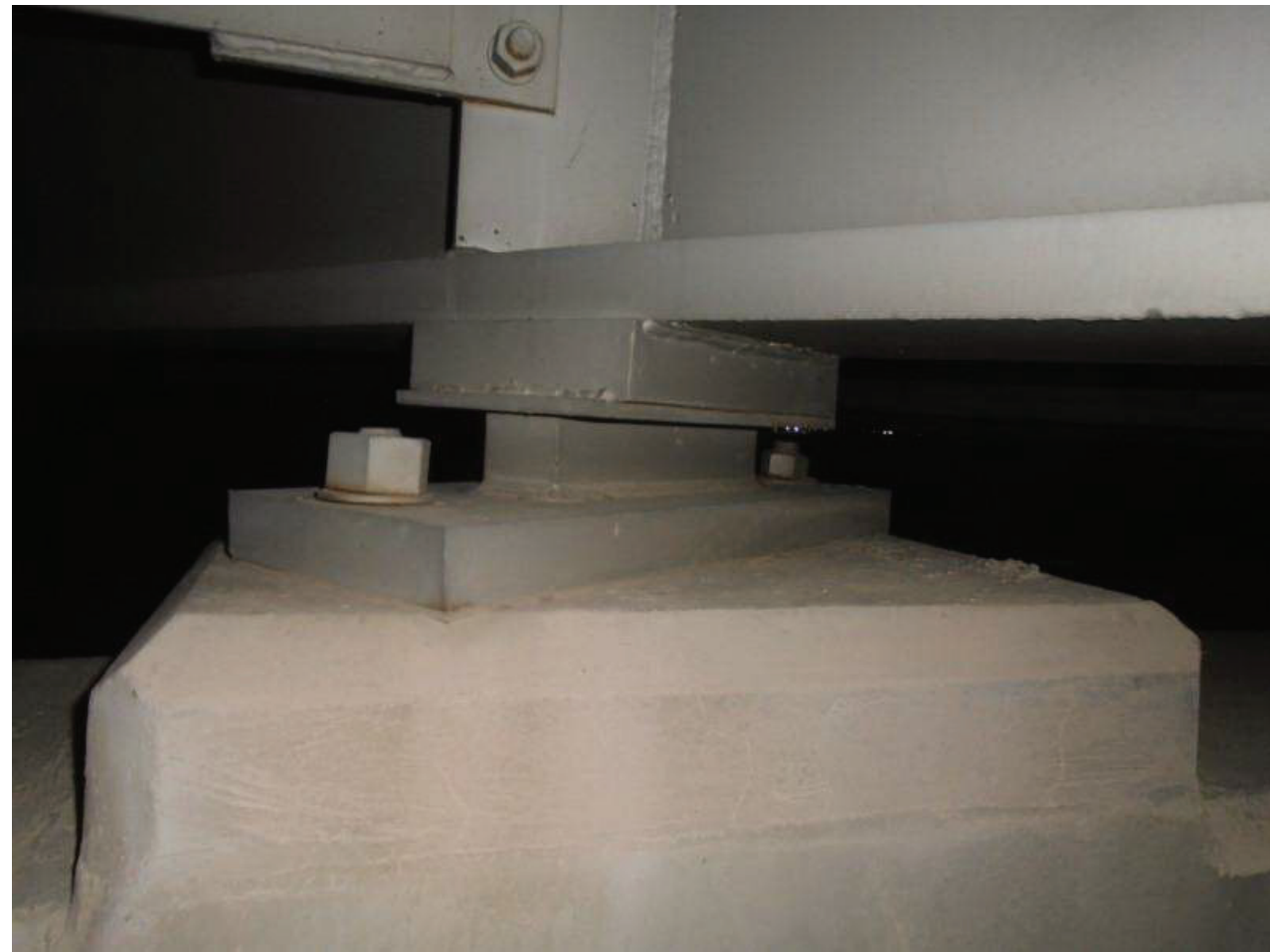


File Name : 01214-2020-05-31-Photo-13.JPG
 Description : Typical Bearing, Pier 1, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-14.JPG

Description : Typical Bearing, Pier 2, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



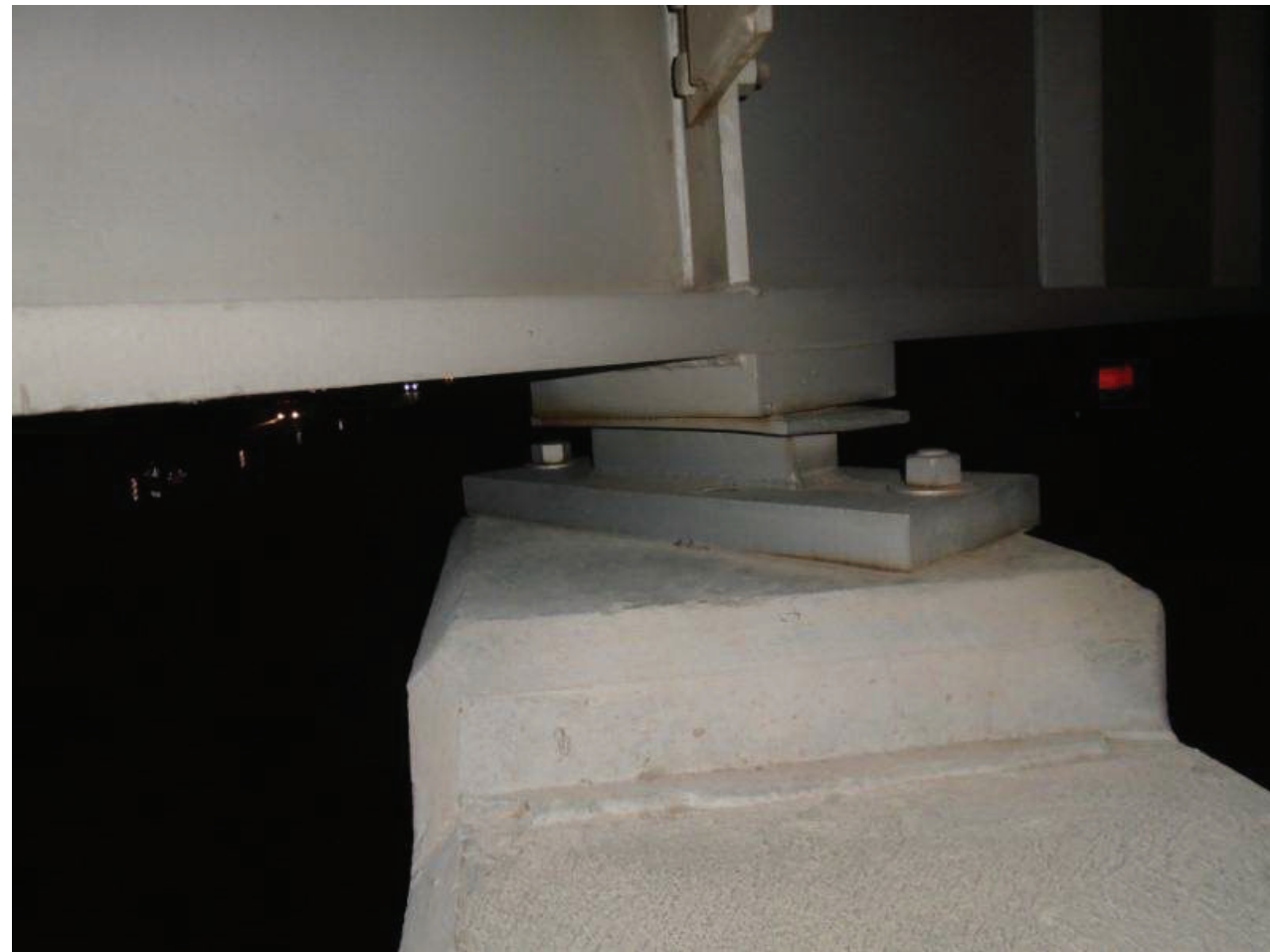
File Name : 01214-2020-05-31-Photo-15.JPG

Description : Heavy Surface Corrosion, Pier 2, Bering 4, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-16.JPG
 Description : Bent Keeper Plate, Pier 2, Bearing 1, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-17.JPG
 Description : Typical Bearing, Pier 3, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-18.JPG
 Description : Typical Bearing, S Abutment, LNw

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-19.JPG
 Description : South Abutment, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-20.JPG
 Description : Typical Scrape Marks, Bottom Flange of Girders

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-21.JPG
 Description : Sheared Bolts, Span 3, Girder 1, South Splice Plate, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-22.JPG

Description : Bent Vertical Stiffener, Span 3, Girder 1, South Splice Plate, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-23.JPG

Description : Impact Damage, Span 3, Girder 3, Over Left Lane, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-24.JPG
 Description : Loose Connection, Wrong Way Sign Support, Span 3, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type :	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-25.JPG
 Description : Hand Tight Connection, Wrong Way Sign Support, Span 3, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-26.JPG
 Description : Edge Spall, Pier 1 Cap, Bay 2, South Side, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01214-2020-05-31-Photo-27.JPG
 Description : Typical Pier Cap Cracks

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-28.JPG
 Description : Soffit Honeycombing with Exposed Rebar, Span 2, Bay 3

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01214	Structure Name :	Casa Blanca TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Casa Blanca	Inspection Type:	In-Depth
MP :	175.81	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01214-2020-05-31-Photo-29.JPG
 Description : WB Clearance Sign, 15'-11", LNW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01214	Structure Name : Casa Blanca TI UP	Inspected by : AECOM-Muthart/Hatch
Route : 10	Road Name : IRR Casa Blanca	Inspection Type: In-Depth
MP : 175.81	Agency : ADOT	Inspection Date : Sunday, May 31, 2020
ADOT District: Southcentral		Next Insp. Due By : 05/31/2022



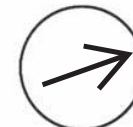
File Name : 01214-2020-05-31-Photo-30.JPG
 Description : EB Clearance Sign, 15'-11", LE

Arizona Department of Transportation
BRIDGE GROUP
 SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
 VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

STRUCTURE NAME **Casa Blanca TI UP**

STRUCTURE NO. **1214**

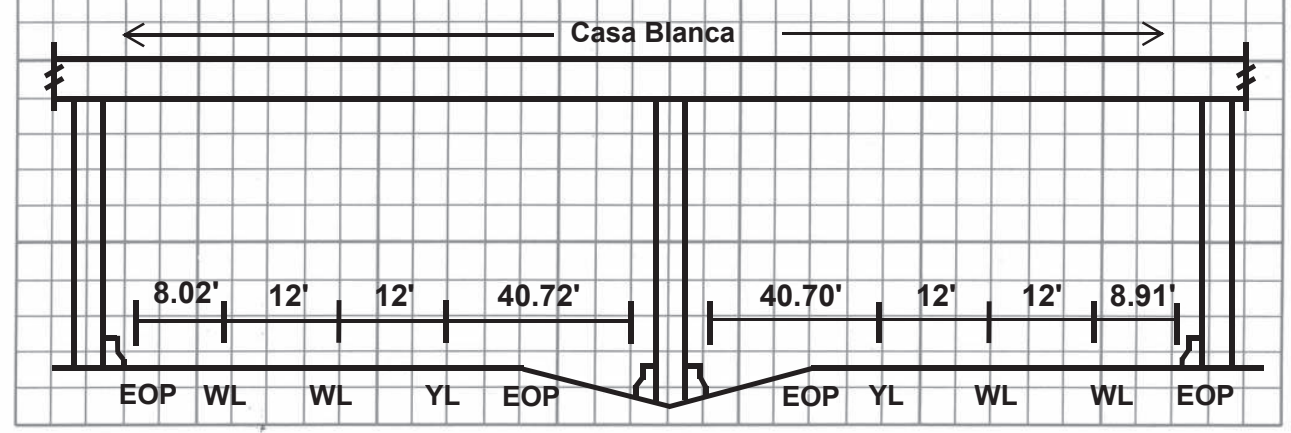
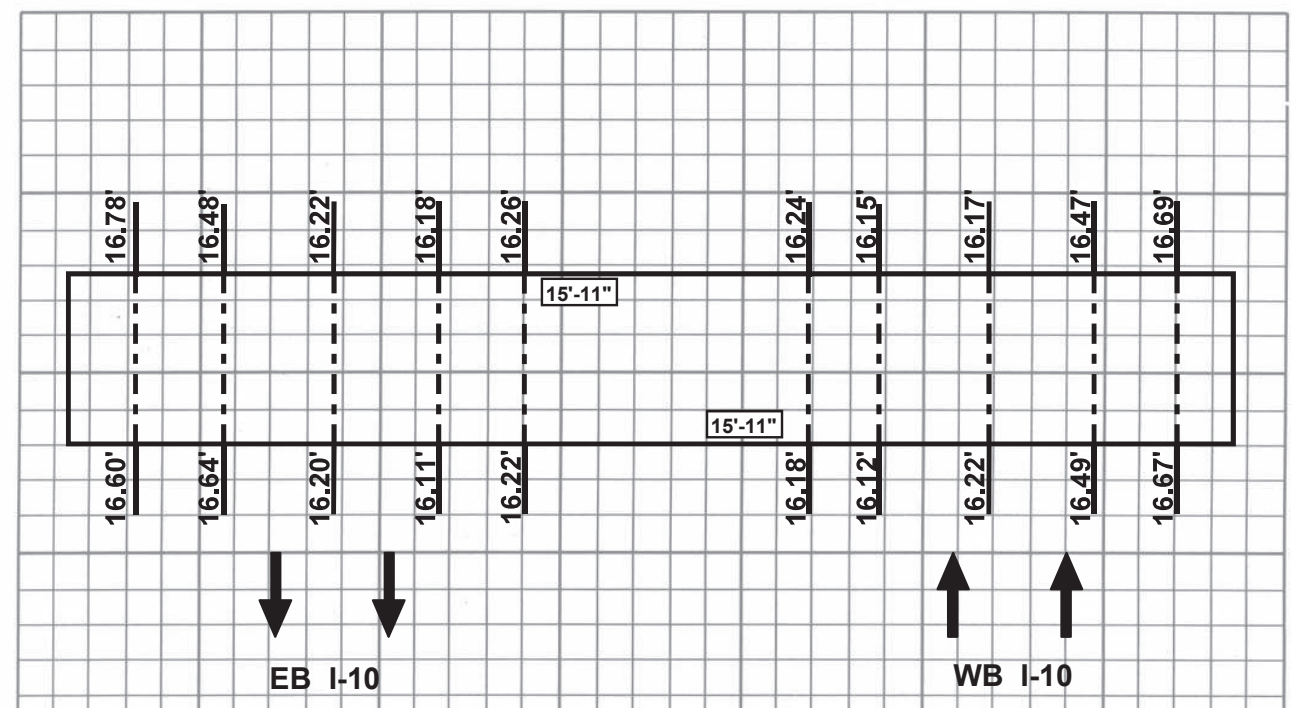
LOCATION **I-10 175.81**
 ROUTE MILEPOST



NORTH

Min Vertical Clearance
 WB: 16.12'
 EB: 16.11'

INSPECTION				
DATE	5/31/20			
INITIAL	BM/AH			
NEW / REVISED DIAGRAM	Rev			



† 64-4505 R07/06

Looking Northwest



AECOM
7720 North 16th Street
Phoenix, AZ 85020
aecom.com

Project name:
On-Call Statewide Bridge Engineering,
Assessment, & Evaluation - Task Order No. 4

Project ref:
#2019-010.01

From:
Brinton Muthart

Inspection Date:
May, 31 2020

To:
Arizona Department of Transportation
Bridge Management Group
205 S. 17th Ave.
Room 261E
Phoenix, AZ 85007

CC:

Inspection Report Supplement

Subject: 01214 Casa Blanca TI UP - 2020 In-Depth Inspection

9. Photos:

- 1) Roadway ID LS
- 2) Elevation ID LSE
- 3) Typical Deck
- 4) Typical Soffit
- 5) Typical Joint, N Joint LSE
- 6) Typical Deck Cracking
- 7) Typical Protective Coating Condition
- 8) Pothole, SW Approach Overlay, LSE
- 9) Impact Damage, SE Approach Transition, LN
- 10) Typical Graffiti, E Concrete Bridge Barrier, LSE
- 11) North Abutment, LNE
- 12) Typical Bearing, N Abutment, LNW
- 13) Typical Bearing, Pier 1, LN
- 14) Typical Bearing, Pier 2, LS
- 15) Heavy Surface Corrosion, Pier 2, Bering 4, LSE
- 16) Bent Keeper Plate, Pier 2, Bearing 1, LSE
- 17) Typical Bearing, Pier 3, LS
- 18) Typical Bearing, S Abutment, LNW
- 19) South Abutment, LSE
- 20) Typical Scrape Marks, Bottom Flange of Girders
- 21) Sheared Bolts, Span 3, Girder 1, South Splice Plate, LE
- 22) Bent Vertical Stiffener, Span 3, Girder 1, South Splice Plate, LE
- 23) Impact Damage, Span 3, Girder 3, Over Left Lane, LE
- 24) Loose Connection, Wrong Way Sign Support, Span 3, LSW
- 25) Hand Tight Connection, Wrong Way Sign Support, Span 3, LSW
- 26) Edge Spall, Pier 1 Cap, Bay 2, South Side, LN
- 27) Typical Pier Cap Cracks
- 28) Soffit Honeycombing with Exposed Rebar, Span 2, Bay 3
- 29) WB Clearance Sign, 15'-11", LNW
- 30) EB Clearance Sign, 15'-11", LE

BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 01215 Structure Name : Gas Line Rd UP Feature Under : I-10
Route : 10 MP : 177.76 Road Name : IRR Gas Line Rd Agency: ADOT Location : 7.5 mi NW Jct SR 187

Table with multiple sections: LOCATION INFORMATION, DIMENSIONS, PROPOSED IMPROVEMENTS, INVENTORY ROUTE DATA, VERTICAL & HORIZONTAL CLEARANCE, SERVICE, TYPE, and SPAN INFORMATION, INSPECTION, CONDITION RATINGS, CRITICAL FEATURES, APPRAISAL RATINGS, CULVERT INFORMATION, RESPONSIBILITY, BRIDGE SCOUR DATA, BRIDGE RAILING, SUFFICIENCY RATING, BRIDGE CONDITION, NAVIGATION, LOAD, RATE, and POST, GENERAL DATA.

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 01215 Structure Name : Gas Line Rd UP Inspected by : AECOM-Muthart/Hatch
Route : 10 Road Name : IRR Gas Line Rd Inspection Type: In-Depth
MP : 177.76 Agency : ADOT Inspection Date : Sunday, May 31, 2020
ADOT District: Southcentral Next Insp. Due By : May 2022

Work Candidate ID: 713EDB0-82A5-063020-18E76B26EC
Action: 1061 Paint-Misc. Activity
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 3-Can be scheduled
Remove graffiti from the west face of girder 1 (see photo 26) and the northwest dado (see photo 27).

Work Candidate ID: 713EDB0-82A5-063020-E4E17CD02D
Action: 1056 Misc-Remove Vegetation
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 3-Can be scheduled
Remove vegetation growing out of the concrete slope protection at both abutments (see photo 27).

Work Candidate ID: 713EDB0-82A5-063020-18204182AB
Action: 1001 Approach Railing
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 3-Can be scheduled
Replace missing top rail tube of the approach rail at all four corners (see photo 7).

Work Candidate ID: 713EDB0-82A5-063020-FE36C3E6AB
Action: 1059 Misc-Tighten Bolts and Nuts
Estimated Quantity:
Estimated Cost: \$0.00
A212 - Repair Priority: 3-Can be scheduled
1. Replace the missing bottom flange splice bolt at Span 2, G4 in the first splice (see photo 25).
2. Replace the wrong size nuts and bolts located at Span 2, G4 in the first splice (see photo 25).

BRIDGE GROUP

Inspection Report

Structure No.:	01215	Structure Name:	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name:	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency:	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	May 2022		

NBI Condition Ratings			
N58 Deck :	6 Satisfactory	N61 Channel:	N N/A (NBI)
N59 Superstructure :	7 Good	N62 Culvert :	N N/A (NBI)
N60 Substructure :	7 Good		

Appraisal Ratings			
N67 Structural Evaluation:	7 Above Min Criteria	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	6 Equal Min Criteria	N72 Approach Roadway Align.:	7 Above Min Criteria
N69 Vert. & Horiz. Clearances:	3 Intolerable - Correct	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

- This was an in-depth inspection by AECOM under Task Order 4 of contract #2019-10.01.
- The bridge was inspected during daytime and nighttime hours. The bridge was accessed using a bucket truck with phased single lane closures on I-10.
- Roadway:
 - The concrete roadway is in fair condition with insignificant to wide transverse and random longitudinal cracks.
 - The transitions are level.
 - The approach guardrails consist of w-beams with non-stiffened unattached transitions and curved end treatments (see photo 5).
 - The top rail tube of the approach rail at all four corners is missing (see photo 7 and the maintenance report).
- Fills:
 - The slope protection consists of concrete slope paving.
 - There are wide random cracks and vegetation growth in the slope protection of both abutments (see photo 27 and the maintenance report).
- Clearance:

Minimum vertical clearances measured under the structure are 16.34 feet and 16.23 feet for WB and EB traffic respectively (see attached vertical clearance diagram). Therefore, no posting of vertical clearance sign for WB traffic is required per ADOT's signing policy. Vertical clearance sign for EB traffic is adequate (see photo 28).
- Maintenance Items:

There are three previously recommended maintenance items; "Remove graffiti from the east barrier has been completed (see photo 8), the other two items were not complete and are repeated. There are two new maintenance items added from this inspection for a total of four (see maintenance report).
- Repair Items:

There are no previously recommended repairs to verify and no new repairs are added from this inspection.
- Photos:
 - Roadway ID LS
 - Elevation ID LSE
 - Typical Deck
 - Typical Soffit
 - Typical Joint, N Joint LSE
 - Typical Deck Cracking
 - Missing Metal Railing Section, Typical at All Corners
 - Removed Graffiti, East Barrier Near Mid Span, LE
 - North Abutment, LNW
 - Typical Bearing, North Abutment, LNE
 - Typical Bearing, Pier 4, LNE
 - Typical Bearing, Pier 3, LS
 - Typical Bearing, Pier 2, LSW
 - Typical Bearing, Pier 1, LSW
 - Typical Bearing, South Abutment, LSE
 - South Abutment, LSE
 - Typical Diaphragm Connection
 - Splice Plate Corrosion, Span 4, Girder 4, LSE
 - Scrape Marks, Bottom Flange, Girder 2, Span 4, Under N Splice Plate
 - Impact Damage, Bottom Flange, Girder 1, Span 2, Over Right Lane, LNE
 - Impact Damage, Bottom Flange, Girder 3, Span 2, North of Splice Plate, LE
 - Impact Damage, Bottom Flange, Girder 4, Span 2, Over Right Lane, LE
 - Bent Vertical Stiffener, Girder 1, Span 2, Diaphragm 2, LN
 - Scrape Marks, Bottom Flange, Girder 4, Span 2, Over all Lanes
 - Missing Bolt, Span 2, Girder 4, South Splice Plate, LE
 - Graffiti, W Face of Girder 1, LE
 - Vegetation Growing, NW Slope Protection, LS
 - EB Clearance Sign, 15'-11", LN

BRIDGE GROUP

Inspection Report

Structure No.:	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentra	Next Insp. Due By :	May 2022		

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4

12	Re Concrete Deck	14,040.00	sq.ft	2.00	11160	1440	1440	0
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Top deck is bare concrete. Concrete overhangs and curbs.

1. There are insignificant vertical and horizontal cracks in the curbs.
 2. East curb has some minor spalls.

1120	<i>Efflorescence/Rust Staining</i>	36.00	sq.ft	2.00	0	36	0	0
------	------------------------------------	-------	-------	------	---	----	---	---

1. Overhangs have insignificant to moderate transverse cracks with efflorescence.

1130	<i>Cracking (RC and Other)</i>	2,844.00	sq.ft	2.00	0	1404	1440	0
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1. Deck surface has random insignificant to wide transverse and map cracks (see photo 6).
 2. Deck underside has few insignificant to moderate transverse cracks.

107	Steel Opn Girder/Beam	1,800.00	ft	2.00	1739	60	1	0
-----	-----------------------	----------	----	------	------	----	---	---

4 continuous 5- span welded steel plate girders. Secondary members: staggered steel diaphragms bolted to stiffeners.

1. This bridge is considered North/South. The spans are numbered from South to North. The girders are numbered from West to East.
 2. There are no fracture critical members on this bridge. No non-destructive testing was performed.
 3. There is graffiti on the west face of girder 1 at the north abutment, visible to the traveling public (see photo 26 and the maintenance report)

515	<i>Steel Protective Coating</i>	18,000.00	sq.ft	2.00	16900	900	0	200
-----	---------------------------------	-----------	-------	------	-------	-----	---	-----

Paint System: silver color paint on steel members. Paint system contains lead.

1. Paint is in overall good condition (see photo 17).
 2. Girders have areas of partial to complete paint failure (see photos 18, 19, 20, 21, 22, 23, 24, and 25).

1000	<i>Corrosion</i>	50.00	ft	2.00	0	50	0	0
------	------------------	-------	----	------	---	----	---	---

1. Span 2, Girder 1, near the north splice plate, minor scrapes on bottom flange.
 2. Span 2, Girder 3, over the right lane, minor scrapes on bottom flange.
 3. Span 2, Girder 4, over the left lane, minor scrapes on bottom flange.
 4. Span 4, Girder 1, 2, 3, and 4, over right lane, minor scrapes on bottom flange (see photo 24).
 5. Span 4, Girder 2, 3, and 4, over the left lane, minor scrapes in bottom flange (see photo 19).
 6. Span 4, Girder 4, corrosion on the bottom flange and splice plate (see photo 18).

1020	<i>Connection</i>	1.00	ft	2.00	0	0	1	0
------	-------------------	------	----	------	---	---	---	---

1. Span 2, Girder 4, south splice is missing 1 bolt in the bottom flange and 5 bolts are the wrong size (see photo 25 and the maintenance report).

1900	<i>Distortion</i>	10.00	ft	2.00	0	10	0	0
------	-------------------	-------	----	------	---	----	---	---

1. Span 2, Girder 1, has minor impact damage over the right lane (see photo 20).
 2. Span 2, Girder 1, diaphragm 2, has a bent vertical stiffener with rust (see photo 23).
 3. Span 2, Girder 3, over the right lane near the splice plate, bottom flange has a 2 inch deep gouge and a 2 inch tear (see photo 21).
 4. Span 2, Girder 4, over the right lane has 3 inch long up to 1 inch deep tear and random gouges on the bottom flange (see photo 22).
 5. Span 2, Girder 4, over the right shoulder has up to 3 foot long scrapes with random gouges on the bottom flange.
 6. Span 2, Girder 4, there is minor impact damage to the bottom flange splice plate at the south splice.

205	Re Conc Column	16.00	each	2.00	15	1	0	0
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4- round concrete columns per pier founded on drilled shafts

1. There are insignificant cracks at end columns.
 2. Pier 1, east column, has a shallow 4" diameter spall.

1130	<i>Cracking (RC and Other)</i>	1.00	each	2.00	0	1	0	0
------	--------------------------------	------	------	------	---	---	---	---

1. Pier 1, east column, has insignificant to moderate map cracks.

215	Re Conc Abutment	49.00	ft	2.00	19	30	0	0
-----	------------------	-------	----	------	----	----	---	---

Concrete stub abutments on 14" diameter CIP shell piles. Concrete dados and wingwalls.

1. There is graffiti on the west dado at the north abutment, visible to the traveling public (see photo 27 and the maintenance report).

1120	<i>Efflorescence/Rust Staining</i>	3.00	ft	2.00	0	3	0	0
------	------------------------------------	------	----	------	---	---	---	---

1. There are insignificant to moderate vertical and transverse cracks with efflorescence in the south abutment backwall and seat.

1130	<i>Cracking (RC and Other)</i>	27.00	ft	2.00	0	27	0	0
------	--------------------------------	-------	----	------	---	----	---	---

1. There are insignificant to moderate vertical and transverse cracks in both abutment backwalls, seats, dados and wingwalls.

234	Re Conc Pier Cap	230.00	ft	2.00	209	21	0	0
-----	------------------	--------	----	------	-----	----	---	---

Concrete caps on columns

BRIDGE GROUP

Inspection Report

Structure No. : 01215 Structure Name : Gas Line Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Gas Line Rd Inspection Type: In-Depth
 MP : 177.76 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentr Next Insp. Due By : May 2022

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
1130	Cracking (RC and Other)	21.00	ft	2.00	0	21	0	0
1. There are insignificant to moderate vertical cracks in the pier caps.								
304	Open Expansion Joint	96.00	ft	2.00	40	56	0	0
Sliding steel plates at abutments. 1. Deck joint openings measured at 90 degrees F: South Abutment: West side 2-7/16 inches; East side 1-1/4 inches North Abutment: West side 1 inches; East side 2 inches								
2350	Debris Impaction	56.00	ft	2.00	0	56	0	0
1. Joint openings are partly full of debris.								
311	Moveable Bearing	16.00	each	2.00	10	6	0	0
Rocker bearings at abutments and Piers 1 and 4. 1. The abutment and pier rocker bearings measured at 85 degrees F: South Abutment : G1 = 2 degrees (Exp); G2 = 0 degrees; G3 = 2 degrees (Exp); G4 = 3 degrees (Exp) Pier 1: G1 = 1 degree (Exp); G2 = 0 degrees; G3 = 0 degrees; G4 = 1 degree (Exp) Pier 4: G1 = 0 degrees; G2 = 0 degrees; G3 = 0 degrees; G4 = 0 degrees North Abutment : G1 = 3 degrees (Exp); G2 = 4 degrees (Exp); G3 = 3 degrees (Exp); G4 = 4 degrees (Exp)								
1000	Corrosion	6.00	each	2.00	0	6	0	0
1. There is minor rust packing in all exterior masonry plates at both abutments (see photos 10, 11, 14, and 15).								
313	Fixed Bearing	8.00	each	2.00	8	0	0	0
Fixed steel bearings at Piers 2 and 3. 1. Fixed bearings are in good condition (see photos 12 and 13).								
321	Re Conc Approach Slab	953.00	sq.ft	2.00	483	20	450	0
Concrete approach slabs and roadways. 1. Concrete approach slabs have minor edge spalls along the backwall.								
1130	Cracking (RC and Other)	450.00	sq.ft	2.00	0	0	450	0
1. Concrete approach slabs have insignificant to wide longitudinal and map cracks								
4000	Settlement	20.00	sq.ft	2.00	0	20	0	0
1. There is 1/2 inch settlement at the end of south approach slab on the east side. 2. Due to the settlement, a copy of this report will be forward to the Geotechnical section for review.								
330	Metal Bridge Railing	900.00	ft	2.00	899	1	0	0
Single steel tube railing on top of parapet, no transition connection (H-1-1).								
1900	Distortion	1.00	ft	2.00	0	1	0	0
1. There is damage at the east rail over Span 5.								
331	Re Conc Bridge Railing	900.00	ft	2.00	579	321	0	0
Concrete parapet with single steel tube railing.								
1080	Delamination/Spall/Patched Area	1.00	ft	2.00	0	1	0	0
1. The east barrier has a 4" delamination.								
1130	Cracking (RC and Other)	320.00	ft	2.00	0	320	0	0
1. There are insignificant to moderate vertical and horizontal cracks in the parapets.								

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01215 Structure Name : Gas Line Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Gas Line Rd Inspection Type: In-Depth
 MP : 177.76 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentral Next Insp. Due By : 05/31/2022



File Name : 01215-2020-05-31-Photo-1.JPG

Description : Roadway ID LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



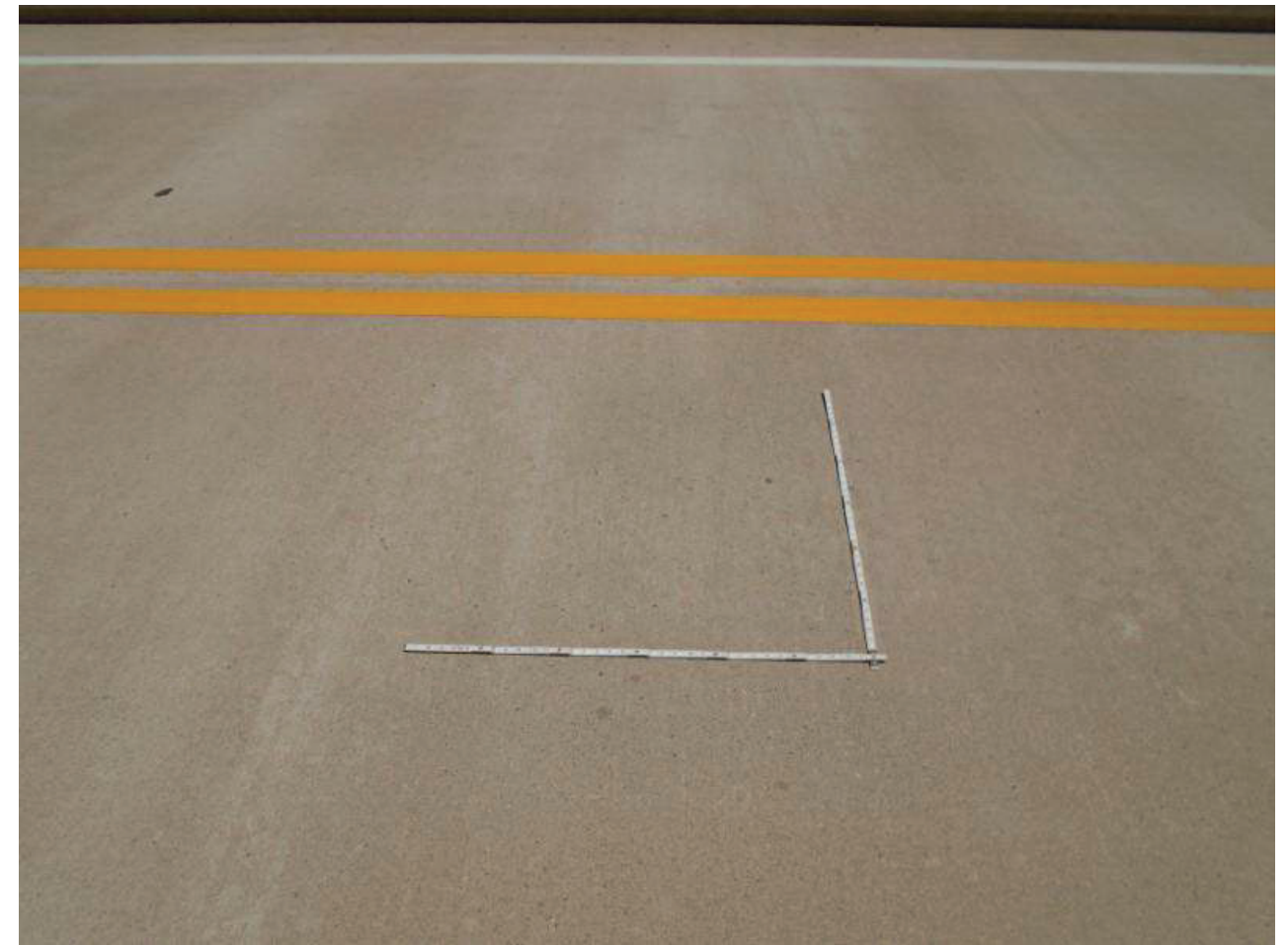
File Name : 01215-2020-05-31-Photo-2.JPG

Description : Elevation ID LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-3.JPG

Description : Typical Deck

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-4.JPG

Description : Typical Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



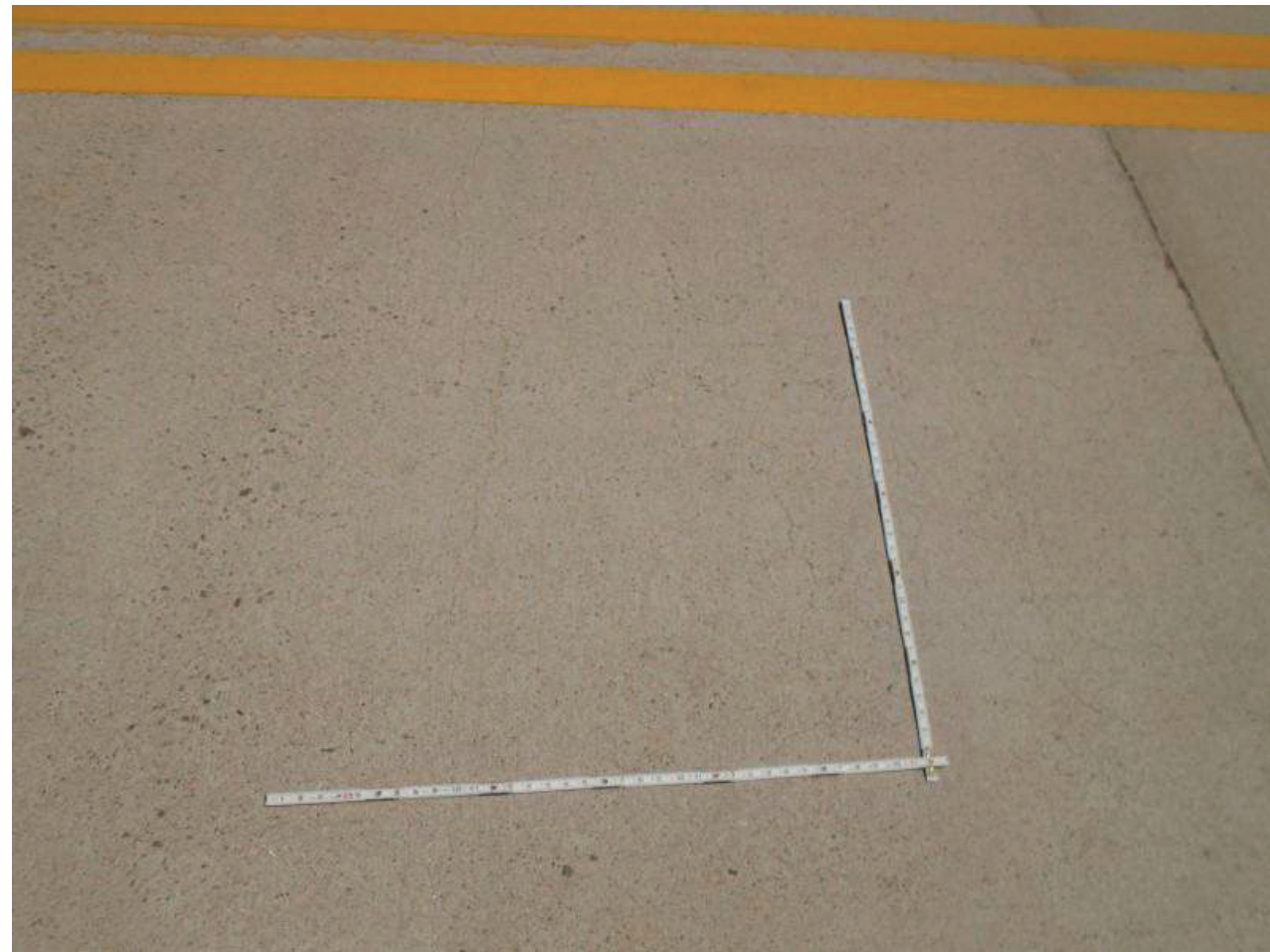
File Name : 01215-2020-05-31-Photo-5.JPG

Description : Typical Joint, N Joint LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type :	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-6.JPG

Description : Typical Deck Cracking

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type :	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-7.JPG

Description : Missing Metal Railing Section, Typical at All Corners

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-8.JPG
 Description : Removed Graffiti, East Barrier Near Mid Span, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-9.JPG
 Description : North Abutment, LNW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01215-2020-05-31-Photo-10.JPG

Description : Typical Bearing, North Abutment, LNE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



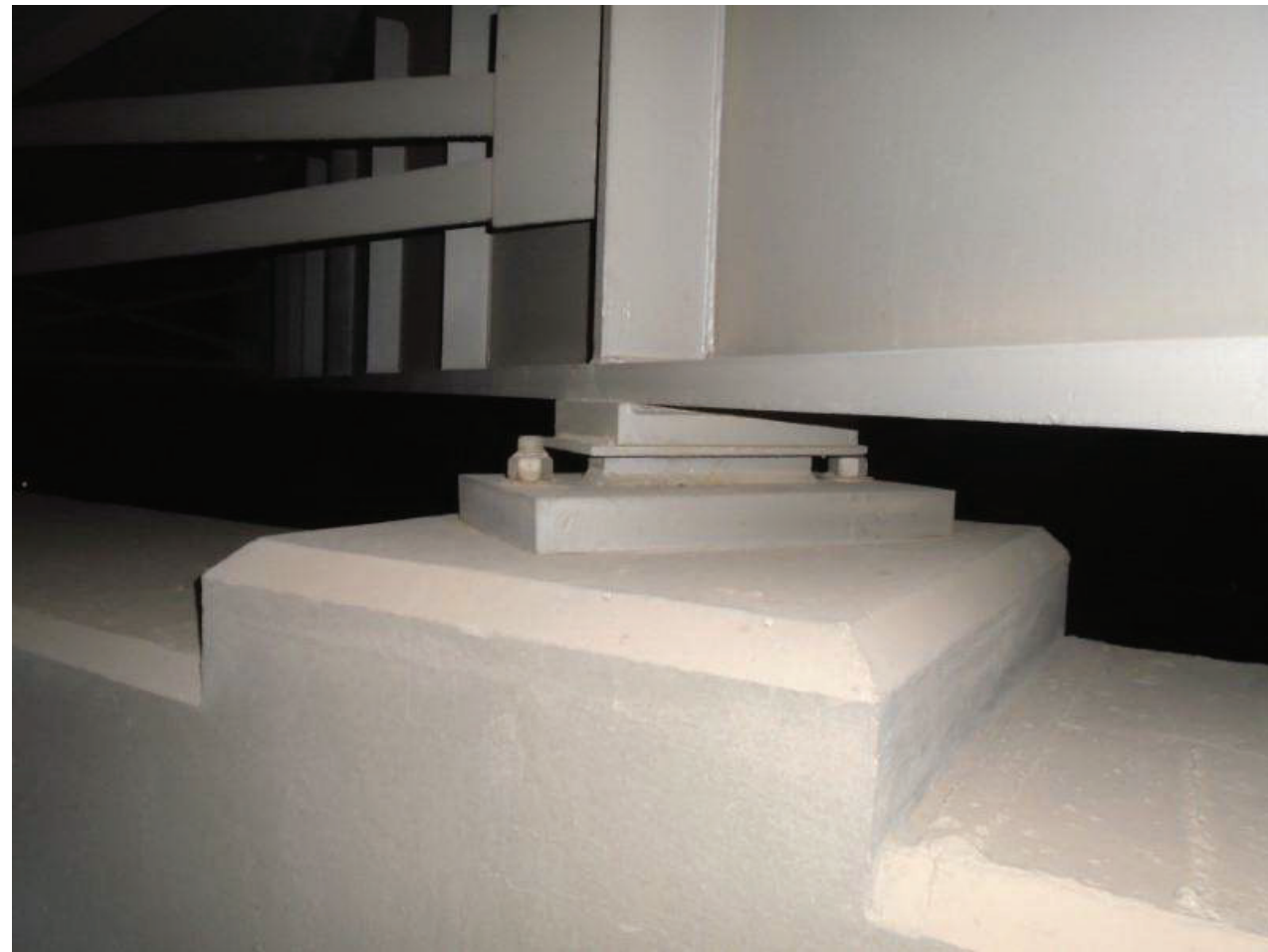
File Name : 01215-2020-05-31-Photo-11.JPG

Description : Typical Bearing, Pier 4, LNE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type :	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-12.JPG

Description : Typical Bearing, Pier 3, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type :	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-13.JPG

Description : Typical Bearing, Pier 2, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type :	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-14.JPG

Description : Typical Bearing, Pier 1, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type :	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-15.JPG

Description : Typical Bearing, South Abutment, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01215-2020-05-31-Photo-16.JPG
 Description : South Abutment, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022

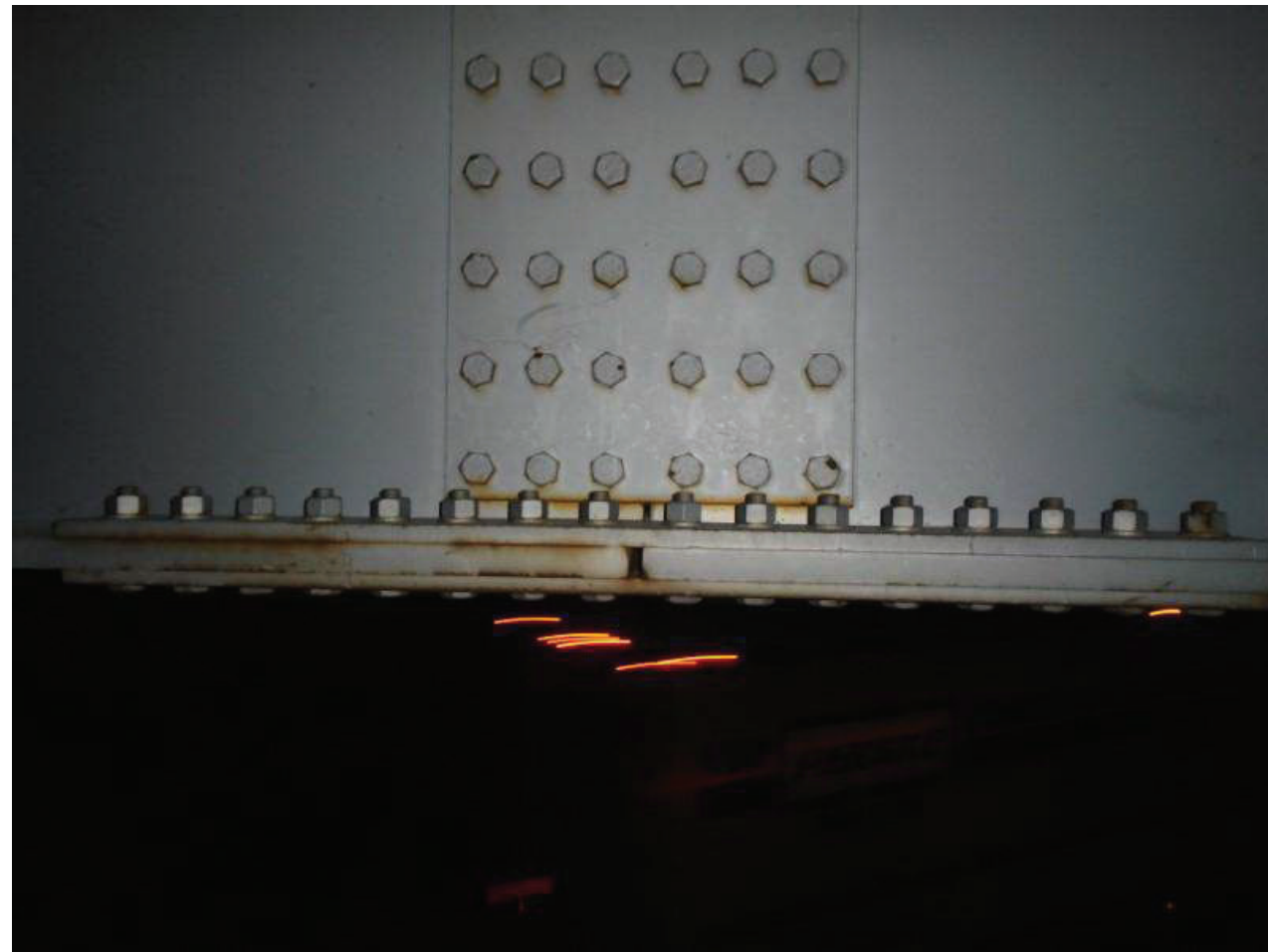


File Name : 01215-2020-05-31-Photo-17.JPG
 Description : Typical Diaphragm Connection

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-18.JPG
 Description : Splice Plate Corrosion, Span 4, Girder 4, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-19.JPG
 Description : Scrape Marks, Bottom Flange, Girder 2, Span 4, Under N Splice Plate

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



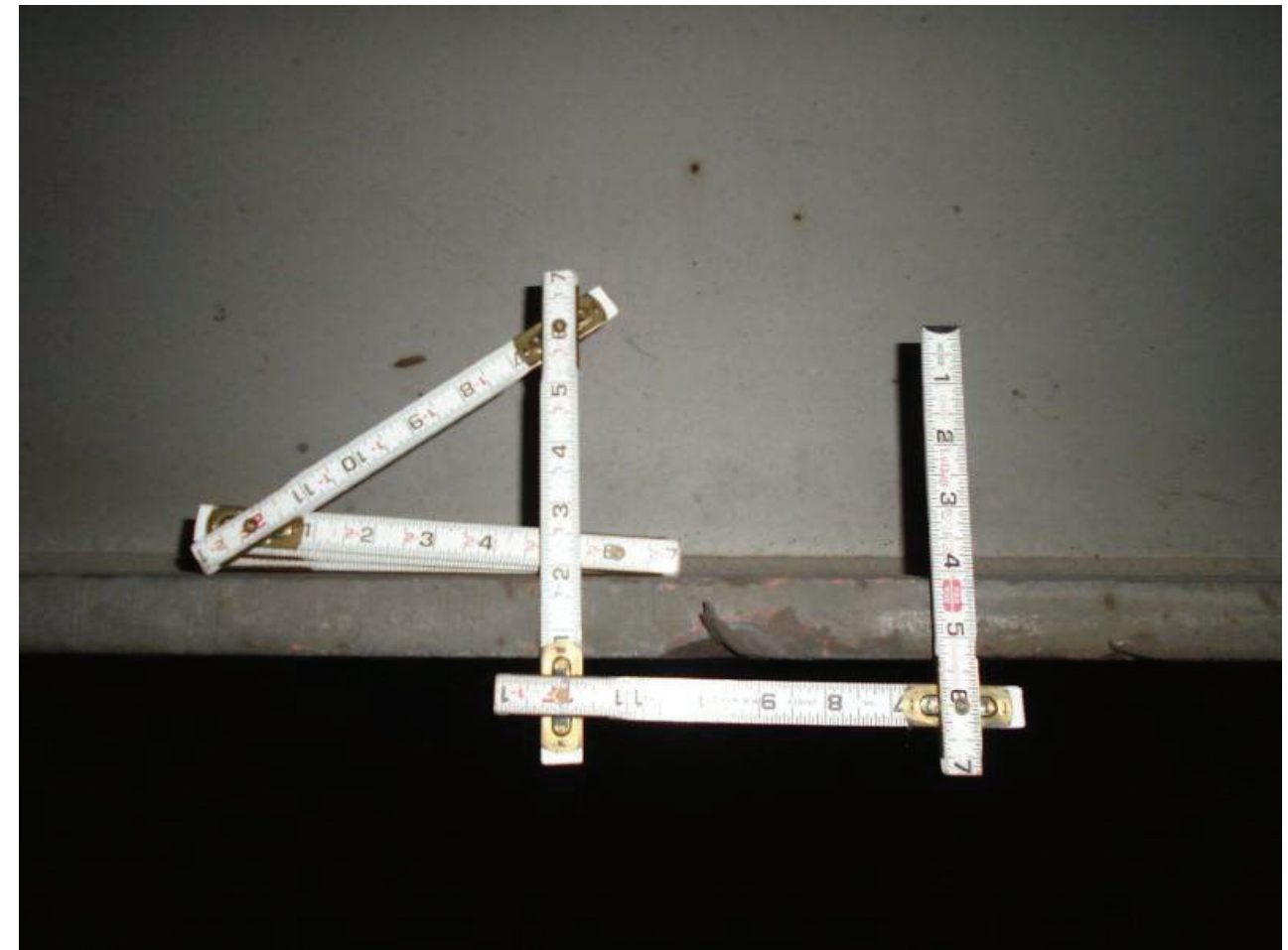
File Name : 01215-2020-05-31-Photo-20.JPG

Description : Impact Damage, Bottom Flange, Girder 1, Span 2, Over Right Lane, LNE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-21.JPG

Description : Impact Damage, Bottom Flange, Girder 3, Span 2, North of Splice Plate, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-22.JPG

Description : Impact Damage, Bottom Flange, Girder 4, Span 2, Over Right Lane, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



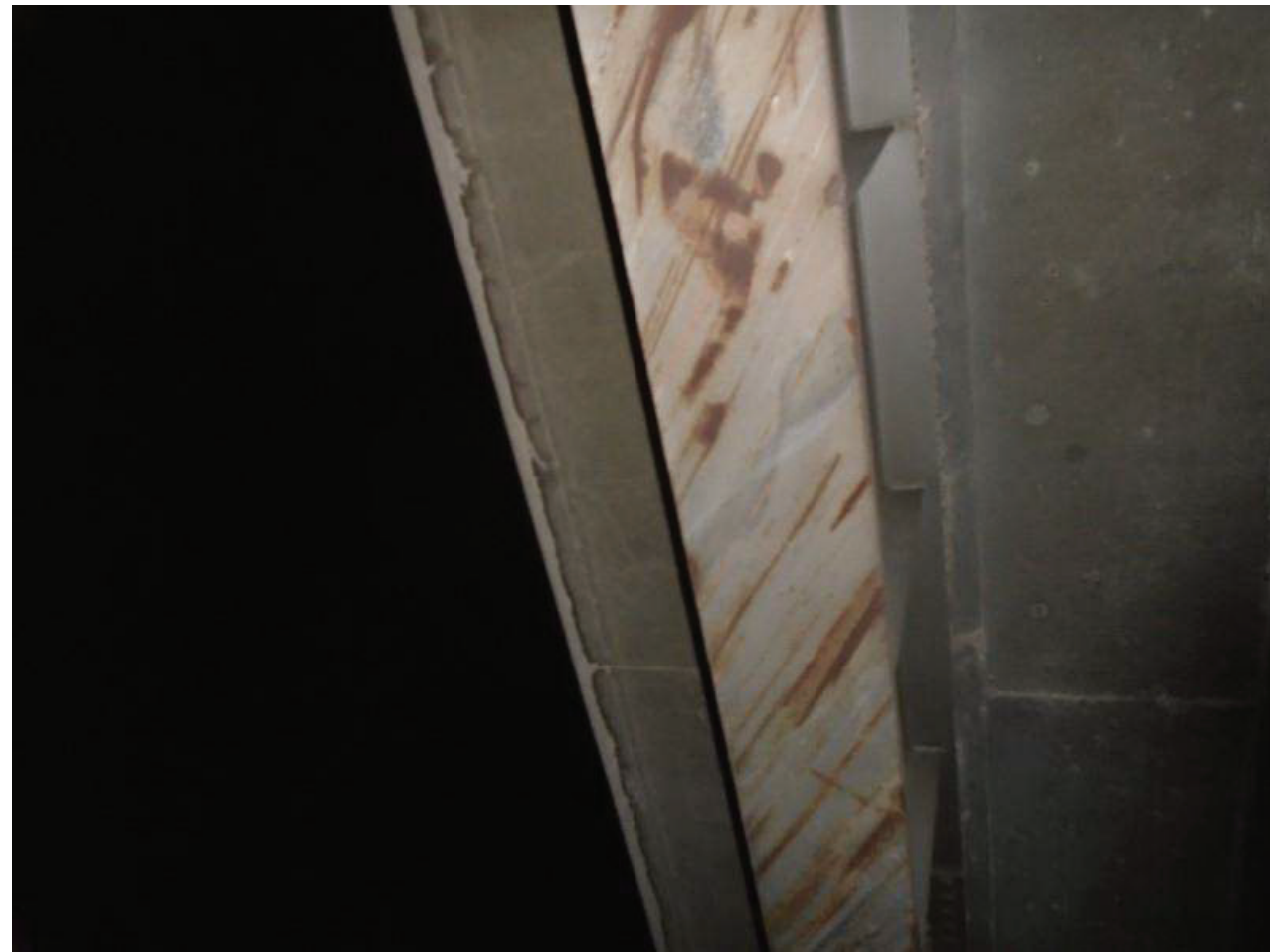
File Name : 01215-2020-05-31-Photo-23.JPG

Description : Bent Vertical Stiffener, Girder 1, Span 2, Diaphragm 2, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type :	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-24.JPG
 Description : Scrape Marks, Bottom Flange, Girder 4, Span 2, Over all Lanes

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type :	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-25.JPG
 Description : Missing Bolt, Span 2, Girder 4, South Splice Plate, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-26.JPG

Description : Graffiti, W Face of Girder 1, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01215	Structure Name :	Gas Line Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Gas Line Rd	Inspection Type:	In-Depth
MP :	177.76	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01215-2020-05-31-Photo-27.JPG

Description : Vegetation Growing, NW Slope Protection, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01215	Structure Name : Gas Line Rd UP	Inspected by : AECOM-Muthart/Hatch
Route : 10	Road Name : IRR Gas Line Rd	Inspection Type: In-Depth
MP : 177.76	Agency : ADOT	Inspection Date : Sunday, May 31, 2020
ADOT District: Southcentral		Next Insp. Due By : 05/31/2022



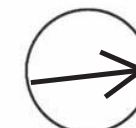
File Name : 01215-2020-05-31-Photo-28.JPG
 Description : EB Clearance Sign, 15'-11", LN

Arizona Department of Transportation
BRIDGE GROUP
 SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
 VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

STRUCTURE NAME **Gas Line Road UP**

STRUCTURE NO. **1215**

LOCATION **I-10 177.76**
 ROUTE MILEPOST



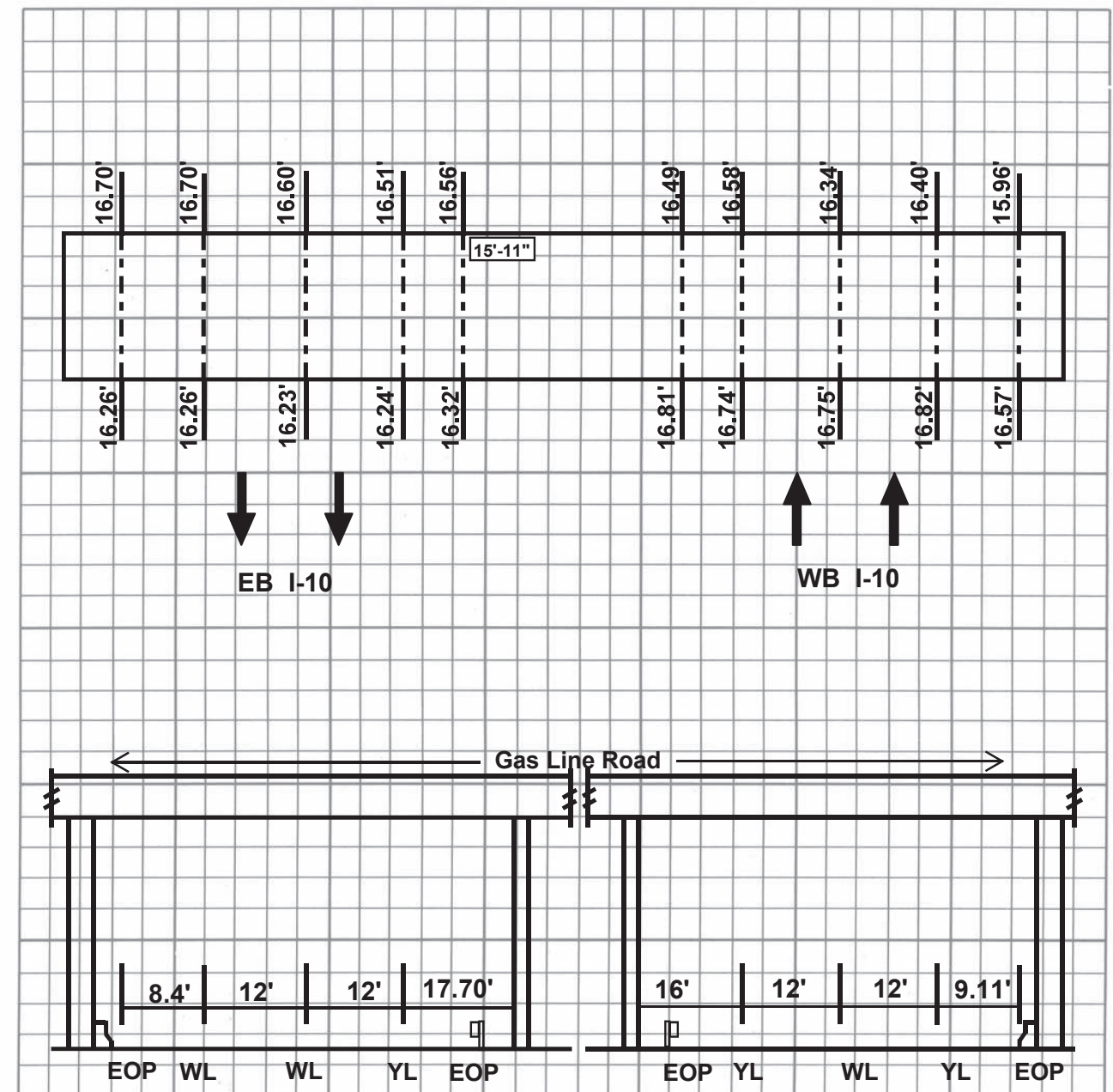
NORTH

Min Vertical Clearance

WB: 16.34'

EB: 16.23'

INSPECTION				
DATE	5/31/20			
INITIAL	BM/AH			
NEW / REVISED DIAGRAM	Rev			



† 64-4505 R07/06

Looking Northwest

BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 01216 Structure Name : Seed Farm Rd UP Feature Under : I-10
 Route : 10 MP : 179.39 Road Name : IRR Seed Farm Road Agency: ADOT Location : 5.9 mi NW Jct SR 187

LOCATION INFORMATION		DIMENSIONS		PROPOSED IMPROVEMENTS	
N1-State Code :	049	N32:Appr Rdwy Width (feet):	26	N75-Type of Work:	
N2-State Hwy District :	Southcentral	N48-Max Span Length (feet):	93	N76-Length of Str Imp (feet):	
N3-County Code :	Pinal	N49-Structure Length (feet):	292	N94-Br Improv Cost (x1000):	
N4-Place Code :	Unknown	N50a-Lt Curb/Swlk Width (feet):	1.5	N95-Rdwy Improv Cost (x1000):	
N16-Latitude:	33 Deg 04 Min 27.12 Sec	N50b-Rt Curb/Swlk Width (feet):	1.5	N96-Total Project Cost (x1000):	
N17-Longitude :	111 Deg 48 Min 31.68 Sec	N51-Br Width Curb-Curb (feet):	26.0	N97-Year of Cost Estimate:	
N98-Border St Code - % Resp:		N52-Deck Width Out-Out (feet):	31.2		
N99-Border Bridge Number:		N112-NBIS Br Length?	Y		
INVENTORY ROUTE DATA		VERTICAL & HORIZONTAL CLEARANCE		CONSTRUCTION PROJECT DATA	
N19-Detour Length (miles):	6	N53-Min Vert Over Clr (feet):	35.00	N27-Year Built:	1967
N20-Toll:	3	N54-Min Vert Under Clr (feet):	H 16.18	N106-Year of Reconstruction:	
ROADWAY RECORD	ON UNDER	N55-Min Lat Under Clr Rt (feet):	H 9.0	A204-Orig Project Number:	I-10-3(40)
N5-Inv Rte:	1 4 0 0000 0 2 1 1 00010 0	N56-Min Lat Under Clr Lt (feet):	39.0	A205-Orig Project Station:	1807+68.20
N28-Lanes:	2 4	SERVICE, TYPE, and SPAN INFORMATION		A223-TRACS Number:	
N10-Inv Rte Min Vert Clr (feet):	35.00 16.64	N42-Service Type:	1 1	A225-Deck Area (sq. feet):	9110
N11-Inv Rte Milepoint:	0.00 179.39	N43-Str Type, Main:	4 2		
N26-Functional Class:	09 01	N44-Str Type, Appr:	0 0	INSPECTION	
N29-Avg Daily Traffic:	50 61214	N45-Number of Main Spans:	4	N90-Inspection Date:	05/31/2020
N30-Year of ADT:	2020 2018	N46-Number of Appr Spans:	0	N91-Insp Freq (months):	24
N47-Inv Rte Tot Horiz Clr (feet):	26.0 73.10	CONDITION RATINGS		A207-Inspection Quarter:	2
N100-Defense Hwy:	0 1	N58-Deck:	6	Inspection Type:	In-Depth
N101-Parallel Bridge:	N	N59-Superstructure:	5	A228-Next Insp Date:	May 2022
N102-Direction of Traffic:	2 2	N60-Substructure:	6	CRITICAL FEATURES	
N104-Hwy System:	0 1	N61-Channel:	N	N92A-Fracture Critical:	N
N109-Percent Truck Traffic:	5 19	N62-Culvert:	N	N92B-Underwater Insp:	N
N110-National Truck Network:	0 1	APPRAISAL RATINGS		N92C-Special Insp:	N
N114-Future ADT:	60 61224	N67-Struct Evaluation:	5	N93A-Date Fract Crit Insp:	
N115-Year of Future ADT:	2040 2038	N68-Deck Geometry:	6	N93B-Date Underwater Insp:	
A200-Is N5 the Princ. Rte?	N Y	N69-Underclearance Rtg:	3	N93C-Date Spec Insp:	
RESPONSIBILITY		N71-Waterway Adequacy:	N	A234-Steel In-Depth Insp Freq(months):	48
N21-Maint Responsibility:	01	N72-Appr Rdw Align:	7	CULVERT INFORMATION	
N22-Bridge Owner:	01	N36-Traffic Safety Features:	1 0 1 1	A217-Culv Barrel Height(feet):	0
A229-Agency:	ADOT	BRIDGE SCOUR DATA		A218-Culv Length (feet):	0
		N113-Scour Critical Rtg:	N	A219-Culv Fill Height (feet):	0
		A202-Foundation Type:	49	BRIDGE RAILING	
		A220-Found Embed (feet):		A206a,b,c-	
		A221-Scour Countermeasure:		Bridge Rail Type,	311
		LOAD, RATE, and POST		Geometric Conform, and	
		N31-Design Loading:	5	Structural Conform:	
		N41-Open, Post, Close:	A	SUFFICIENCY RATING	
		N63-Method Used for Oper. Rtg:	1	Sufficiency Rating:	85.00
		N64-Operating Load Rtg/Factor:	59	BRIDGE CONDITION	
		N65-Method Used for Inv. Rtg:	1	Bridge Condition:	Fair
		N66-Inventory Load Rtg/Factor:	36	A300 - GENERAL COMMENTS	
		N70-Bridge Posting:	5		
		N103-Temp Str Designation:			
		A211-Posted Limit (Tons):			
		A222-Date of Load Rtg:	09/24/2008		
		A233-Posted Vert Clr NB/EB (ft-in):	0-0		
		A233-Posted Vert Clr SB/WB (ft-in):	15-10		

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 01216 Structure Name : Seed Farm Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Seed Farm Road Inspection Type : In-Depth
 MP : 179.39 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentral Next Insp. Due By : May 2022

Work Candidate ID:	551163C-7C6D-063020-5A8E0A0A0A	A216 - Actual Completion Cost	\$
Action:	1037 Deck-Wash		
Estimated Quantity:		A215 - Completion Date:	
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Remove the vegetation and debris on the bridge shoulder and the shoulders of the approach roadway (see photos 5, 7, 9, 10, 11, and 12).			
Work Candidate ID:	551163C-7C6D-063020-34988F9A4D	A216 - Actual Completion Cost	\$
Action:	1039 Drainage-Correct Deck Drainage		
Estimated Quantity:		A215 - Completion Date:	
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		
Repair the erosion hole and roadway undermining behind SE wingwall (see photo 7).			

BRIDGE GROUP

Bridge Repair Report

Structure Number : 01216 Structure Name : Seed Farm Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Seed Farm Road Inspection Type : In-Depth
 MP : 179.39 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentral Next Insp. Due By : May 2022

Work Candidate ID: 551163C-14B6-050818-27CEE203C4
Action: 1013 Bearings-Reset **A216 - Actual Completion Cost** \$
Estimated Quantity: 6.00
Estimated Cost: \$0.00 **A215 - Completion Date:**
A212 - Repair Priority: 3-Can be scheduled

1. Reset the rockers at girders 1, 2, 3, and 4 of the east abutment; they exhibit large rotations that appear to be approaching the limit of the bearings (see photo 14).

Work Candidate ID: 01216-GGZK-062116-AF08824BC682
Action: 1079 Superstructure-Repair Steel **A216 - Actual Completion Cost** \$
Estimated Quantity:
Estimated Cost: **A215 - Completion Date:**
A212 - Repair Priority: 3-Can be scheduled

Repair cracks due to fatigue and impact at following locations:
 1. Span 2, Girder 1, Diaphragm 1, over the right lane, 0.25 inch cracked weld between vertical stiffener and web, and 3-7/8 in cracks between diaphragm gusset plate and vertical stiffener plate web (see photo 21).
 2. Span 2, Girder 1 Diaphragm 2, cracked stiffener to web weld, 3/4 inch long (see photo 28).
 3. Span 2, Girder 2, near East field splice, 12 inch by 1 inch hole in the web due to impact (see photo 22).
 4. Span 2, Girder 2, Diaphragm 1, south face, cracked web 0.25 inch long, over the right lane due to impact (see photo 24).
 5. Span 2, Girder 2, Diaphragm 1, north face, horizontal tear/crack 2.5 inch long (see photo 25).
 6. Span 2, Girder 4, the stiffener to web weld is cracked approximately 1/2 inch (see photo 27).

BRIDGE GROUP

Inspection Report

Structure No.: 01216 Structure Name: Seed Farm Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name: IRR Seed Farm Road Inspection Type: In-Depth
 MP : 179.39 Agency: ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentral Next Insp. Due By : May 2022

NBI Condition Ratings			
N58 Deck :	6 Satisfactory	N61 Channel:	N N/A (NBI)
N59 Superstructure :	5 Fair	N62 Culvert :	N N/A (NBI)
N60 Substructure :	6 Satisfactory		

Appraisal Ratings			
N67 Structural Evaluation:	5 Above Min Tolerable	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	6 Equal Min Criteria	N72 Approach Roadway Align.:	7 Above Min Criteria
N69 Vert. & Horiz. Clearances:	3 Intolerable - Correct	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

1. This was an in-depth inspection by AECOM under Task Order 4 of contract #2019-10.01.
 2. The bridge was inspected during daytime and nighttime hours. The bridge was accessed using a bucket truck with phased single lane closures on I-10.
 3. Roadway:
 a) Concrete roadway has extensive insignificant to wide longitudinal, random and map cracks with large edge spalls along the joints (see photos 9 and 10).
 b) The transitions are uneven.
 c) The NE roadway approach has settled causing a large crack/spall in the approach roadway (see photo 11).
 d) Based on the observed differential settlements at the approach slabs, this report shall be forwarded to the bridge geotechnical section for further evaluation.
 e) The approach guardrails consist of w-beams with non-stiffened unattached transactions and curved end treatments (see photo 5).
 f) The SW approach guardrail has some minor impact damage.
 4. Fills:
 a) The slope protection consists of paved concrete.
 b) There is a 1 foot by 1.5 feet by 2 feet deep erosion hole behind the SE wall. The erosion has begun to undermine the roadway 1'-1" laterally (see photo 7 and maintenance report).
 c) Slope paving has insignificant to wide random cracks typically on top and some minor heaving at the southeast corner. Foam appears to have been injected under slope paving to mitigate erosion/undermining.
 5. Clearance:
 Minimum vertical clearances, measured under the structure, are 16.18 feet and 16.40 feet for WB and EB traffic respectively (see attached vertical clearance diagram). Therefore, the vertical clearance sign reading 15'-10" (see photo 33) for WB traffic is adequate per ADOT's signing policy.
 6. Maintenance Items:
 There is one previously recommended maintenance item which is repeated for this inspection. There is one new maintenance item added from this inspection for a total of 2 (see maintenance report).
 7. Repair Items:
 There are two previously recommended repairs that were not completed and are repeated (see repair report). There are no new repair items recommended from this inspection.
 8. Photos:
 See attached Inspection Report Supplement.

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
12	Re Concrete Deck	9,110.00	sq.ft	2.00	6514	916	1680	0

Top deck is bare concrete. Concrete overhangs and curbs.
 1. There is vegetation and debris accumulating on the bridge shoulder and the shoulders of the approach roadway (see photos 5, 7, 9, 10, 11, 12 and the maintenance report).
 2. Deck surface has a few minor pop-outs.
 3. The curbs have insignificant to moderate vertical and horizontal cracks.
 4. Uneven deck movement is evident in the zero joint opening measurements at the northwest and southeast corners, it's also evident with the misaligned concrete dados at these corners.

1120	Efflorescence/Rust Staining	5.00	sq.ft	2.00	0	5	0	0
1. Deck underside has insignificant to moderate transverse cracks with light efflorescence.								
1130	Cracking (RC and Other)	2,591.00	sq.ft	2.00	0	911	1680	0
1. Deck surface has dense insignificant to wide transverse cracks (see photo 6)								

107	Steel Opn Girder/Beam	1,155.00	ft	2.00	1100	45	10	0
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4 continuous 4-span steel plate girders with field splices. Secondary members: staggered steel diaphragms bolted to stiffeners.
 1. This bridge is considered East/West. The spans are numbered from East to West. The girders are numbered from South to North.
 2. There are no fracture critical members on this structure. No non-destructive testing was performed.

BRIDGE GROUP

Inspection Report

Structure No. : 01216 Structure Name : Seed Farm Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Seed Farm Road Inspection Type: In-Depth
 MP : 179.39 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentr Next Insp. Due By : May 2022

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
515	Steel Protective Coating	11,972.00	sq.ft	2.00	9338	0	2394	240
Paint System: Silver paint on steel members. Paint contains lead. 1. There are areas of peeling paint throughout the girders. 2394 SF CS3 2. There are areas where the paint has completely failed (see photos 20, 21, 22, 23, 24, 25, 26, and 29). 240 SF CS4								
1000	Corrosion	40.00	ft	2.00	0	40	0	0
1. There are scrape marks in the bottom flange of Girders 1, 2, 3, and 4 in Span 2 over the left and right WB lanes (see photo 20).								
1010	Cracking	10.00	ft	2.00	0	0	10	0
1. Span 2, Girder 1, Diaphragm 1, over the right lane, 0.25 inch cracked weld between vertical stiffener and web, and 3-7/8 in cracks between diaphragm gusset plate and vertical stiffener plate web (see photo 21 and the repair report). 2. Span 2, Girder 1 Diaphragm 2, cracked stiffener to web weld, 3/4 inch long (see photo 28 and the repair report). 3. Span 2, Girder 2, near East field splice, 12 inch by 1 inch hole in the web due to impact (see photo 22 and the repair report). 4. Span 2, Girder 2, Diaphragm 1, south face, cracked web 0.25 inch long, over the right lane due to impact (see photo 24 and the repair report). 5. Span 2, Girder 2, Diaphragm 1, north face, horizontal tear/crack 2.5 inch long (see photo 25 and repair report). 6. Span 2, Girder 4, the stiffener to web weld is cracked approximately 1/2 inch (see photo 27 repair report).								
1900	Distortion	5.00	ft	2.00	0	5	0	0
1. Span 2, Girder 1, impact damage on bottom flange and field splice plate (see photo 20). 2. Span 2, Girder 2, near East field splice, bent bottom flange 0.25 inch over 2 feet and bent vertical stiffener plate due to impact (see photo 23). 3. Span 2, Girder 4, the stiffener and bottom flange are bent 1.75" over 17" at the east field splice due to impact (see photo 26).								
205	Re Conc Column	12.00	each	2.00	10	2	0	0
4 concrete round columns and drilled shafts.								
1130	Cracking (RC and Other)	2.00	each	2.00	0	2	0	0
1. Pier 1 columns 1 and 2 have insignificant to moderate random map cracks.								
215	Re Conc Abutment	75.00	ft	2.00	42	18	15	0
Concrete stub abutments on steel piles. Concrete dados and wingwalls. 1. There are moderate water stains on both abutments with active leakage (see photos 13 and 19). 2. Wingwalls and dados have insignificant random cracks.								
1080	Delamination/Spall/Patched Area	3.00	ft	2.00	0	3	0	0
1. The east abutment at the south corner has a 3 foot x 1 foot patched delamination (see photo 30).								
1120	Efflorescence/Rust Staining	4.00	ft	2.00	0	1	3	0
1. Backwalls at both abutments have insignificant to moderate vertical and diagonal cracks with efflorescence (see photos 30 and 31).								
1130	Cracking (RC and Other)	26.00	ft	2.00	0	14	12	0
1. There are insignificant to wide vertical and horizontal cracks at both abutments (see photos 30 and 31). 2. West abutment has insignificant to wide horizontal cracks at the end of the abutment cap (see photo 32).								
234	Re Conc Pier Cap	112.00	ft	2.00	112	0	0	0
Concrete cap on 4- columns 1. No defects are noted on the concrete pier caps.								
304	Open Expansion Joint	62.00	ft	2.00	0	57	0	5
Steel sliding plate joint at abutments. 1. Deck joint openings measured at 97 degrees F: West Abutment: North side 0 inches; South side 1-1/8 inches East abutment: North side 1-5/16 inches; South side 0 inches								
2350	Debris Impaction	57.00	ft	2.00	0	57	0	0
1. Both deck joints are completely full of debris.								
2360	Adjacent Deck or Header	5.00	ft	2.00	0	0	0	5
1. 54 inch section of steel plate joint armor has sheared-off at the east abutment (see photo 8). 2. The NW deck header has a 6" x 12" delamination (see photo 10).								
311	Moveable Bearing	8.00	each	2.00	2	2	4	0

BRIDGE GROUP

Inspection Report

Structure No. : 01216 Structure Name : Seed Farm Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Seed Farm Road Inspection Type: In-Depth
 MP : 179.39 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentr Next Insp. Due By : May 2022

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
Steel rocker bearings at abutments. 1. Rocker bearings measured at the following locations and temperatures: East abutment measured at 70 degrees F: G1 = 10 degrees (Exp); G2 = 9 degrees (Exp); G3 = 7 degrees (Exp); G4 = 7 degrees (Exp) West abutment measured at 81 degrees F: G1 = 3 degrees (Exp); G2 = 3 degrees (Exp); G3 = 5 degrees (Exp); G4 = 5 degrees (Exp)								
2220	Alignment	6.00	each	2.00	0	2	4	0
1. The rockers at girders 1, 2, 3, and 4 of the east abutment exhibit large rotations that appear to be approaching the limit of the bearings (see photo 14 and the repair report). 2. The rockers at girders 3 & 4 of the west abutment exhibit moderate rotations. It is recommended to monitor the rotations during future inspections (see photo 18).								
313	Fixed Bearing	12.00	each	2.00	7	5	0	0
Fixed steel bearings at piers.								
1000	Corrosion	5.00	each	2.00	0	5	0	0
1. Bearings at piers have surface corrosion (see photos 15, 16, and 17).								
321	Re Conc Approach Slab	615.00	sq.ft	2.00	0	459	156	0
Concrete approach slabs and roadway.								
1080	Delamination/Spall/Patched Area	75.00	sq.ft	2.00	0	75	0	0
1. Approach slab have long shallow edge spalls along the joints.								
1130	Cracking (RC and Other)	156.00	sq.ft	2.00	0	0	156	0
1. Concrete approach slabs at both ends have extensive insignificant to wide longitudinal, random and map cracks.								
1190	Abrasion(PSC/RC)	156.00	sq.ft	2.00	0	156	0	0
1. Approach slabs have areas of light to moderate abrasion.								
4000	Settlement	228.00	sq.ft	2.00	0	228	0	0
1. The west approach slab has settled across the entire width. However, due to the debris and vegetation growth an exact measurement was not recorded (see photos 5, 7, 9, and 10). Settlement is approximately 1/2" at the corners. 2. Due to the settlement, a copy of this report will be forward to the Geotechnical section for review.								
330	Metal Bridge Railing	584.00	ft	2.00	584	0	0	0
Single tube railing (H-1-1) on top of concrete parapet. 1. No defects are noted on the metal bridge railings.								
331	Re Conc Bridge Railing	584.00	ft	2.00	526	58	0	0
Reinforced concrete parapet with single tube railing (H-1-1).								
1130	Cracking (RC and Other)	58.00	ft	2.00	0	58	0	0
1. Parapets have insignificant to moderate vertical and horizontal cracks.								

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-1.JPG

Description : Roadway ID LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



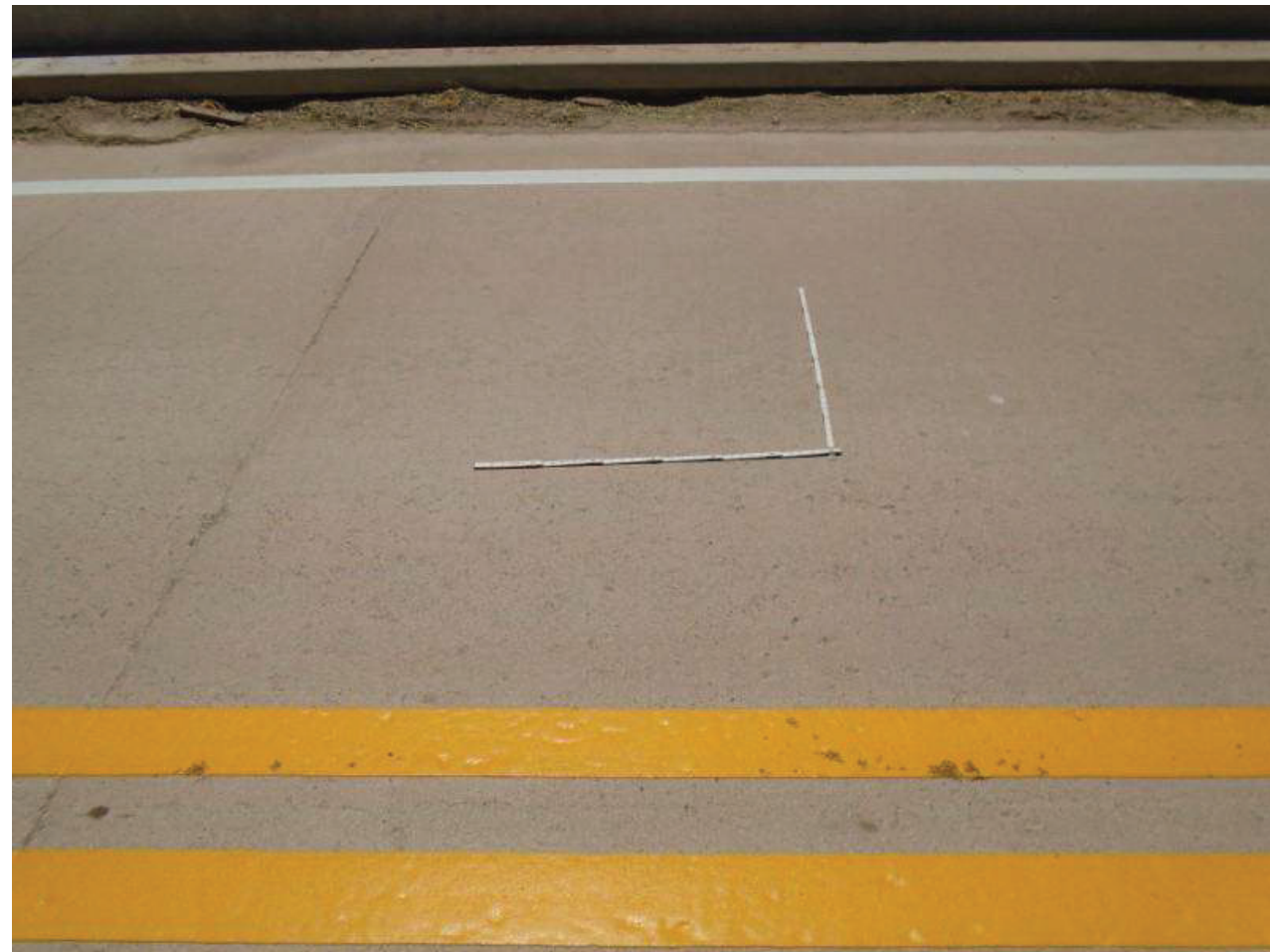
File Name : 01216-2020-05-31-Photo-2.JPG

Description : Elevation ID LSE

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Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-3.JPG

Description : Typical Deck

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



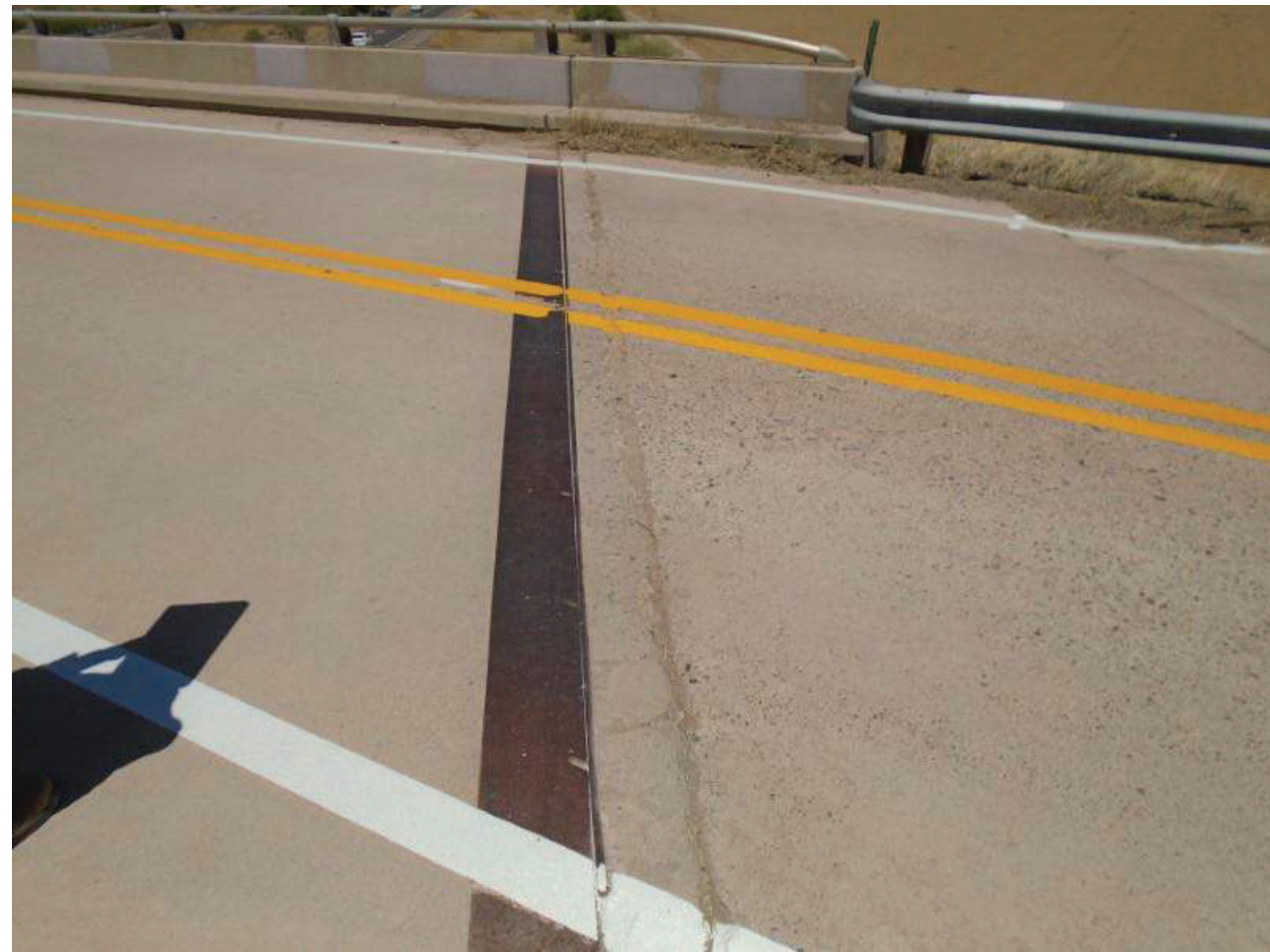
File Name : 01216-2020-05-31-Photo-4.JPG

Description : Typical Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-5.JPG
 Description : Typical Joint, E Joint LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-6.JPG
 Description : Typical Deck Cracking

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-7.JPG

Description : Erosion Hole, SE Corner, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-8.JPG

Description : Missing Section of Joint Armor, East Joint, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-9.JPG
 Description : Restricted Joint Movement, East Abutment Joint, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-10.JPG
 Description : Restricted Joint Movement, West Abutment Joint, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-11.JPG
 Description : Local Settlement, NE Approach Roadway, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-12.JPG
 Description : Typical Shoulder Debris, Both Sides of Bridge

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-13.JPG

Description : East Abutment, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-14.JPG

Description : Large Rotation, Bearing 1, East Abutment, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-15.JPG

Description : Typical Bearing, Pier 1, LNE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-16.JPG

Description : Typical Bearing, Pier 2, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-17.JPG

Description : Typical Bearing, Pier 3, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-18.JPG

Description : Typical Bearing, West Abutment, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-19.JPG

Description : West Abutment, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-20.JPG

Description : Scrape Marks, Span 2, Girder 1, East of Splice Plate, LNW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-21.JPG
 Description : Cracked Weld, Span 2, Girder 1, Diaphragm 1, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-22.JPG
 Description : Impact Damage, Span 2, Girder 2, Diaphragm 1, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022

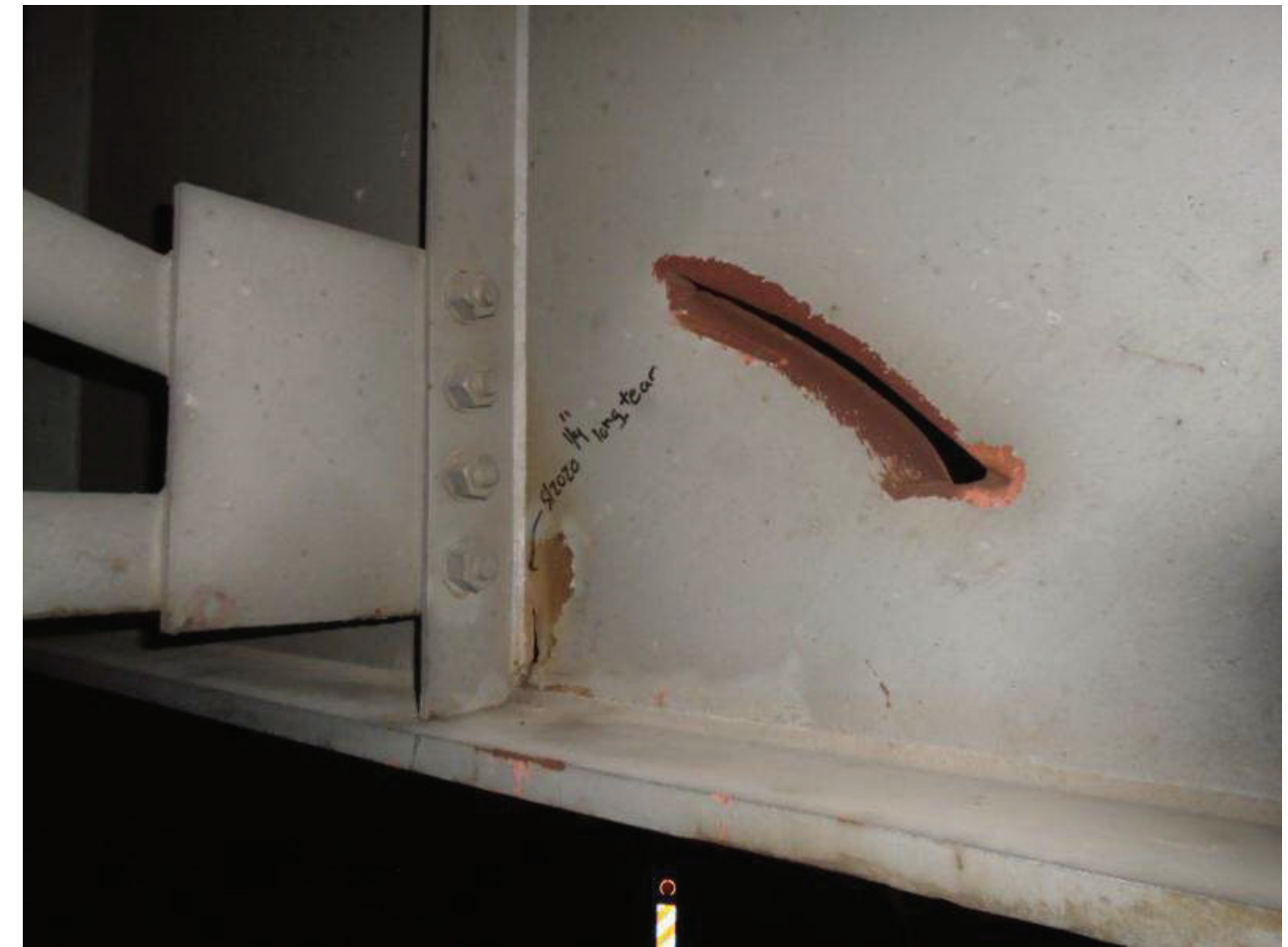


File Name : 01216-2020-05-31-Photo-23.JPG
 Description : Bent Vertical Stiffener, Span 2, Girder 2, Near East Splice Plate, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-24.JPG
 Description : Vertical Tear, Span 2, Girder 2, Diaphragm 1, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022

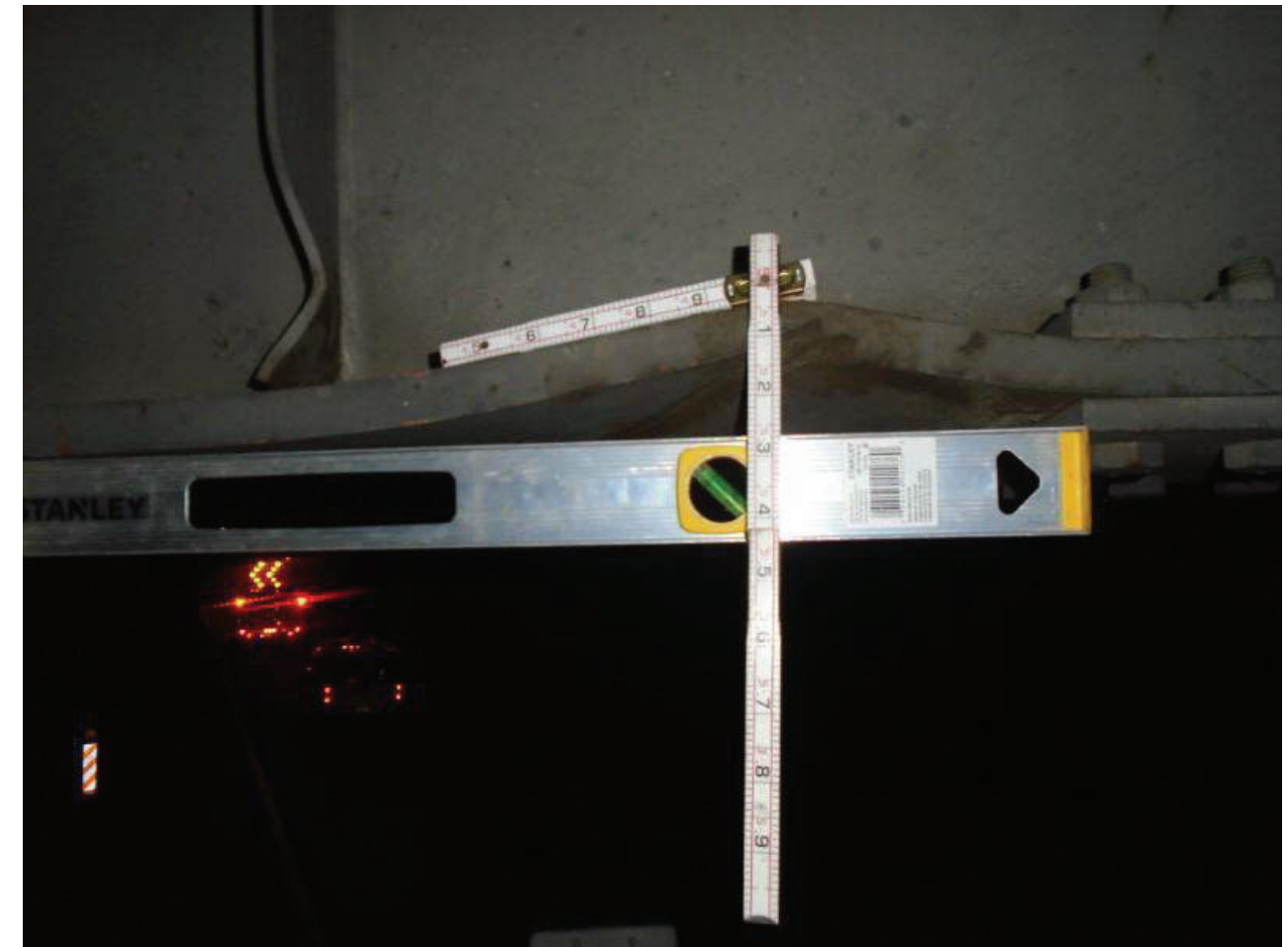


File Name : 01216-2020-05-31-Photo-25.JPG
 Description : Horizontal Tear/Crack Span 2, Girder 2, Diaphragm 1, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022

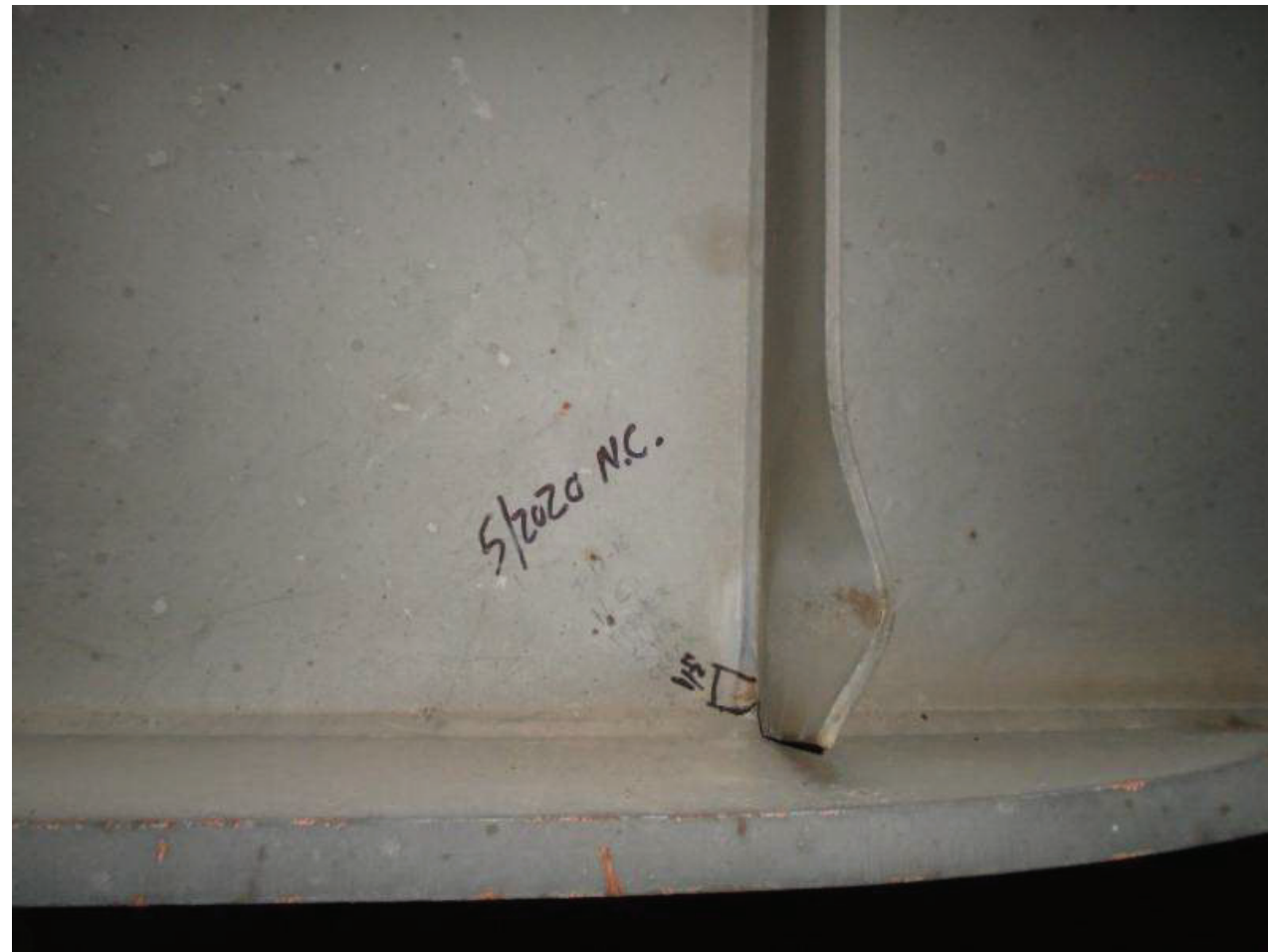


File Name : 01216-2020-05-31-Photo-26.JPG
 Description : Bent Bottom Flange, Span 2, Girder 4, at East Splice Plate, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-27.JPG
 Description : Crack in Vertical Stiffener, Span 2, Girder 4, at East Splice Plate, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type :	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-28.JPG
 Description : Crack in Vertical Stiffener, Span 2, Girder 1, Diaphragm 2, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-29.JPG
 Description : Failing Paint, Span 3, Girder 1, Near Pier 3, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01216-2020-05-31-Photo-30.JPG
 Description : Spalls & Map Cracks, Southeast Abutment Backwall, LNE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-31.JPG
 Description : Spalls & Map Cracks, Southwest Abutment Backwall, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01216	Structure Name :	Seed Farm Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Seed Farm Road	Inspection Type:	In-Depth
MP :	179.39	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01216-2020-05-31-Photo-32.JPG
 Description : Wide Crack, Northwest Abutment Backwall, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01216	Structure Name : Seed Farm Rd UP	Inspected by : AECOM-Muthart/Hatch
Route : 10	Road Name : IRR Seed Farm Road	Inspection Type : In-Depth
MP : 179.39	Agency : ADOT	Inspection Date : Sunday, May 31, 2020
ADOT District : Southcentral		Next Insp. Due By : 05/31/2022



File Name : 01216-2020-05-31-Photo-33.JPG

Description : WB Clearance Sign, 15'-10", LN

Arizona Department of Transportation
BRIDGE GROUP
SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

STRUCTURE NAME **Seed Farm Rd UP**

STRUCTURE NO. **1216**

LOCATION **I-10 179.39**
ROUTE MILEPOST



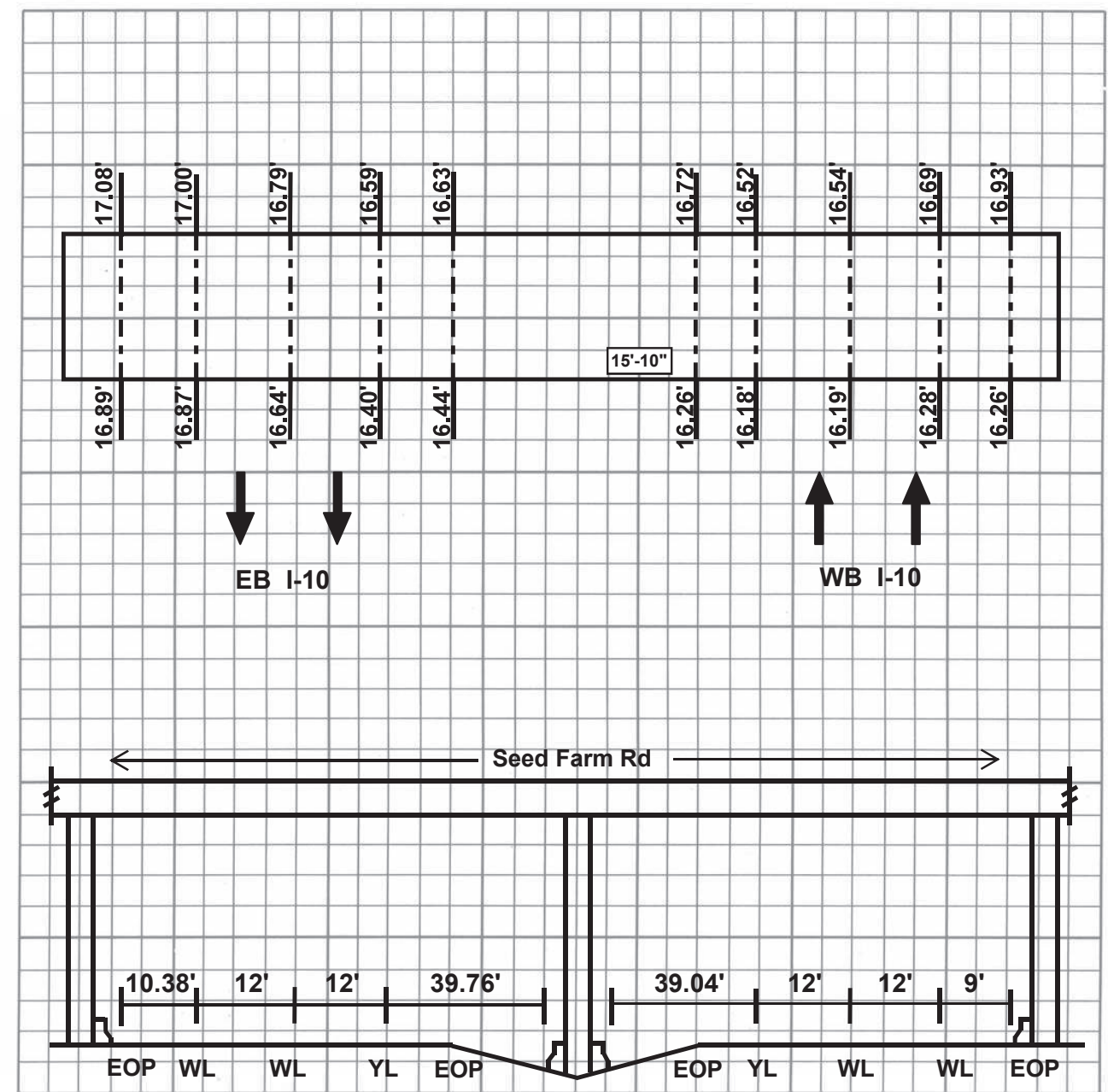
NORTH

Min Vertical Clearance

WB: 16.18'

EB: 16.40'

INSPECTION				
DATE	5/31/20			
INITIAL	BM/AH			
NEW / REVISED DIAGRAM	Rev			



† 64-4505 R07/06

Looking Northwest



AECOM
7720 North 16th Street
Phoenix, AZ 85020
aecom.com

Project name:
On-Call Statewide Bridge Engineering,
Assessment, & Evaluation - Task Order No. 4

Project ref:
#2019-010.01

From:
Brinton Muthart

Inspection Date:
May, 31 2020

To:
Arizona Department of Transportation
Bridge Management Group
205 S. 17th Ave.
Room 261E
Phoenix, AZ 85007

CC:

Inspection Report Supplement

Subject: 01216 Seed Farm Rd UP - 2020 In-Depth Inspection

8. Photos:

- 1) Roadway ID LW
- 2) Elevation ID LSE
- 3) Typical Deck
- 4) Typical Soffit
- 5) Typical Joint, E Joint LN
- 6) Typical Deck Cracking
- 7) Erosion Hole, SE Corner, LS
- 8) Missing Section of Joint Armor, East Joint, LN
- 9) Restricted Joint Movement, East Abutment Joint, LN
- 10) Restricted Joint Movement, West Abutment Joint, LN
- 11) Local Settlement, NE Approach Roadway, LN
- 12) Typical Shoulder Debris, Both Sides of Bridge
- 13) East Abutment, LN
- 14) Large Rotation, Bearing 1, East Abutment, LN
- 15) Typical Bearing, Pier 1, LNE
- 16) Typical Bearing, Pier 2, LN
- 17) Typical Bearing, Pier 3, LW
- 18) Typical Bearing, West Abutment, LW
- 19) West Abutment, LW
- 20) Scrape Marks, Span 2, Girder 1, East of Splice Plate, LNW
- 21) Cracked Weld, Span 2, Girder 1, Diaphragm 1, LSW
- 22) Impact Damage, Span 2, Girder 2, Diaphragm 1, LS
- 23) Bent Vertical Stiffener, Span 2, Girder 2, Near East Splice Plate, LN
- 24) Vertical Tear, Span 2, Girder 2, Diaphragm 1, LNW
- 25) Horizontal Tear/Crack Span 2, Girder 2, Diaphragm 1, LS
- 26) Bent Bottom Flange, Span 2, Girder 4, at East Splice Plate, LN
- 27) Crack in Vertical Stiffener, Span 2, Girder 4, at East Splice Plate, LN
- 28) Crack in Vertical Stiffener, Span 2, Girder 1, Diaphragm 2, LS
- 29) Failing Paint, Span 3, Girder 1, Near Pier 3, LN
- 30) Spalls & Map Cracks, Southeast Abutment Backwall, LNE
- 31) Spalls & Map Cracks, Southwest Abutment Backwall, LW
- 32) Wide Crack, Northwest Abutment Backwall, LW
- 33) WB Clearance Sign, 15'-10", LN

BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 01150 Structure Name : Dirk Lay Rd UP Feature Under : I-10
 Route : 10 MP : 181.44 Road Name : IRR Dirk Lay Rd Agency: ADOT Location : 17.7 mi W Jct I-8

LOCATION INFORMATION		DIMENSIONS		PROPOSED IMPROVEMENTS	
N1-State Code :	049	N32:Appr Rdwy Width (feet):	26	N75-Type of Work:	
N2-State Hwy District :	Southcentral	N48-Max Span Length (feet):	98	N76-Length of Str Imp (feet):	
N3-County Code :	Pinal	N49-Structure Length (feet):	470	N94-Br Improv Cost (x1000):	
N4-Place Code :	Unknown	N50a-Lt Curb/Swlk Width (feet):	1.5	N95-Rdwy Improv Cost (x1000):	
N16-Latitude:	33 Deg 02 Min 55.68 Sec	N50b-Rt Curb/Swlk Width (feet):	1.5	N96-Total Project Cost (x1000):	
N17-Longitude :	111 Deg 47 Min 21.48 Sec	N51-Br Width Curb-Curb (feet):	26.0	N97-Year of Cost Estimate:	
N98-Border St Code - % Resp:		N52-Deck Width Out-Out (feet):	31.2		
N99-Border Bridge Number:		N112-NBIS Br Length?	Y		
INVENTORY ROUTE DATA		VERTICAL & HORIZONTAL CLEARANCE		CONSTRUCTION PROJECT DATA	
N19-Detour Length (miles):	13	N53-Min Vert Over Clr (feet):	99.99	N27-Year Built:	1967
N20-Toll:	3	N54-Min Vert Under Clr (feet):	H 16.26	N106-Year of Reconstruction:	
ROADWAY RECORD	ON UNDER	N55-Min Lat Under Clr Rt (feet):	H 9.3	A204-Orig Project Number:	I-10-3(42)
N5-Inv Rte:	1 8 0 00000 0 2 1 1 00010 0	N56-Min Lat Under Clr Lt (feet):	15.6	A205-Orig Project Station:	1915+03.36
N28-Lanes:	2 4	SERVICE, TYPE, and SPAN INFORMATION		A223-TRACS Number:	
N10-Inv Rte Min Vert Clr (feet):	99.99 16.35	N42-Service Type:	1 1	A225-Deck Area (sq. feet):	14664
N11-Inv Rte Milepoint:	0.00 181.44	N43-Str Type, Main:	4 2	INSPECTION	
N26-Functional Class:	09 01	N44-Str Type, Appr:	0 0	N90-Inspection Date:	05/31/2020
N29-Avg Daily Traffic:	10 61214	N45-Number of Main Spans:	5	N91-Insp Freq (months):	24
N30-Year of ADT:	2020 2018	N46-Number of Appr Spans:	0	A207-Inspection Quarter:	2
N47-Inv Rte Tot Horiz Clr (feet):	26.0 37.00	CONDITION RATINGS		Inspection Type:	In-Depth
N100-Defense Hwy:	0 1	N58-Deck:	7	A228-Next Insp Date:	May 2022
N101-Parallel Bridge:	N	N59-Superstructure:	7	CRITICAL FEATURES	
N102-Direction of Traffic:	2 2	N60-Substructure:	7	N92A-Fracture Critical:	N
N104-Hwy System:	0 1	N61-Channel:	N	N92B-Underwater Insp:	N
N109-Percent Truck Traffic:	0 19	N62-Culvert:	N	N92C-Special Insp:	N
N110-National Truck Network:	0 1	APPRAISAL RATINGS		N93A-Date Fract Crit Insp:	
N114-Future ADT:	20 61224	N67-Struct Evaluation:	7	N93B-Date Underwater Insp:	
N115-Year of Future ADT:	2040 2038	N68-Deck Geometry:	6	N93C-Date Spec Insp:	
A200-Is N5 the Princ. Rte?	N Y	N69-Underclearance Rtg:	3	A234-Steel In-Depth Insp Freq(months):	48
RESPONSIBILITY		N71-Waterway Adequacy:	N	CULVERT INFORMATION	
N21-Maint Responsibility:	01	N72-Appr Rdw Align:	7	A217-Culv Barrel Height(feet):	0
N22-Bridge Owner:	01	N36-Traffic Safety Features:	1 0 0 0	A218-Culv Length (feet):	0
A229-Agency:	ADOT	BRIDGE SCOUR DATA		A219-Culv Fill Height (feet):	0
		N113-Scour Critical Rtg:	N	BRIDGE RAILING	
		A202-Foundation Type:	41	A206a,b,c-	
		A220-Found Embed (feet):		Bridge Rail Type,	311
		A221-Scour Countermeasure:		Geometric Conform, and	
		LOAD, RATE, and POST		Structural Conform:	
		N31-Design Loading:	5	SUFFICIENCY RATING	
		N41-Open, Post, Close:	A	Sufficiency Rating:	94.00
		N63-Method Used for Oper. Rtg:	1	BRIDGE CONDITION	
		N64-Operating Load Rtg/Factor:	67	Bridge Condition:	Good
		N65-Method Used for Inv. Rtg:	1	A300 - GENERAL COMMENTS	
		N66-Inventory Load Rtg/Factor:	40		
		N70-Bridge Posting:	5		
		N103-Temp Str Designation:			
		A211-Posted Limit (Tons):			
		A222-Date of Load Rtg:	03/04/2010		
		A233-Posted Vert Clr NB/EB (ft-in):	0-0		
		A233-Posted Vert Clr SB/WB (ft-in):	0-0		

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 01150 Structure Name : Dirk Lay Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Dirk Lay Rd Inspection Type : In-Depth
 MP : 181.44 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District: Southcentral Next Insp. Due By : May 2022

Work Candidate ID:	351F165-027B-051520-D18454AAA9	A216 - Actual Completion Cost	\$
Action:	1056 Misc-Remove Vegetation		
Estimated Quantity:		A215 - Completion Date:	
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		

Remove the vegetation growing in the transition between the approach slab and the approach roadway (see photo 7).

Work Candidate ID:	351F165-A3AC-050718-2B09F1C17D	A216 - Actual Completion Cost	\$
Action:	1059 Misc-Tighten Bolts and Nuts		
Estimated Quantity:	3.00	A215 - Completion Date:	
Estimated Cost:	\$0.00		
A212 - Repair Priority:	3-Can be scheduled		

Replace or tighten missing or loose bolts on the metal bridge rail and the approach railing at the following locations:
 1. End sections on the approach transition at all four corners (see photo 8).
 2. The NW corner near the north joint (see photo 9).
 3. The south metal rail near pier 2.

BRIDGE GROUP

Bridge Repair Report

Structure Number : 01150	Structure Name : Dirk Lay Rd UP	Inspected by : AECOM-Muthart/Hatch
Route : 10	Road Name : IRR Dirk Lay Rd	Inspection Type : In-Depth
MP : 181.44	Agency : ADOT	Inspection Date : Sunday, May 31, 2020
ADOT District: Southcentral		Next Insp. Due By : May 2022

Work Candidate ID: 01150-SUUN-061716-ADFD3061A6F5	A216 - Actual Completion Cost	\$
Action: 1079 Superstructure-Repair Steel		
Estimated Quantity: 3.00	A215 - Completion Date:	
Estimated Cost:		
A212 - Repair Priority: 3-Can be scheduled		

Repair the damaged vertical stiffeners in Span 4, Girder 2, over the WB right lane at the following locations:

- 8 stiffeners from Pier 4 (just north of the north splice plate) is bent and has a 1/2 inch crack in the stiffener to web weld (see photo 22).
- Stiffener at diaphragm 3 has a 1 inch long tear at the bottom (see photo 23).
- 6th stiffener from Pier 4 has a 1/2 inch long tear at the bottom (see photo 24).

Work Candidate ID: 351F165-027B-081020-731C6E6F01	A216 - Actual Completion Cost	\$
Action: 1013 Bearings-Reset		
Estimated Quantity:	A215 - Completion Date:	
Estimated Cost: \$0.00		
A212 - Repair Priority: 3-Can be scheduled		

- Reset the rockers at girders 1, 2, 3, & 4 of the north abutment due to the large rotations (see photo 11).
- Reset the rocker at girder 1 of the south abutment due to the large rotation (see photo 16).

BRIDGE GROUP

Inspection Report

Structure No.: 01150	Structure Name: Dirk Lay Rd UP	Inspected by : AECOM-Muthart/Hatch
Route : 10	Road Name: IRR Dirk Lay Rd	Inspection Type: In-Depth
MP : 181.44	Agency: ADOT	Inspection Date : Sunday, May 31, 2020
ADOT District: Southcentral		Next Insp. Due By : May 2022

NBI Condition Ratings			
N58 Deck :	7 Good	N61 Channel:	N N/A (NBI)
N59 Superstructure :	7 Good	N62 Culvert :	N N/A (NBI)
N60 Substructure :	7 Good		

Appraisal Ratings			
N67 Structural Evaluation:	7 Above Min Criteria	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	6 Equal Min Criteria	N72 Approach Roadway Align.:	7 Above Min Criteria
N69 Vert. & Horiz. Clearances:	3 Intolerable - Correct	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

- This was an in-depth inspection by AECOM under Task Order 4 of contract #2019-10.01.
- The bridge was inspected during daytime and nighttime hours. The bridge was accessed using a bucket truck with phased single lane closures on I-10.
- Roadway:
 - AC approach roadway has insignificant to wide transverse and longitudinal cracks with vegetation growing in the cracks obstructing the roadway (see photos 1 & 7 and the maintenance report).
 - Transitions are uneven.
 - The w-beam approach guardrails are not stiffened and are not connected the bridge railing.
 - Some of the nuts are missing or loose on top of the transition barrier at the ends of both metal bridge rails (see photo 8 and the maintenance report).
- Fills:
 - The slope protection is concrete slope paving at abutments.
 - Slope paving has insignificant to moderate random cracks. Foam appears to have been injected under slope paving to mitigate erosion/undermining.
- Clearance:

Minimum measured vertical underclearances are 16.26 feet (EB) and 16.34 feet (WB). Therefore, posting of vertical clearance is not required, per current ADOT signing policy.
- Maintenance Items:

There is one previously recommended maintenance item that has not been completed and is repeated for this inspection. There is one new maintenance item added from this inspection for a total of two (see the maintenance report).
- Repair Items:

One previously recommended repair was not completed and is repeated. There is one new repair item added from this inspection for a total of two (see the repair report).
- Photos:
 - Roadway ID LS
 - Elevation ID LE
 - Typical Deck
 - Typical Soffit
 - Typical Joint, S Joint LS
 - Typical Deck Cracking
 - Overgrowing Vegetation, N Approach, LN
 - Typical Missing Nuts, End of Metal Railing
 - Typical Missing Nuts, Intermediate Metal Railing Support
 - N Abutment, LNW
 - N Abutment, Bearing 4, LNW
 - Pier 4, Bearing 4, Surface Corrosion, LN
 - Pier 3, Typical Bearing Condition, LSW
 - Pier 2, Typical Bearing Condition, LSW
 - Pier 1, Typical Bearing Condition, LW
 - S Abutment, Bearing 1, LW
 - S Abutment, LSW
 - Typical Diaphragm
 - Wide Map Cracks, East End of North Abutment, LNW
 - Scrape Marks, Bottom Flange, Girder 4, Over WB Right Lane, LS
 - Bent Stiffener/Bottom Flange Dent, Span 4, Girder 2, Bay 2, Near N Field Splice, LW
 - Bent Stiffener/Typical Surface Corrosion on Splice Plate, Span 4, Girder 2, Bay 2, Near N Field Splice, LW
 - Bent Diaphragm Stiffener, Span 4, Girder 2, Bay 2, LSW
 - Cracked Diaphragm Stiffener, Span4, Girder 2, Bay 2, LW
 - Impact Damage, Span 2, Girder 4, Over Left Lane, LE
 - Spall with Scrape Marks, Pier 2, Second Column from East, LE
 - Vertical Cracks, Pier 3 Cap, at Column 4, LN

BRIDGE GROUP

Inspection Report

Structure No. : 01150 Structure Name : Dirk Lay Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Dirk Lay Rd Inspection Type : In-Depth
 MP : 181.44 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District : Southcentr Next Insp. Due By : May 2022

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
12	Re Concrete Deck	14,664.00	sq.ft	2.00	13958	706	0	0
Description: Top deck is bare concrete. Concrete overhangs. 18 inch wide concrete curb, both sides. 1. Deck bottom has insignificant transverse cracks, a few with light efflorescence.								
1130	Cracking (RC and Other)	700.00	sq.ft	2.00	0	700	0	0
1. Deck top exhibits insignificant to moderate transverse, random cracks and minor scaling (see photo 6).								
1190	Abrasion(PSC/RC)	6.00	sq.ft	2.00	0	6	0	0
1. North span near the joint exhibits some light to moderate abrasion near the joint.								
107	Steel Opn Girder/Beam	1,860.00	ft	2.00	1843	13	4	0
Description: 5-span continuous; 4- welded plate girders. Secondary members: staggered steel diaphragms bolted to stiffeners. 1. This bridge is oriented North/South. Spans are numbered from South to North. Girders are numbered from West to East. 2. There are no fracture critical members in this structure. No non-destructive testing was performed.								
515	Steel Protective Coating	20,680.00	sq.ft	2.00	20246	414	0	20
Description: Paint System: silver paint on steel members. Paint contains lead. 1. Paint is in generally good condition (see photo 18) however there are many isolated areas of peeling paint (see photo 18). 414 SF CS2 2. There are some areas with complete paint failure due to scrape marks or collision damage (see photos 20, 21, 22, 23, 24, and 25). 20 SF CS4								
1000	Corrosion	10.00	ft	2.00	0	10	0	0
1. There is minor rust packing in all exterior splice plates at the bottom flanges. 2. Span 2, Girder 1, 3, and 4 have minor scrape marks on the bottom flange over the left lane (see photo 20). 3. There are scrape marks and dents on all girder bottom flanges in Spans 2 and 4 (see photos 21, 22, and 25).								
1900	Distortion	7.00	ft	2.00	0	3	4	0
1. Span 2, Girder 4, over left lane has impact damage (see photo 25). 2. Span 4, Girder 2, bay 2, has 2 dents up to 2" x 2" located on the bottom flange (see photo 21). 3. Span 4, Girder 2, has 3 damaged stiffeners over the WB right lane and are listed below: a) 8 stiffeners from Pier 4 (just north of the north splice plate) is bent and has a 1/2 inch crack in the stiffener to web weld (see photo 22 and the repair report). b) Stiffener at diaphragm 3 has a 1 inch long tear at the bottom (see photo 23 and the repair report). c) 6th stiffener from Pier 4 has a 1/2 inch long tear at the bottom (see photo 24 and the repair report).								
205	Re Conc Column	16.00	each	2.00	15	1	0	0
4 Concrete square columns per pier on spread footings. 1. Piers have insignificant horizontal, vertical and random cracks.								
1080	Delamination/Spall/Patched Area	1.00	each	2.00	0	1	0	0
Pier 2, Column 2, has an edge spall 10" x 3" x 0.25" with scrape marks (see photo 26).								
215	Re Conc Abutment	115.00	ft	2.00	70	41	4	0
Concrete stub abutments on steel H-piles. Concrete dados and wingwalls. 1. Abutments have water stains (see photos 10 & 17). 2. Wingwalls have insignificant random cracks.								
1120	Efflorescence/Rust Staining	3.00	ft	2.00	0	3	0	0
1. Abutments have insignificant to moderate vertical and horizontal cracks with efflorescence.								
1130	Cracking (RC and Other)	42.00	ft	2.00	0	38	4	0
1. Abutment caps and backwalls have insignificant to wide vertical and horizontal cracks. 2. North abutment cap has a wide horizontal crack on the cap face (see photo 19).								
234	Re Conc Pier Cap	213.00	ft	2.00	198	15	0	0
Concrete caps on 4 square columns at each pier.								
1080	Delamination/Spall/Patched Area	1.00	ft	2.00	0	1	0	0
1. Pier 4 cap, Bay 2, has two 3" diameter spalls.								
1130	Cracking (RC and Other)	14.00	ft	2.00	0	14	0	0
1. Pier caps have insignificant to moderate horizontal, vertical and random cracks (see photo 27). 2. Pier cap 4 on the north side of the pedestal at bearing 1 has a wide vertical cracks.								

BRIDGE GROUP

Inspection Report

Structure No. : 01150 Structure Name : Dirk Lay Rd UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR Dirk Lay Rd Inspection Type : In-Depth
 MP : 181.44 Agency : ADOT Inspection Date : Sunday, May 31, 2020
 ADOT District : Southcentr Next Insp. Due By : May 2022

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
304	Open Expansion Joint	96.00	ft	2.00	15	81	0	0
Sliding steel plates at abutments. 1. Sliding plates joints have surface rust (see photos 5 and 7). 2. Joint openings measured at 93 degrees F: South Abutment: West side 2-1/8 inches; East side 1-7/8 inches North Abutment: West side 2 inches; East side 1-3/4 inches								
2350	Debris Impaction	81.00	ft	2.00	0	81	0	0
1. Joints are partially filled with debris.								
311	Moveable Bearing	16.00	each	2.00	6	7	3	0
Rocker bearings at abutments and Pier 1 and Pier 4. 1. Rocker bearings were measured at the following locations and temperatures: South abutment measured at 81 degrees F: G1 = 5 degrees (Exp); G2 = 0 degrees ; G3 = 0 degrees; G4 = 1 degree (Exp) Pier 1 measured at 81 degrees F: G1 = 0 degrees; G2 = 0 degrees ; G3 = 0 degrees; G4 = 0 degrees Pier 4 measured at 102 degrees F: G1 = 1 degree (Exp); G2 = 1 degree (Exp); G3 = 1 degree (Exp); G4 = 1 degrees (Exp) North abutment measured at 106 degrees F: G1 = 5 degree (Exp); G2 = 7 degrees (Exp); G3 = 10 degrees (Exp); G4 = 8 degrees (Exp)								
1000	Corrosion	5.00	each	2.00	0	5	0	0
1. There is peeling paint and surface rust at most of the exterior girder bearings (see photo 12). 2. There is minor rust packing in all masonry plates at both abutments and piers (see photos 11, 12, 15, and 16).								
2220	Alignment	5.00	each	2.00	0	2	3	0
1. The rockers at girders 1, 2, 3, & 4 of the north abutment exhibit large rotations that appear to be approaching the limit of the bearings (see photo 11 and the repair report). 2. The rocker at girder 1 of the south abutment exhibits large rotation that appears to be approaching the limit of the bearing (see photo 16 and the repair report).								
313	Fixed Bearing	8.00	each	2.00	4	4	0	0
Fixed steel bearings at Pier 2 and Pier 3.								
1000	Corrosion	4.00	each	2.00	0	4	0	0
1. Peeling paint and surface rust at most of the exterior girder bearings (see photo 13). 2. Minor rust packing in all masonry plates at both abutments and piers (see photo 14).								
321	Re Conc Approach Slab	268.00	sq.ft	2.00	28	240	0	0
Concrete approach slabs and AC roadway.								
1130	Cracking (RC and Other)	140.00	sq.ft	2.00	0	140	0	0
1. Approach slabs have insignificant to moderate longitudinal and random cracks.								
4000	Settlement	100.00	sq.ft	2.00	0	100	0	0
1. Approach slabs have minor to moderate settlement at the corners near the roadway shoulder and the approach roadway transition (see photo 7).								
330	Metal Bridge Railing	940.00	ft	2.00	934	6	0	0
H-1-1 tube rail on parapet. W-beam transitions not attached to dados, all 4 corners.								
1020	Connection	6.00	ft	2.00	0	6	0	0
1. There are two locations with loose connections listed below (see photo 9 and the maintenance report): a. (1) North metal rail near pier 2. b. (1) South metal rail near pier 2.								
331	Re Conc Bridge Railing	940.00	ft	2.00	705	235	0	0
Concrete parapet with H-1-1 tube rail on top. W-beam transitions not attached to dados, all 4 corners.								
1130	Cracking (RC and Other)	235.00	ft	2.00	0	235	0	0
1. Parapets have insignificant to moderate vertical cracks throughout.								

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-1.JPG
 Description : Roadway ID LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-2.JPG
 Description : Elevation ID LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-3.JPG

Description : Typical Deck

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-4.JPG

Description : Typical Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		

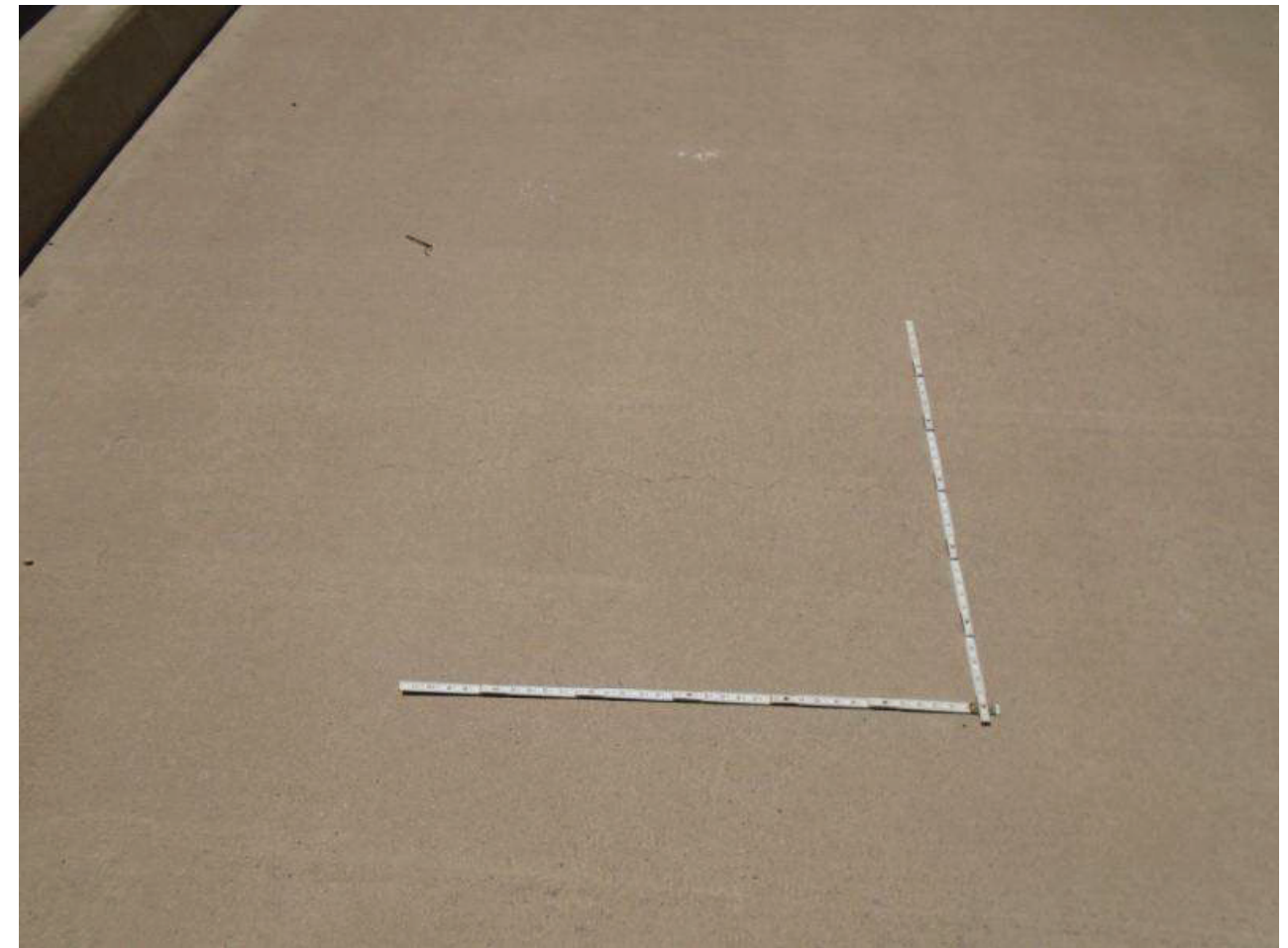


File Name : 01150-2020-05-31-Photo-5.JPG
 Description : Typical Joint, S Joint LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-6.JPG
 Description : Typical Deck Cracking

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-7.JPG
 Description : Overgrowing Vegetation, N Approach, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-8.JPG
 Description : Typical Missing Nuts, End of Metal Railing

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-9.JPG
 Description : Typical Missing Nuts, Intermediate Metal Railing Support

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-10.JPG
 Description : N Abutment, LNW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-11.JPG

Description : N Abutment, Bearing 4, LNw

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



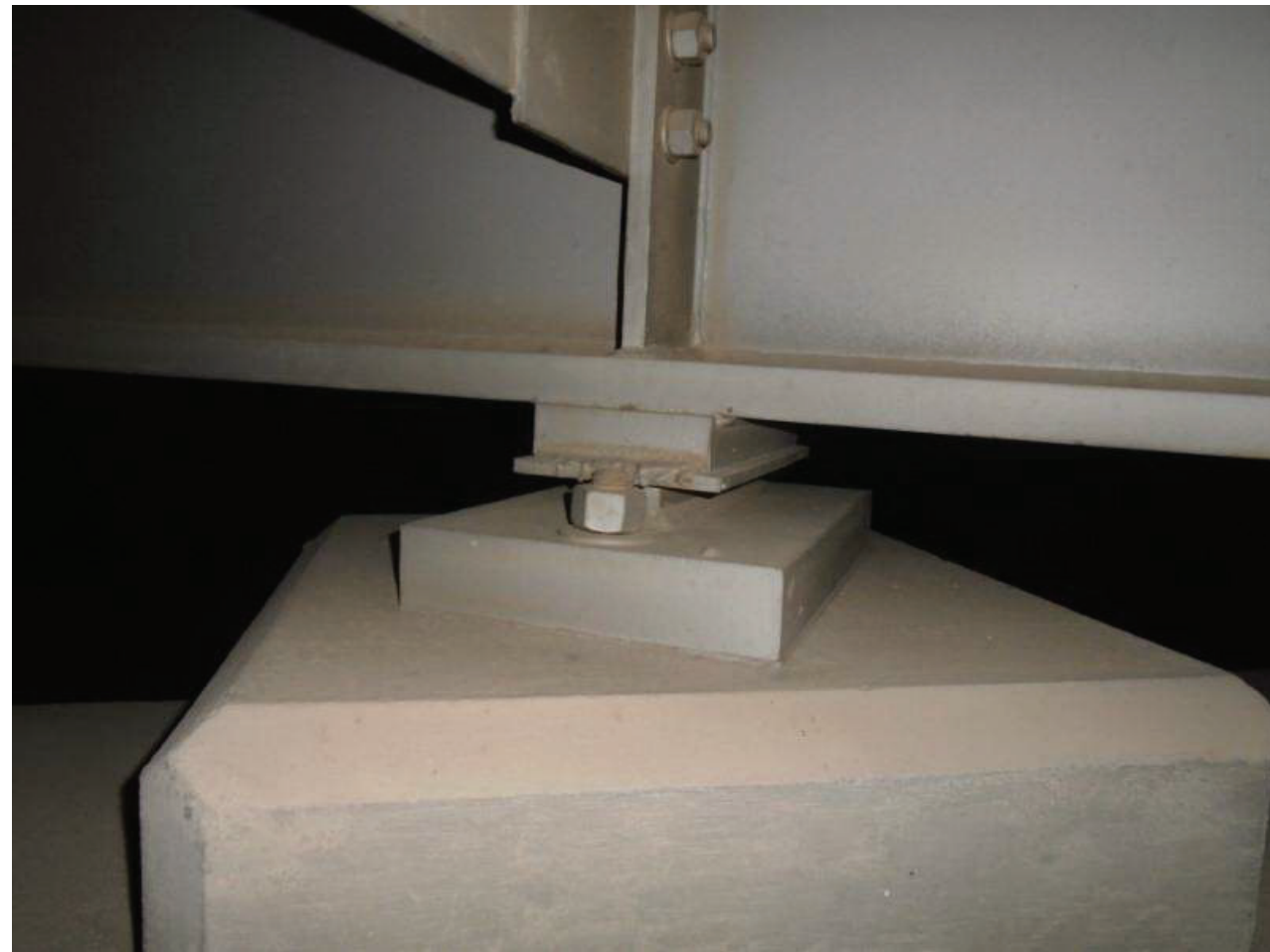
File Name : 01150-2020-05-31-Photo-12.JPG

Description : Pier 4, Bearing 4, Surface Corrosion, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-13.JPG
 Description : Pier 3, Typical Bearing Condition, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-14.JPG
 Description : Pier 2, Typical Bearing Condition, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type :	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-15.JPG

Description : Pier 1, Typical Bearing Condition, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type :	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-16.JPG

Description : S Abutment, Bearing 1, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type :	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-17.JPG

Description : S Abutment, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type :	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-18.JPG

Description : Typical Diaphragm

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-19.JPG
 Description : Wide Map Cracks, East End of North Abutment, LNW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-20.JPG
 Description : Scrape Marks, Bottom Flange, Girder 4, Over WB Right Lane, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-21.JPG

Description : Bent Stiffener/Bottom Flange Dent, Span 4, Girder 2, Bay 2, Near N Field Splice, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-22.JPG

Description : Bent Stiffener/Typical Surface Corrosion on Splice Plate, Span 4, Girder 2, Bay 2, Near N Field Splice, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type :	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-23.JPG
 Description : Bent Diaphragm Stiffener, Span 4, Girder 2, Bay 2, LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type :	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District :	Southcentral			Next Insp. Due By :	05/31/2022



File Name : 01150-2020-05-31-Photo-24.JPG
 Description : Cracked Diaphragm Stiffener, Span 4, Girder 2, Bay 2, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-25.JPG
 Description : Impact Damage, Span 2, Girder 4, Over Left Lane, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01150	Structure Name :	Dirk Lay Rd UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR Dirk Lay Rd	Inspection Type:	In-Depth
MP :	181.44	Agency :	ADOT	Inspection Date :	Sunday, May 31, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/31/2022		



File Name : 01150-2020-05-31-Photo-26.JPG
 Description : Spall with Scrape Marks, Pier 2, Second Column from East, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01150	Structure Name : Dirk Lay Rd UP	Inspected by : AECOM-Muthart/Hatch
Route : 10	Road Name : IRR Dirk Lay Rd	Inspection Type: In-Depth
MP : 181.44	Agency : ADOT	Inspection Date : Sunday, May 31, 2020
ADOT District: Southcentral		Next Insp. Due By : 05/31/2022



File Name : 01150-2020-05-31-Photo-27.JPG
 Description : Vertical Cracks, Pier 3 Cap, at Column 4, LN

Arizona Department of Transportation
BRIDGE GROUP
 SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
 VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

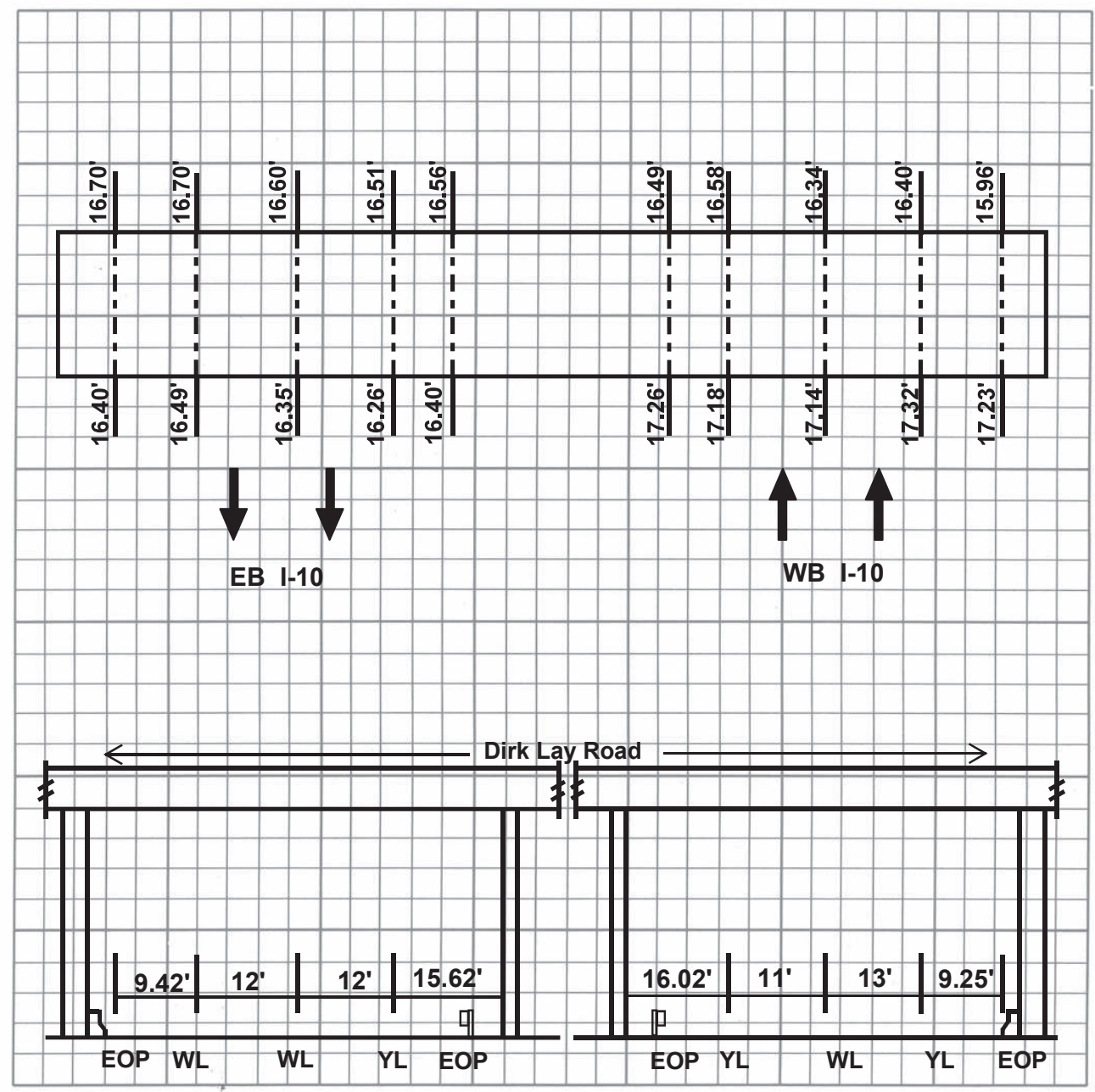
STRUCTURE NAME **Dirk Lay Rd UP**

STRUCTURE NO. **1150**

LOCATION **I-10 181.44**
 ROUTE MILEPOST

Min Vertical Clearance
WB: 16.34'
EB: 16.26'

INSPECTION				
DATE	5/31/20			
INITIAL	BM/AH			
NEW / REVISED DIAGRAM	Rev			



64-4505 R07/06

BRIDGE GROUP

Structure Inventory and Appraisal

Structure Number : 01151 Structure Name : Hwy 387 TI UP Feature Under : I-10
Route : 10 MP : 185.26 Road Name : IRR SR 387 Agency: ADOT Location : 9.5 mi SE Jct SR 587

Table with multiple sections: LOCATION INFORMATION, DIMENSIONS, PROPOSED IMPROVEMENTS, INVENTORY ROUTE DATA, VERTICAL & HORIZONTAL CLEARANCE, SERVICE, TYPE, and SPAN INFORMATION, INSPECTION, CONDITION RATINGS, CRITICAL FEATURES, APPRAISAL RATINGS, BRIDGE SCOUR DATA, LOAD, RATE, and POST, RESPONSIBILITY, NAVIGATION, GENERAL DATA.

BRIDGE GROUP

Bridge Maintenance Report

Structure Number : 01151 Structure Name : Hwy 387 TI UP Inspected by : AECOM-Muthart/Hatch
Route : 10 Road Name : IRR SR 387 Inspection Type: In-Depth
MP : 185.26 Agency : ADOT Inspection Date : Friday, May 22, 2020
ADOT District: Southcentral Next Insp. Due By : May 2022

Table with Work Candidate ID, Action, Estimated Quantity, Estimated Cost, A212 - Repair Priority, and a description of the repair work.

Table with Work Candidate ID, Action, Estimated Quantity, Estimated Cost, A212 - Repair Priority, and a description of the repair work.

BRIDGE GROUP

Inspection Report

Structure No.: 01151 Structure Name: Hwy 387 TI UP Inspected by: AECOM-Muthart/Hatch
Route: 10 Road Name: IRR SR 387 Inspection Type: In-Depth
MP: 185.26 Agency: ADOT Inspection Date: Friday, May 22, 2020
ADOT District: Southcentral Next Insp. Due By: May 2022

NBI Condition Ratings

N58 Deck :	6 Satisfactory	N61 Channel:	N N/A (NBI)
N59 Superstructure :	7 Good	N62 Culvert :	N N/A (NBI)
N60 Substructure :	7 Good		

Appraisal Ratings

N67 Structural Evaluation:	7 Above Min Criteria	N71 Waterway Adequacy:	N Not applicable
N68 Deck Geometry:	4 Tolerable	N72 Approach Roadway Align.:	7 Above Min Criteria
N69 Vert. & Horiz. Clearances:	4 Tolerable	N113 Scour Critical:	N Not Over Waterway

Inspection Notes

- This was an in-depth inspection by AECOM under Task Order 4 of contract #2019-10.01.
- The bridge was inspected during daytime and nighttime hours. The bridge was accessed using a bucket truck with phased single lane closures on I-10.
- Roadway:
 - AC approach roadway has insignificant to moderate transverse and longitudinal cracks and minor rutting.
 - Transitions are uneven.
 - The approach curb along northeast dado is broken.
 - The w-beam approach guardrails are stiffened with square end treatments.
 - The southwest approach barrier has a 10' x 9" x 0.25" spall/scaling area on the south face (see photo 9).
 - The end of southwest approach barrier has a 14" x 9" x 9" spall with exposed rebar.
 - The end of northwest approach barrier has a 12" x 9" x 2" spall.
 - The NW approach guardrail has damaged spacer blocks located at post 1, 2, 4, and 5 from bridge (see photo 7 and the maintenance report).
- Fills:
 - The slope protection is concrete paving.
 - There are insignificant to wide random cracks in the slope paving at both abutments.
 - Top of slope paving at SW & NE corner has wide cracks.
 - There are moderate erosion gullies in the embankment fill at the north end on both sides of the roadway.
- Clearance:

Minimum vertical clearances, measured under the structure, are 16.61 feet and 16.62 feet for WB and EB traffic respectively (see attached vertical clearance diagram). Therefore, no posting of vertical clearance sign is required per ADOT's signing policy.
- Maintenance Items:

There are no previously recommended maintenance items to verify. There are two new maintenance items added from this inspection (see maintenance report).
- Repair Items:

There are no previously recommended repairs to verify and no new repairs are added from this inspection.
- Photos:

See attached Inspection Report Supplement.

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
12	Re Concrete Deck	10,102.00	sq.ft	2.00	5206	3048	1848	0
Top deck is bare concrete. Concrete overhangs.								
1090	Exposed Rebar	1.00	sq.ft	2.00	0	1	0	0
1. There is honeycombing with exposed rebar in soffit between Girder 2 and Girder 3 in Span 3 near Pier 2 (see photo 21).								
1120	Efflorescence/Rust Staining	15.00	sq.ft	2.00	0	15	0	0
1. Deck underside has a few insignificant to moderate transverse cracks with efflorescence (see photo 22).								
1130	Cracking (RC and Other)	4,880.00	sq.ft	2.00	0	3032	1848	0
1. Deck concrete surface has insignificant to wide transverse and map cracks (see photo 6).								
107	Steel Opn Girder/Beam	1,138.00	ft	2.00	1138	0	0	0
4 Span continuous; 4 Steel plate girders with field splices. Secondary members: staggered cross bracing made of angles bolted to stiffener plates.								
1. This bridge is considered North/South. The spans are numbered from South to North. The girders are numbered from West to East.								
2. There are no fracture critical members on this structure. No non-destructive testing was performed.								
3. Span 2, Girder 3 – The 7th stiffener from Pier 1 (north of field splice) is slightly bent at mid-height (see photo 19).								
4. Pier 2 - Diaphragm between Girder 3 and 4, misaligned bolt hole in gusset plate at Girder 3 (see photo 18).								
5. Span 3, Girder 3 – There are a few minor scrapes over the Westbound right lane.								

BRIDGE GROUP

Inspection Report

Structure No.: 01151 Structure Name: Hwy 387 TI UP Inspected by: AECOM-Muthart/Hatch
Route: 10 Road Name: IRR SR 387 Inspection Type: In-Depth
MP: 185.26 Agency: ADOT Inspection Date: Friday, May 22, 2020
ADOT District: Southcentr Next Insp. Due By: May 2022

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
515	Steel Protective Coating	12,246.00	sq.ft	2.00	8688	1186	1186	1186
Painted steel girders.								
1. Span 2, Girder 1 - The splice plate has areas of chipping and peeling paint (see photo 20).								
2. Span 2, Girder 1 – There are four small areas of paint peeling on the bottom flange over the right shoulder.								
3. Span 2, Girder 1 and 4 - There are areas of chipped paint on the bottom flange.								
4. Span 3, Girder 4 – There are five spots of paint peeling off the web near Pier 2 due to sign mounting. Similar in Span 2 at Girder 1.								
205	Re Conc Column	12.00	each	2.00	12	0	0	0
4 Square concrete columns with cap per pier on spread footings								
1. No defects noted on the concrete columns.								
215	Re Conc Abutment	82.00	ft	2.00	55	24	3	0
Concrete stub abutments on H-piles. Concrete wingwalls and dados.								
1. There are insignificant to moderate vertical and horizontal cracks in the wingwalls.								
2. Backwalls have water stain marks.								
3. There is water leakage stains on the backwall and abutment cap (see photos 10 and 16).								
1120	Efflorescence/Rust Staining	6.00	ft	2.00	0	6	0	0
1. Abutment backwalls and seats have insignificant to moderate vertical and horizontal cracks with efflorescence.								
1130	Cracking (RC and Other)	15.00	ft	2.00	0	12	3	0
1. Abutment backwalls and seats have insignificant to moderate vertical and horizontal cracks.								
234	Re Conc Pier Cap	121.00	ft	2.00	121	0	0	0
Concrete cap on 4 Square columns.								
1. There are minor insignificant vertical cracks in pier caps at exterior columns.								
304	Open Expansion Joint	69.00	ft	2.00	61	8	0	0
Sliding steel plate joints at abutments.								
1. Deck joint openings measured at 90 degrees F:								
South Abutment: West side 2-3/8 inches; East side 2-1/2 inches								
North Abutment: West side 2-1/2 inches; East side 2 inches								
2350	Debris Impaction	8.00	ft	2.00	0	8	0	0
1. Joint openings are partially filled with AC and debris.								
311	Moveable Bearing	16.00	each	2.00	6	10	0	0
Steel rocker bearings at Abutments and Piers 1 and 3.								
1. No defects noted on the abutment rockers.								
2. Rocker bearing measurements were taken at the follow locations and temperatures (see photos 11, 12, 14, and 15).								
South abutment measured at 84 degrees F: G1 = 2 degrees (Exp); G2 = 0 degrees; G3 = 1 degree (Exp); G4 = 0 degrees								
Pier 1 measured at 84 degrees F: G1 = 1 degrees (Exp); G2 = 1 degrees (Exp); G3 = 0 degrees; G4 = 0 degrees								
Pier 3 measured at 70 degrees F: G1 = 0 degree; G2 = 1 degree (Con); G3 = 0 degrees; G4 = 0 degrees								
South abutment measured at 70 degrees F: G1 = 3 degrees (Exp); G2 = 1 degree (Exp); G3 = 1 degree (Exp); G4 = 3 degrees (Exp)								
1000	Corrosion	10.00	each	2.00	0	10	0	0
1. Bearings have some surface corrosion.								
2. There is minor rust packing in the masonry plates at Pier 1.								
313	Fixed Bearing	4.00	each	2.00	2	2	0	0
Fixed steel bearings at Pier 2.								
1. Fixed bearings at interior girders are in good condition.								
1000	Corrosion	2.00	each	2.00	0	2	0	0
1. Exterior bearings have some surface corrosion.								
2. There is surface corrosion on some of the sole plates at Pier 2 (see photo 13).								

BRIDGE GROUP

Inspection Report

Structure No. : 01151 Structure Name : Hwy 387 TI UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR SR 387 Inspection Type: In-Depth
 MP : 185.26 Agency : ADOT Inspection Date : Friday, May 22, 2020
 ADOT District: Southcentra Next Insp. Due By : May 2022

Element No.	Element Description	Quantity	Units	Env.	Condition State			
					1	2	3	4
321	Re Conc Approach Slab	560.00	sq.ft	2.00	560	0	0	0
Concrete approach slabs with AC overlay and AC roadways. 1. The approach slabs are covered by an AC wearing surface and are not visible for inspection. 2. The condition states are retained from the previous inspection.								
510	Wearing Surfaces	560.00	sq.ft	2.00	560	0	0	0
1. No defects noted on the AC wearing surface.								
331	Re Conc Bridge Railing	574.00	ft	2.00	0	574	0	0
32 inch concrete barrier; guardrail transition stiffened and connected to barrier 1. Both barriers have graffiti visible to the traveling public (see photo 8 and the maintenance report).								
1080	Delamination/Spall/Patched Area	2.00	ft	2.00	0	2	0	0
1. West side barrier over Span 1 has a 2' x 6" x 0.5" edge spall.								
1130	Cracking (RC and Other)	572.00	ft	2.00	0	572	0	0
1. There are insignificant longitudinal and vertical cracks of heavy density in both barriers.								

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01151 Structure Name : Hwy 387 TI UP Inspected by : AECOM-Muthart/Hatch
 Route : 10 Road Name : IRR SR 387 Inspection Type: In-Depth
 MP : 185.26 Agency : ADOT Inspection Date : Friday, May 22, 2020
 ADOT District: Southcentral Next Insp. Due By : 05/22/2022



File Name : 01151-2020-05-22-Photo-1.JPG

Description : Roadway ID LSW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



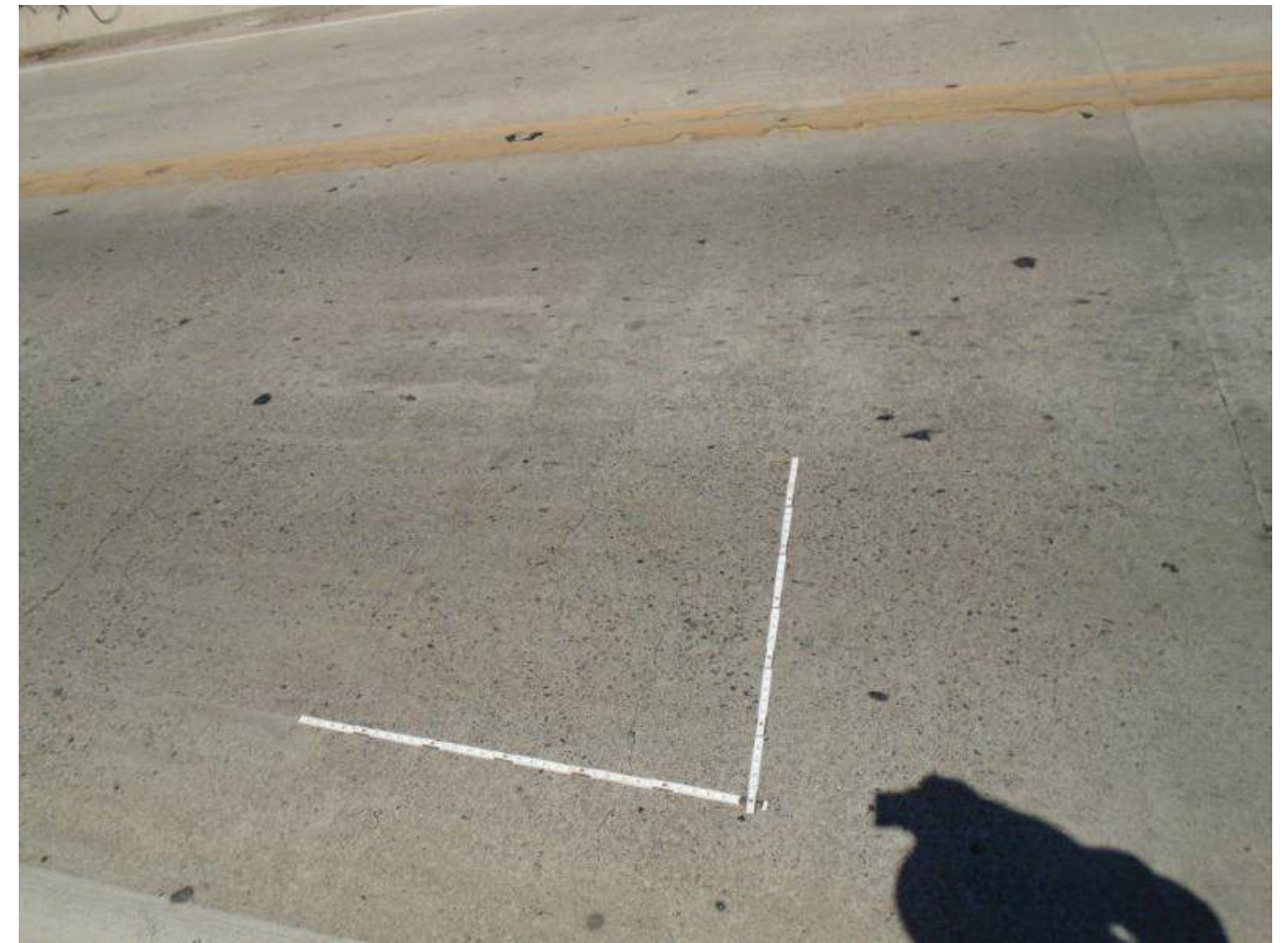
File Name : 01151-2020-05-22-Photo-2.JPG

Description : Elevation ID LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-3.JPG

Description : Typical Deck

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-4.JPG

Description : Typical Soffit

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



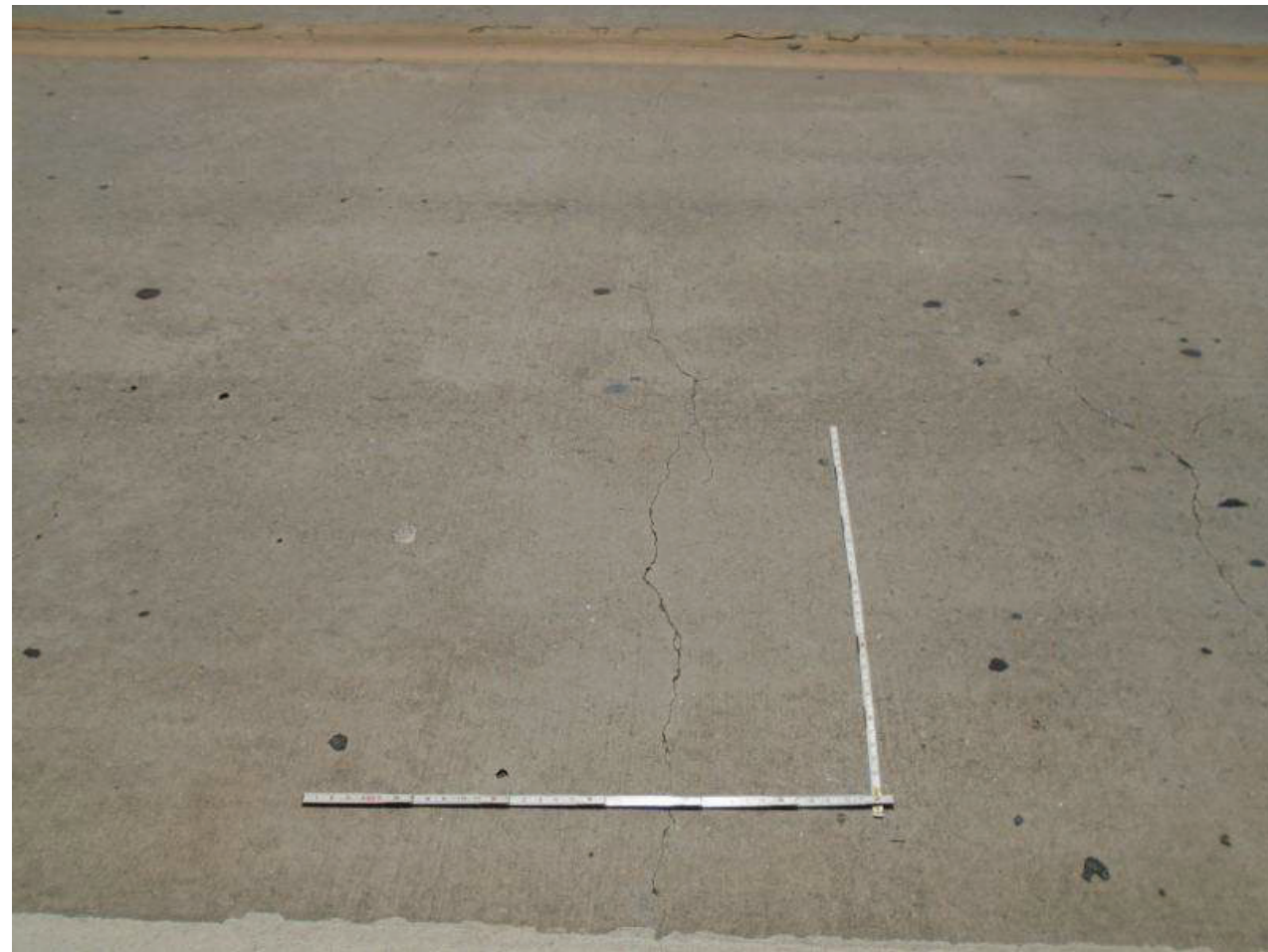
File Name : 01151-2020-05-22-Photo-5.JPG

Description : Typical Joint, S Joint LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type :	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-6.JPG

Description : Typical Deck Cracking

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type :	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-7.JPG

Description : Damaged Spacer Blocks, NW Approach Railing, LNE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-8.JPG
 Description : Typical Graffiti, Concrete Bridge Barrier

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-9.JPG
 Description : Scaling, SE Approach Transition Railing, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type :	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-10.JPG

Description : S Abutment, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type :	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-11.JPG

Description : S Abutment, Typical Bearing, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/22/2022



File Name : 01151-2020-05-22-Photo-12.JPG

Description : Pier 1, Typical Bearing, LSE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/22/2022



File Name : 01151-2020-05-22-Photo-13.JPG

Description : Pier 2, Typical Bearing, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/22/2022



File Name : 01151-2020-05-22-Photo-14.JPG

Description : Pier 3, Typical Bearing, LNW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral			Next Insp. Due By :	05/22/2022



File Name : 01151-2020-05-22-Photo-15.JPG

Description : N Abutment, Typical Bearing, LNW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



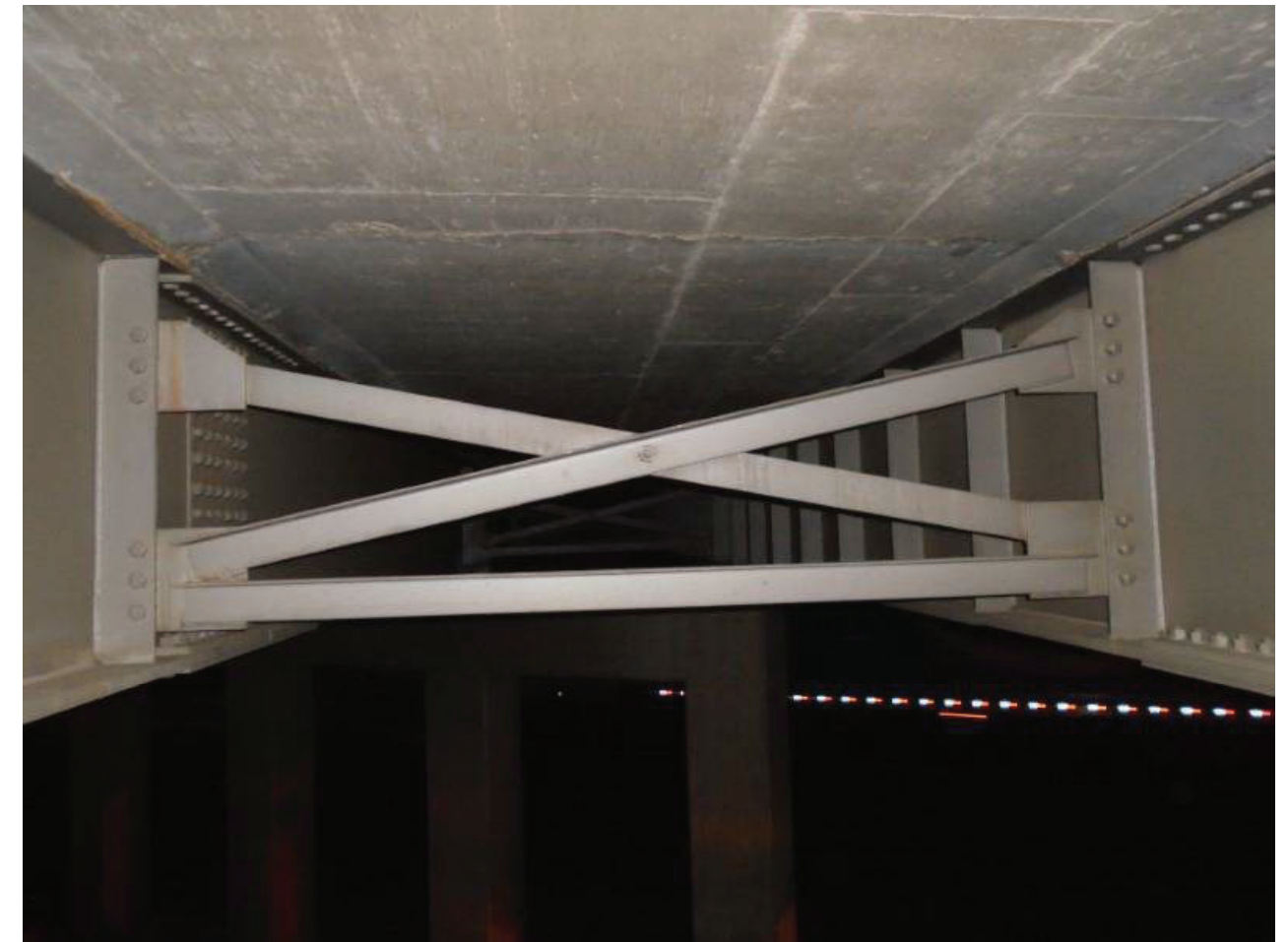
File Name : 01151-2020-05-22-Photo-16.JPG

Description : N Abutment, LNW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-17.JPG

Description : Typical Diaphragm

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-18.JPG
 Description : Misaligned Diaphragm Bolt Hole, Girder 3, N Side of Pier 2, LS

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type:	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District:	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-19.JPG
 Description : Bent Stiffener, 7th From Pier 1, LE

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type :	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/22/2022		

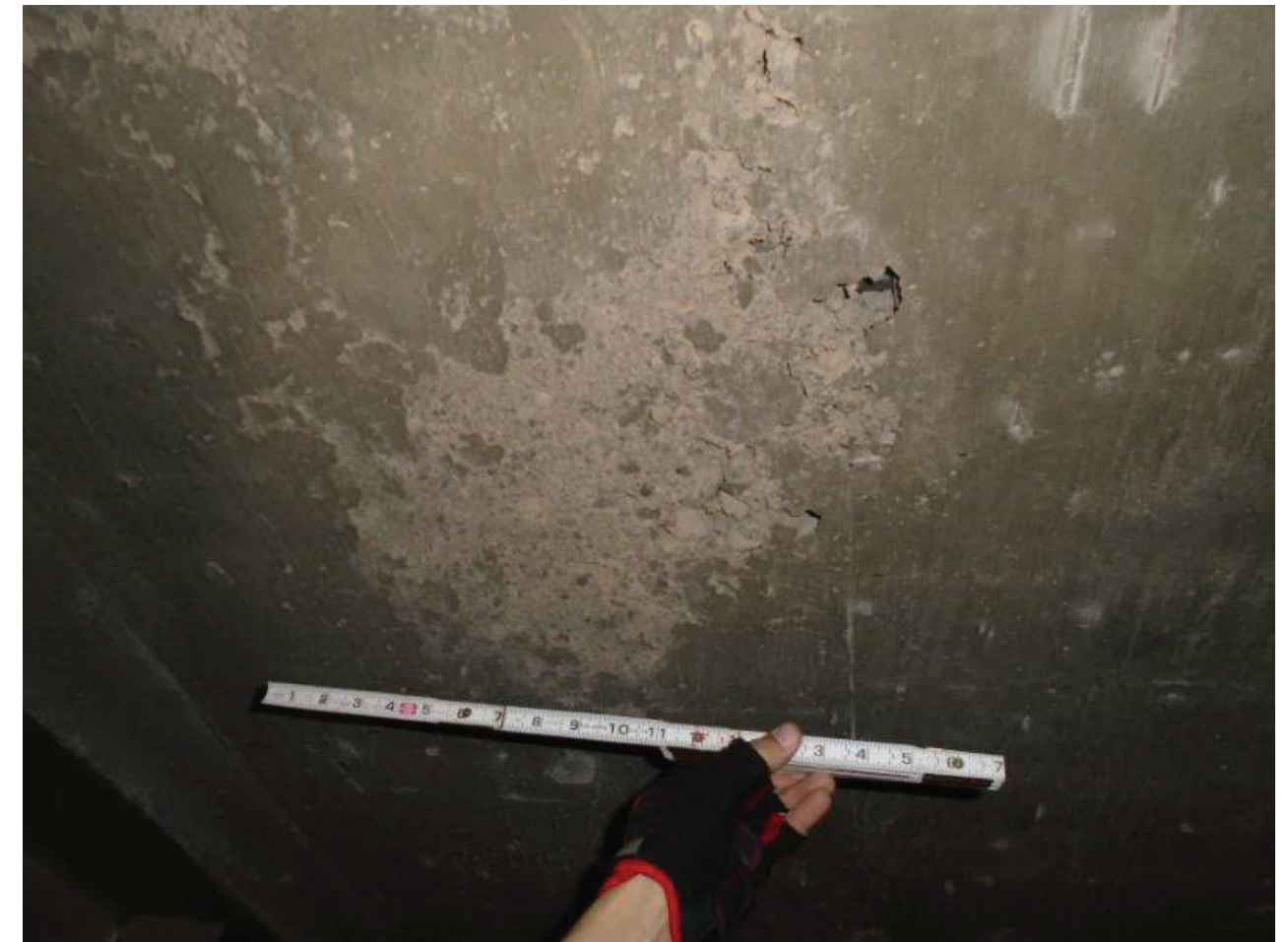


File Name : 01151-2020-05-22-Photo-20.JPG
 Description : Typical Chipping Paint, Girder 1, Span 2, LW

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number :	01151	Structure Name :	Hwy 387 TI UP	Inspected by :	AECOM-Muthart/Hatch
Route :	10	Road Name :	IRR SR 387	Inspection Type :	In-Depth
MP :	185.26	Agency :	ADOT	Inspection Date :	Friday, May 22, 2020
ADOT District :	Southcentral	Next Insp. Due By :	05/22/2022		



File Name : 01151-2020-05-22-Photo-21.JPG
 Description : Soffit Honeycombing with Exposed Rebar, Span 3, Bay 2, N of Pier 2, LN

BRIDGE GROUP

Bridge Inspection Photographs

Structure Number : 01151	Structure Name : Hwy 387 TI UP	Inspected by : AECOM-Muthart/Hatch
Route : 10	Road Name : IRR SR 387	Inspection Type: In-Depth
MP : 185.26	Agency : ADOT	Inspection Date : Friday, May 22, 2020
ADOT District: Southcentral		Next Insp. Due By : 05/22/2022



File Name : 01151-2020-05-22-Photo-22.JPG
 Description : Typical Cracks with Efflorescence, Soffit Overhang

Arizona Department of Transportation
BRIDGE GROUP
 SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT
 VERTICAL & HORIZONTAL CLEARANCE DIAGRAM

STRUCTURE NAME **Hwy 387 TI UP**

STRUCTURE NO. **1151**

LOCATION **I-10 185.26**
 ROUTE MILEPOST



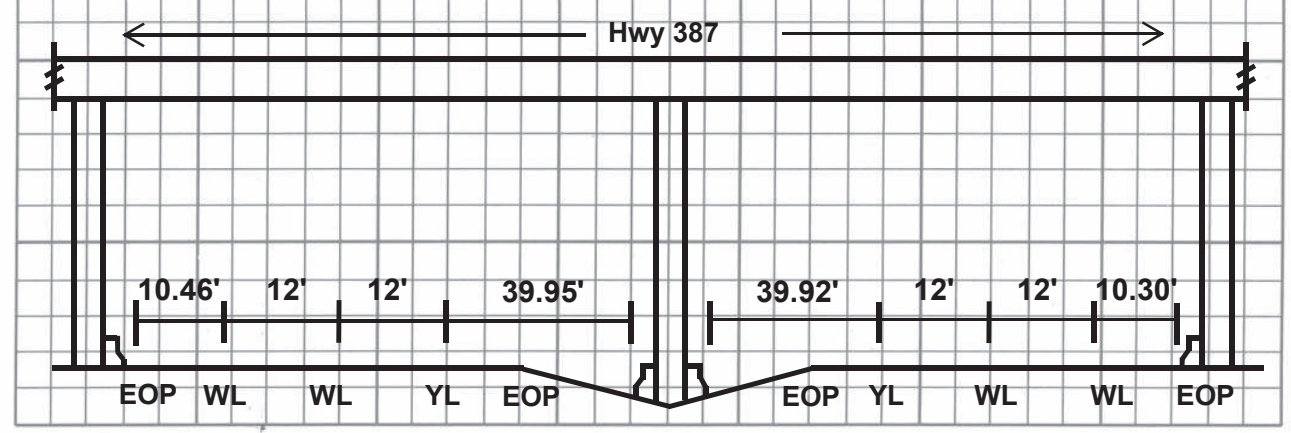
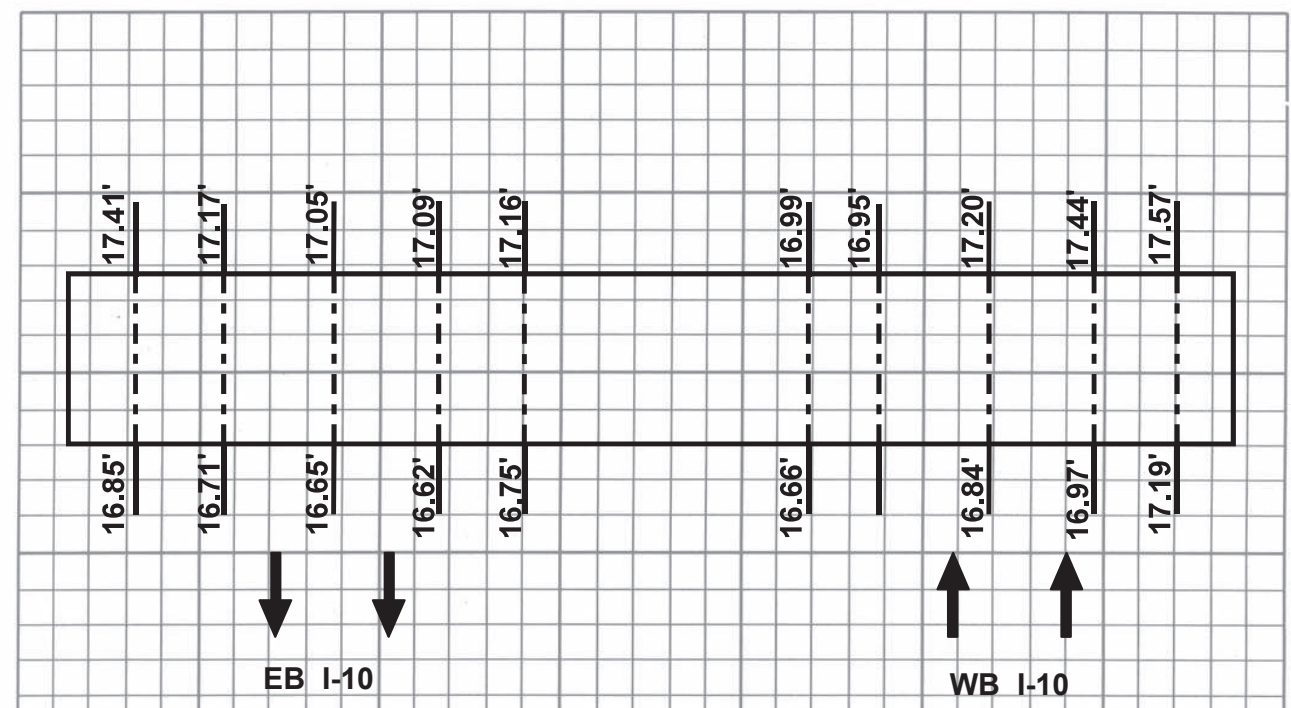
NORTH

Min Vertical Clearance

WB: **16.61'**

EB: **16.62'**

INSPECTION				
DATE	5/22/20			
INITIAL	BM/AH			
NEW / REVISED DIAGRAM	Rev			



† 64-4505 R07/06

Looking North

Appendix I. First Flush Water Quality Memo

This page is intentionally left blank.

Bombardier, Brian

Subject: FW: FW: DRAFT First Flush email

From: Carlos Lopez <clopez@azdot.gov>
Sent: Friday, September 24, 2021 3:55 PM
To: Bombardier, Brian <brian.bombardier@hdrinc.com>
Subject: Fwd: FW: DRAFT First Flush email

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

FYI

----- Forwarded message -----

From: David White <dwhite@wildhorsepass.com>
Date: Wed, Jan 13, 2021 at 9:50 AM
Subject: FW: DRAFT First Flush email
To: Quinn Castro <QCastro@azmag.gov>, Carlos Lopez <clopez@azdot.gov>
CC: Ian A. Shavitz <lshavitz@lippes.com>, Javier Ramos <Javier.Ramos@gric.nsn.us>, Timothy Oliver <Timothy.Oliver@gric.nsn.us>

Quinn/Carlos,

Per our discussion last week:

Carlos,

The Community has reviewed the First Flush Water Quality Letter prepared by the I-10 Study Team in response to Community concerns regarding I-10 Improvement Project drainage issues. Based upon our review of the Letter, it is acceptable to the Community for the project to move forward without first flush basins. Instead, the Community requests that the I-10 Study Team continue to work cooperatively with Seaver Fields to address Community flooding and drainage-related concerns.

Thank you,

David F. White, MPA
General Manager
Wild Horse Pass Development Authority
5350 N 48th Street, Suite 310
Chandler, AZ 85226
o: 520.796.2811
f: 520.796.5543
c: 480.404.0698
email: dwhite@wildhorsepass.com



I-10 | LOOP 202 TO SR-387 WILD HORSE PASS CORRIDOR

August 6, 2020

Mr. David White
General Manager
Wild Horse Pass Development Authority
5350 N. 48th Street
Chandler, AZ 85226

Subject: I-10 First Flush Water Quality over the Gila River Indian Community

During the National Environmental Policy Act (NEPA) scoping phase of the *I-10: State Route 202L to State Route 387* Environmental Assessment, the Gila River Indian Community (Community) requested that the Arizona Department of Transportation (ADOT) consider adding first flush water quality features to the proposed project improvements. In an effort to collaborate and partner with the Community to identify a comprehensive vision for Interstate 10, ADOT has evaluated the Community's request following guidance from ADOT's Post-Construction Best Practices Manual for Stormwater Quality (PCBPM). This letter summarizes the results of that evaluation, the required improvements needed to provide first flush water quality, and the associated impacts from those improvements, particularly with respect to cultural resources.

Background

I-10 was designed and constructed in the mid-1960s. Pavement water quality treatment features were not included as part of the initial construction. In general, the existing I-10 drainage infrastructure is designed as a simple "pass-through" system that conveys the sheet flow under I-10 that naturally exists across the desert floor. These pass-through culverts range in size from small metal pipes to large multi-cell concrete box culverts, the latter being used where natural flows concentrated in drainage washes. Originally, these culverts were built under each direction of the roadway with open ditches in the median connecting them, but a subsequent project, decades later, connected these culverts through the median and buried them, most likely for roadway safety reasons. No retention or detention facilities for either on- or off-site flows has ever been constructed in the I-10 corridor.

Applicable Guidance

Over the years numerous best management practices (BMP) have been developed and implemented by ADOT for post-construction stormwater pollution control. ADOT's Post Construction BMPs provide guidance in the selection, design, and maintenance of BMPs that can be implemented to comply with water quality regulatory requirements such as the Municipal Separate Storm Sewer System (MS4) Permit from the Arizona Department of Environmental Quality (ADEQ).

An MS4 is defined by the Code of Federal Regulations as a conveyance or system of conveyances owned by a state, city, town or other public body, that is designed or used for collecting or conveying stormwater and is not a combined sewer or a publicly owned treatment system. ADOT's roadways and highways statewide are considered MS4s and are regulated under a permit-based program. The permit allows ADOT to discharge stormwater runoff to Waters of the United States. The permit includes conditions that are intended to protect the quality of the receiving waters, and specifies that BMPs will be applied to treat stormwater discharges when drainage conveyances result in an outfall that is located within a quarter mile of an Outstanding Arizona Water (or OAW as defined by the ADEQ), and impaired water (as defined by the U.S. Environmental Protection Agency), or directly to another MS4. It should be noted that no OAWs or impaired water exist in the study area.

Roadways can be one source of pollution. Roadway pollutants may originate from vehicles themselves, including tire fragments and engine fluids. Additional sources may include non-vehicular sources such as litter. The term "first flush" is defined as the stormwater runoff from the first half inch of rain that falls during a storm on the pavement, which is typically the most polluted pavement discharge from a rainfall runoff event.

Site Specific Flow Characteristics

The first step in evaluating the Community's request was to fully define the on- and off-site drainage flow patterns in the corridor. Ultimately, all stormwater runoff ends up in the Gila River which bisects the project limits, either upstream (east) or downstream (west) of I-10.

On-Site Flows:

On-site drainage flows refer to rainfall stormwater that originates within the I-10 easement. For this project, these on-site flows can be categorized into three distinct types.

1. Rainfall that hits the paved surfaces within the corridor – The vast majority of I-10 through the project limits is constructed on a straight tangent. The 300-foot easement has two separate 38-foot paved roadways centered in the easement and separated by a wide open median. The pavement drains towards the easement edges (e.g.: eastbound I-10 pavement drains towards the west easement line, and the westbound I-10 pavement drains towards the east easement line). Pavement drainage does not drain towards the median.
2. Rainfall collected in the median – this category is limited to just the precipitation that hits the median and is occasionally picked up in a drainage inlet connected to one of the cross culverts and then drained outside of the easement.
3. Rainfall collected between the edges of pavement and the easement boundary fence line – this stormwater ultimately joins with the off-site flows defined below.

Off-Site Flows:

Off-site drainage flows refer to stormwater that originates outside of the I-10 easement, crosses the easement, and departs as it would have before I-10 was constructed. Based on the topography, three distinctly different off-site flow patterns were identified in the corridor.

1. State Route (SR)-202L to Gila River: Off-site flows in this segment of I-10 generally flow in a southwesterly direction using the pass-through culverts to convey flows under I-10 and ultimately to the Gila River west (downstream) of I-10.
2. Gila River to SR-587: Off-site flows in this segment of I-10 generally flow in a northwesterly direction parallel to I-10, ultimately draining into the Gila River from both sides of I-10. Very little off-site flow actually crosses I-10 in this segment, but rather, flows along the I-10 roadway embankments.
3. SR-587 to south of SR-387: Off-site flows in this segment of I-10 generally flow in a northeasterly direction using the pass-through culverts to convey flows under I-10 and ultimately to the Gila River east (upstream) of I-10.

First Flush Water Quality Treatment

This evaluation defined the appropriate water quality treatment solution for the first flush water volume from the on-site pavement surface area. All best practices (sedimentation/infiltration/filtration/biological) were reviewed and best practices outside of the state were also reviewed to ascertain if there were additional practices that may warrant consideration. This effort concluded that the most practical and feasible solution for our arid region is the sediment trap system. It does not rely on biological materials that may not be able to survive our climate and does not require intensive maintenance and costly filtration systems. Furthermore, once the runoff leaves the corridor, additional treatment is realized via the infiltration method as it passes over the desert floor, a treatment that exists today.

The cross section of I-10 is consistent throughout the corridor; therefore stormwater volume was computed for a representative length, and then applied to the balance of the corridor. Since the on-site runoff intermixes with off-site flow patterns, a water quality treatment strategy is needed that can integrate into both systems.

With the objective of staying within the existing easement limits, the best strategy involves using linear V-ditches and sediment trap treatment ponds integrated into the existing drainage system. Generally speaking, it is most efficient to apply the water quality treatment facilities to the most downstream portion of the system. Because there are three different drainage flow patterns, three different first flush treatment configurations are required. This results in the treatment facilities being applied to the west of I-10 for the segment between SR-202L and the Gila River, along both sides of I-10 between the Gila River and SR-587, and to the east of I-10 for the segment between SR-587 and SR-387.

For the purpose of this evaluation, the I-10 mainline alternative ML2 (median widening) was assumed for the evaluation. Alternative ML3 (outside widening) would be similar, except the relative location of the V-ditches and treatment ponds would shift 15 feet outward beyond the existing easement fence into the additional easement that is required for ML3 to accommodate the I-10 outside widening, with or without first flush treatment. The following before-and-after representative simulations illustrate how each of the three segments would be treated in each of the three I-10 segments.

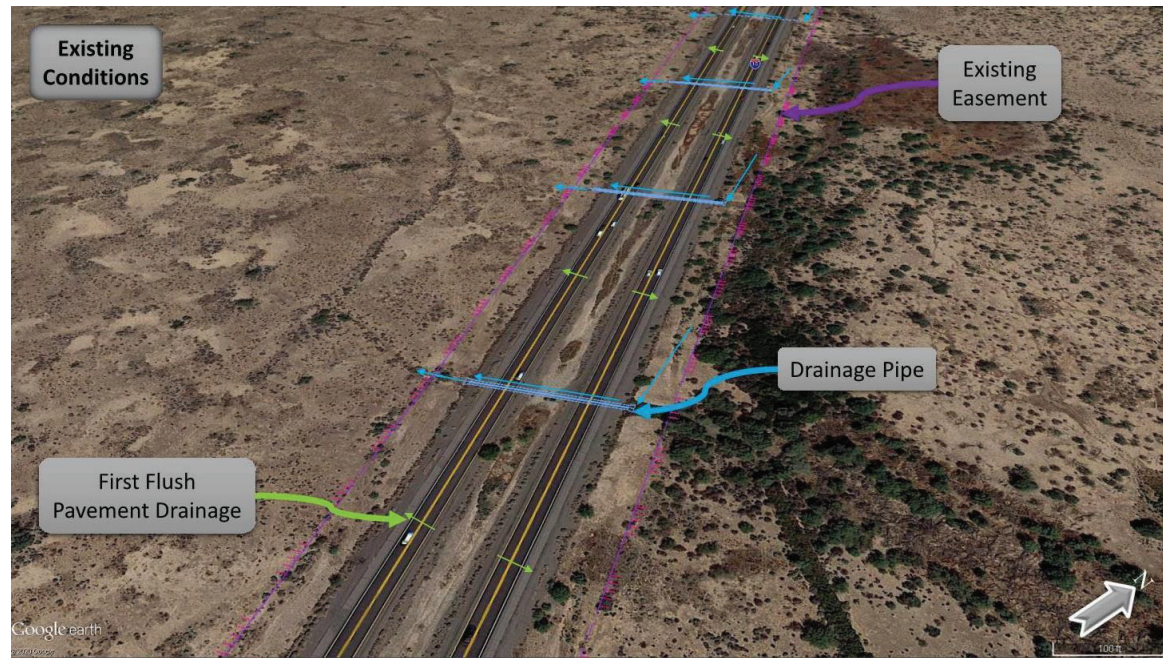


Exhibit 1a: SR-202L to Gila River – Existing Condition

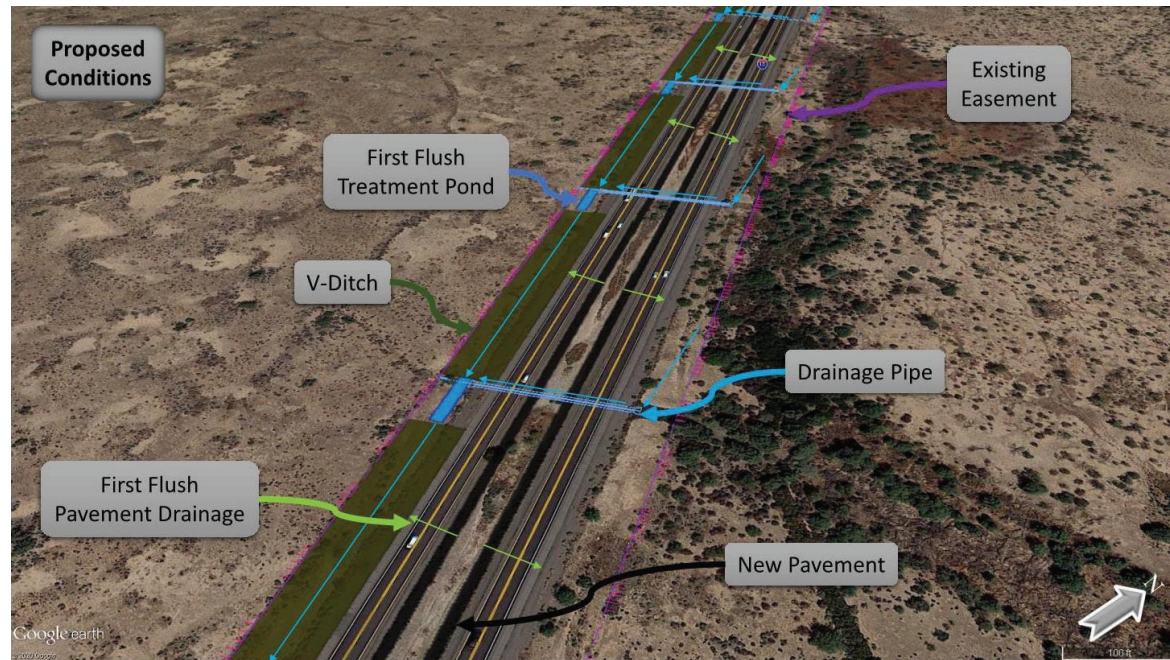


Exhibit 1b: SR-202L to Gila River – Proposed First Flush Water Quality Solution



Exhibit 2a: Gila River to SR-587 – Existing Condition

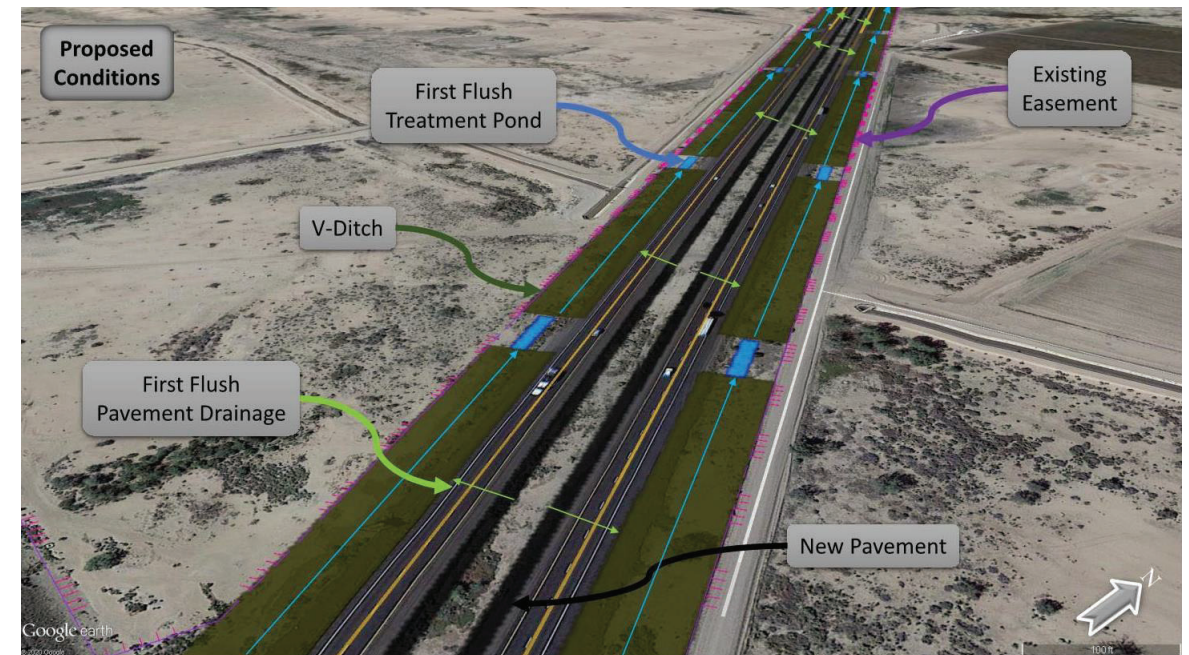


Exhibit 2b: Gila River to SR-587 – Proposed First Flush Water Quality Solution

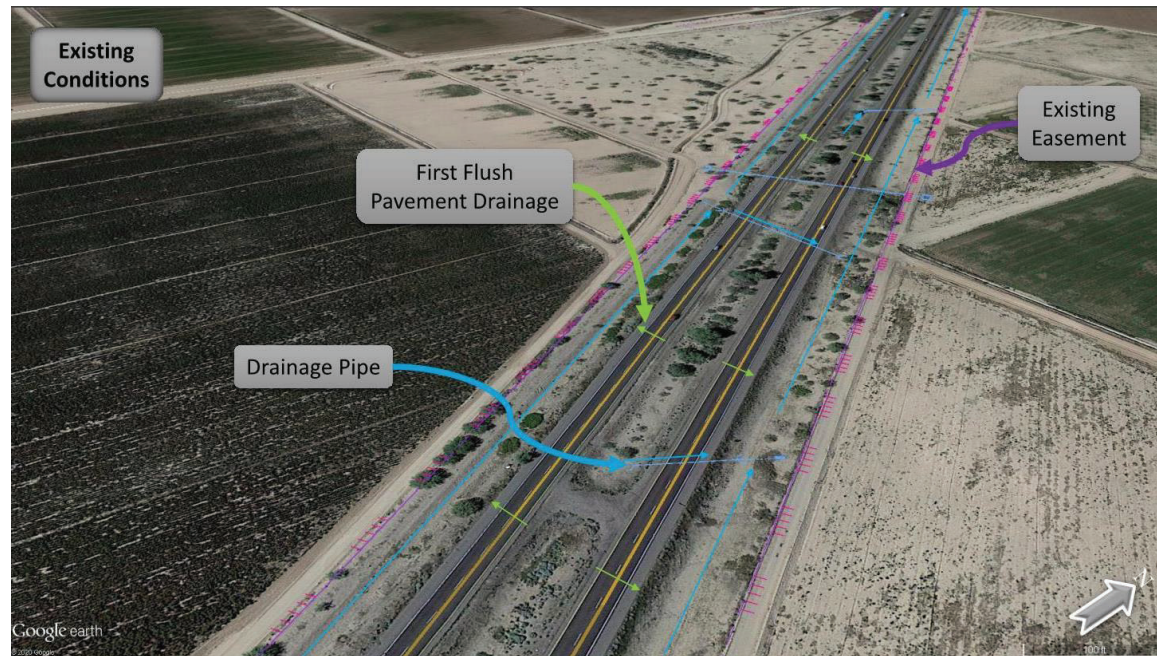


Exhibit 3a: SR-587 to South of SR-387 – Existing Condition

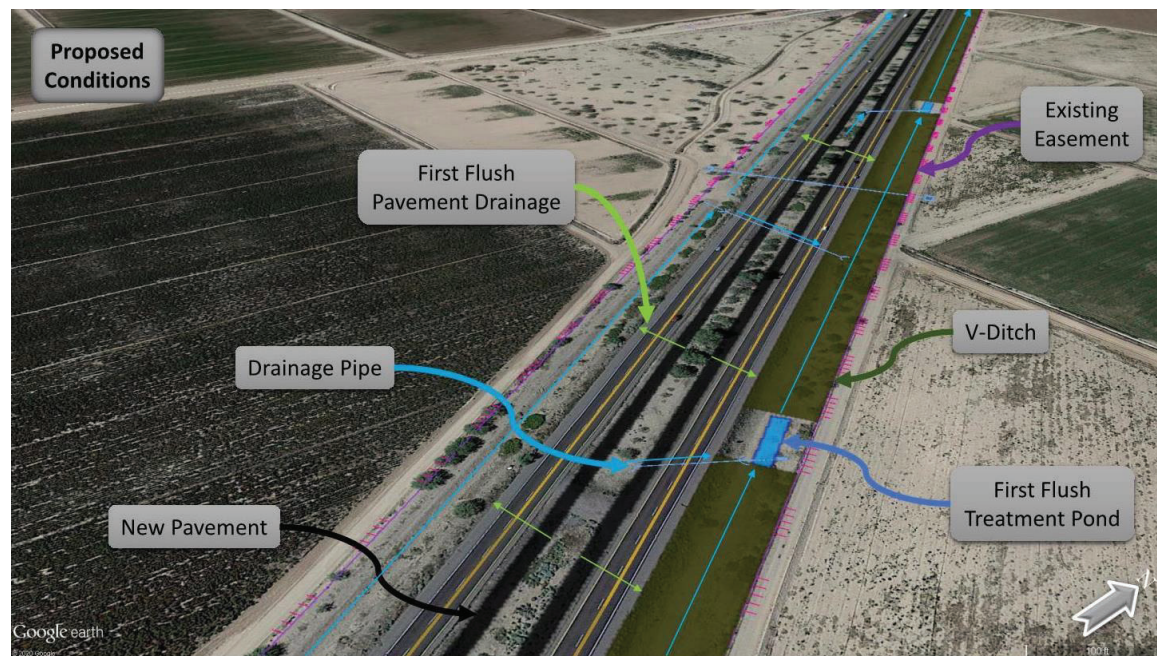


Exhibit 3b: SR-587 to South of SR-387 – Proposed First Flush Water Quality Solution

A representative schematic cross section of the V-ditch grading (depicted with the green shapes in Exhibits 1b, 2b, and 3b) is shown in Exhibit 4.

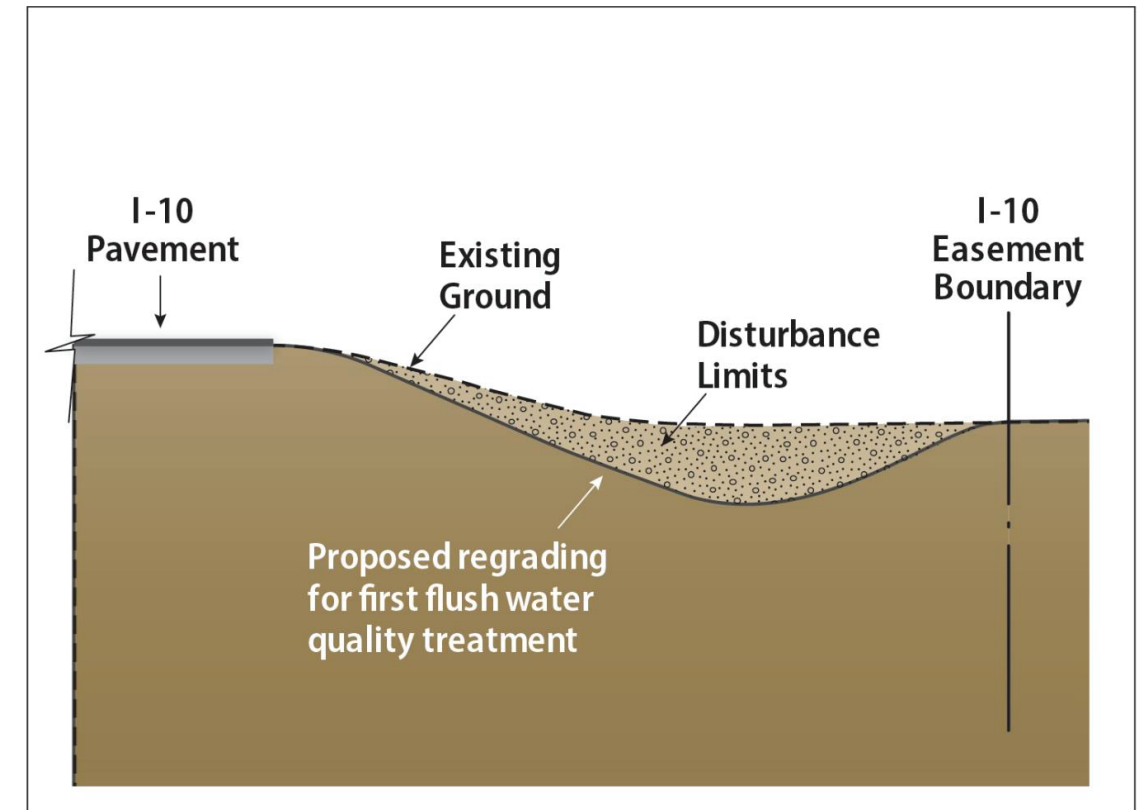


Exhibit 4: Representative cross section of the V-ditch grading

Impacts Assessment

Introduction of first flush water quality features in the corridor would provide some measure of water quality treatment as requested by the Community. However, the construction of these linear treatment features would create additional negative impacts that need to first be considered. Specifically, negative impacts are possible in two primary areas.

1. **Wildlife Movement:** The Community commented during the NEPA scoping phase of the study a desire to improve wildlife movements across the I-10 corridor. While ADOT is studying that request separately, it has been noted that the introduction of longitudinal V-ditches and treatment basins, along with the potential erosion control measures associated within the system (large dumped rocks, etc.), could present an obstacle to some wildlife movement across I-10. While certain mitigations could be introduced to help offset some of these negative impacts, the new water quality features could still introduce new obstacles, despite our best efforts.
2. **Cultural resources:** The construction of linear V-ditches and treatment ponds would require excavating below the natural ground level as shown in Figure 4. This could mean that the entire unpaved area between the edge of the freeway pavement and the easement fence may need to be cleared of vegetation to safely introduce these features along the freeway's edge. This would represent a worst-case condition. Actual excavation impacts could end up being less as a more refined grading plan is developed, but the mere presence of earthmoving

equipment in this area between the roadway edge and the easement fence may result in significant surface disturbance even if excavation limits are minimized. As a result, this worst-case condition is what is quantified for your consideration. With the three segment solutions defined above, the maximum worst-case area of disturbance associated with the water quality features for the I-10 corridor is summarized in the table below:

I-10 Segment	Length (Miles)	Maximum Water Quality Disturbance Footprint (Acres/Mile)	Total Maximum Disturbance Footprint (Acres)
SR-202L to Gila River	11.5	9.1	104.5
Gila River to SR-587	2.4	18.2	43.5
SR-587 to South of SR-387	11.2	9.1	102.0
Totals	25.1		250.0

Given the concentration of known cultural resources along the I-10 corridor, and the high probability of even more unknown cultural resources, the project team’s assessment is that the probability of impacting cultural resources with an additional 250 acres of disturbance (beyond what is needed for the I-10 improvement alternatives) is high.

Conclusion

ADOT has considered the Community’s request to incorporate first flush water quality treatment into the proposed I-10 improvements using the applicable ADOT guidance pertaining to this issue. The summary of this analysis is as follows:

- First flush water quality treatment facilities could be retrofitted to work within the 50+ year old I-10 corridor, using the applicable solution noted above depending on the location in the corridor. However, based on the requirements of ADOT’s MS4 permit from the ADEQ allowing discharge of stormwater runoff into Waters of the United States, the I-10 corridor does not meet the requirements that would mandate the implementation of first flush water quality facilities.
- If first flush water quality treatment facilities are constructed, wildlife movement across I-10 could be negatively impacted by these new linear V-ditches, treatment ponds, and erosion control elements, despite our best efforts to minimize these impacts.
- If first flush water quality treatment facilities are constructed, up to 250 acres of additional ground disturbance beyond what is needed for the proposed I-10 improvements would be required to reshape the edges of I-10 to safely accommodate this new infrastructure along the roadway edges.
- The additional 250 acres of disturbance would require the removal of all existing vegetation within that area.
- The additional 250 acres of disturbance, a large portion of which would be characterized as excavation in areas of natural and undisturbed desert, would have a high likelihood of impacting or increasing the impacts on known and unknown cultural resources.

While ADOT could accommodate the Community’s scoping comment to incorporate first flush water quality facilities into the I-10 corridor, this accommodation will likely result in additional, and potentially substantial, negative impacts to cultural resources and vegetation, and to a lesser degree wildlife movement. Based on both written and verbal feedback we have received from the Community over the course of this study, we understand that these resources are very important to the Community. Consequently, before ADOT proceeds further considering the Community’s request, we are requesting the Community’s written concurrence (an email would suffice) that you still wish to continue this discussion of incorporating water quality treatment features into the project despite the impacts tradeoffs.

ADOT is committed to protecting stormwater quality by reducing, to the maximum extent practicable, any discharge that may cause or contribute to an exceedance of any surface water quality standard (SWQC) of Arizona subject to the requirements of ADOT’s MS4 permit.

ADOT values the partnership with the Community and is available to coordinate any questions or comments that the Community may have on this document.

Sincerely,

DocuSigned by:

 49FEDF555E844FC...

Carlos Lopez, PE
 Project Manager
 Arizona Department of Transportation, Multimodal Planning Division



I-10 | LOOP 202 TO SR-387 WILD HORSE PASS CORRIDOR

To: Seaver Fields, Gila River Indian Community

From: Dan Pfeifer, HDR

CC: Carlos Lopez, ADOT, Trent Kelso, ADOT; Quinn Castro, MAG; Brian Bombardier, HDR

Date: September 1, 2020

Subject: I-10 First Flush Water Quality and Preliminary Drainage Calculations over the Gila River Indian Community

Following up on the study team's phone conversation of August 20, 2020, I have compiled the drainage and first flush water quality calculations that you requested and attached it to this project memo. You will find two figures and the draft calculations developed during our analysis of the water quality treatment facilities. All analysis is based on the ADOT Drainage Design Manuals for Hydrology/Hydraulics (2014/2007). Water quality treatment is based on ADOT's Post-Construction Best Practices Manual for Stormwater Quality. A few highlights to point out regarding the design:

- Pavement Runoff Increase – As seen in the draft calculations for the 10-year Q values for a typical mile, the pre vs. post runoff due to the increase in pavement equates to an additional 0.5 to 1.0 cfs per 500 feet along the corridor. This 500 foot separation roughly correlates to the separation of cross culverts under I-10. This pavement drainage would runoff the embankment slopes in the form of sheet flow and follow the natural grade of the surrounding terrain. By the time the runoff is conveyed to the existing crossing there would most likely be minimal, if any, change in discharge rates from the existing pipe(s). Mitigating this increase in pavement drainage would require a significant grading effort to capture and retain/detain what amounts to essentially a nuisance flow. As a result, our initial assessment would propose to ignore this increased site runoff.
- First Flush Ponds – Ponds are designed as a spreader basin for outfall hydraulics. Runoff beyond the first flush volume would simply weir over the top of the pond to be dispersed as overland flow over the natural terrain grade. These ponds would require both a hardened surface (riprap) and ongoing maintenance to maintain their intended volume and integrity. Our team's biologists have informed us that the riprap lining is not ideal for encouraging or improving wildlife movement. The attached exhibits depict a typical longitudinal ditch profile as well as a typical cross section of how the ponds and the V-ditches channelizing water to them would integrate into the easement.

- Containment of Hazardous Spills – During the August 20 project meeting, you mentioned considerations for containment of accidental hazardous material spills along the freeway. Currently, the ADOT Hazardous Material Response team has procedures to contain, absorb and clean up a potential spill. Further, ADOT coordinates with the Gila River Indian Community Department of Environmental Quality prior to any disturbance or removal of vegetation. A potential consideration to prevent spills from spreading outside the easement or infiltrating the ground would be to have lined longitudinal ditches or berms along the easement lines, but berms are not feasible as it would interfere with off-site drainage patterns. As a result, integrating the first flush water quality system noted in the August 6, 2020 letter would help contain the spill, but would still not prevent infiltration, unless the ditches and ponds were also lined.

As stated previously, everything we are transmitting to you is in DRAFT form, and even then, is only based on representative segments of the corridor. No detailed design has been performed beyond what is shared in this memo.

ADOT appreciates the opportunity to continue this dialog with you and I encourage you to ask any questions that you might have. My direct contact information is as follows:

Dan Pfeifer
HDR Engineering, Inc.
Daniel.pfeifer@hdrinc.com
602-474-3920 (office)
928-862-0426 (mobile)



Computation Sheet

Project: GRIC 110
Subject: Proposed Conditions Rational Method
Task: First Flush Analysis
Job No.: 10175461

Computed: JL
Checked: DAP
Date: 2/4/2020
Date: 2/5/2020

Precipitation Data

I (10 yr-10 min) = 3.66 in/hr
I (25 yr-10 min) = 4.49 in/hr
I (50 yr-10 min) = 5.14 in/hr
I (100 yr-10 min) = 5.79 in/hr
P (10 yr-24 hr) = 2.23 in
P (25 yr-24 hr) = 2.70 in
P (50 yr-24 hr) = 3.07 in
P (100 yr-24 hr) = 3.45 in

Formulas

Q_COMPOSITE = (A_PAVED * C_PAVED + A_UNPAVED * C_UNPAVED) / A_TOTAL
Q_i = A_TOTAL * C_COMPOSITE^i
V_F FLUSH = A_TOTAL * C_COMPOSITE^i * P_i FLUSH
V = A_TOTAL * C_COMPOSITE^i * P

Parameters

A - Drainage area (Paved, Un-paved and Total), in acres (ac)
C - Runoff coefficient (C_PAVED = 0.95, C_UNPAVED = 0.70)
I - Rainfall intensity for a specific storm freq. w/ 10 min duration (in/hr)
P - Total precipitation for a specific storm freq. and duration (ft)
P_i FLUSH - First Flush precipitation (0.50 in = 0.0417 ft)
Q_i - Peak flow, for a specific storm freq. w/ 10 min duration (cfs)
V_F FLUSH - First Flush runoff volume
V - Runoff volume, for a specific storm freq. and duration (ac-ft)

Area ID Convention

EB Eastbound (Per mile)
WB Westbound (Per mile)

Des101a: Proposed median widening (shoulders <12)

Table with columns: Area ID, Area (sqft), Area (acres), C, Area (sqft), C, Area (acres), C, Q^10, Q^25, Q^50, Q^100, V_F FLUSH, V^10, V^25, V^50, V^100, Notes, Boundary, Segment Length. Includes rows for segments 1-5 (EB) and 1-5 (WB).

Summary table with columns: Avg. Per Mile (EB + WB), Full Buildout, Existing, Delta. Values: Avg. Per Mile (EB + WB) 0.457, Avg. Culvert Crossings Per Mile 0, Per Culvert Crossing 0.080, 0.051, 0.030.

Calculations for Sizing of First Flush Treatment Ponds (Per Mile). Table with columns: Bottom Width, Depth, Side Slope, Area of Ditch, Segment Length, % of Typical Mile, V_F FLUSH, A_IMPACTED, A_UNIMPACTED, V_PROV.

Calculations for Sizing of First Flush Treatment Ponds (Per Culvert Crossing). Table with columns: Bottom Width, Depth, Side Slope, Area of Ditch, Segment Length, % of Typical Mile, V_F FLUSH, A_IMPACTED, A_UNIMPACTED, V_PROV.

Chosen Bottom Width



Computation Sheet

Project: GRIC 110
Subject: Existing Conditions Rational Method
Task: First Flush Analysis
Job No.: 10175461

Computed: JL
Checked: DAP
Date: 2/4/2020
Date: 2/5/2020

Precipitation Data

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Formulas

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Q_i = A_TOTAL * C_COMPOSITE^i
V_F FLUSH = A_TOTAL * C_COMPOSITE^i * P_i FLUSH
V = A_TOTAL * C_COMPOSITE^i * P

Parameters

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C - Runoff coefficient (C_PAVED = 0.95, C_UNPAVED = 0.70)
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V - Runoff volume, for a specific storm freq. and duration (ac-ft)

Area ID Convention

EB Eastbound (Per mile)
WB Westbound (Per mile)

Des101a: Proposed median widening (shoulders <12)

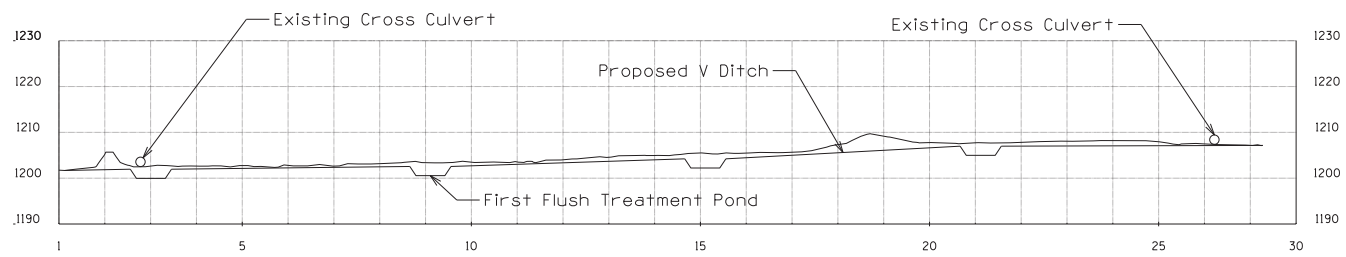
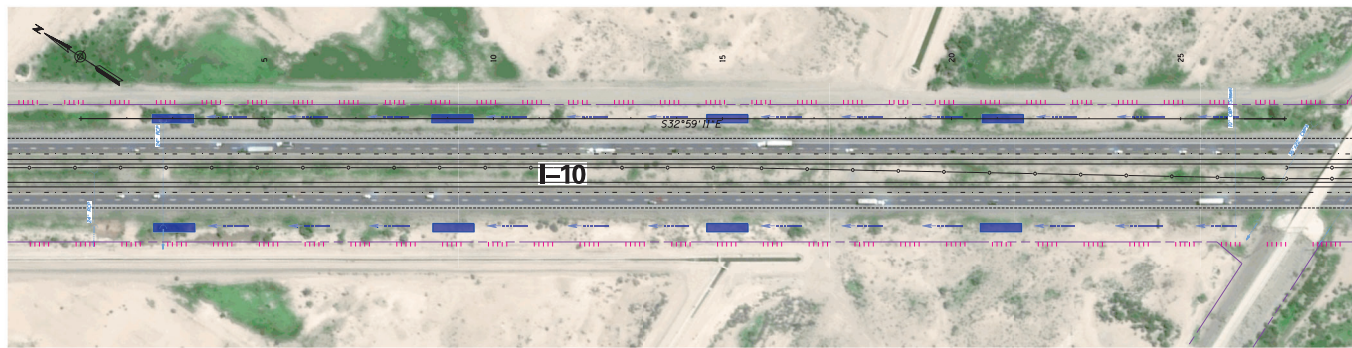
Table with columns: Area ID, Area (sqft), Area (acres), C, Area (sqft), C, Area (acres), C, Q^10, Q^25, Q^50, Q^100, V_F FLUSH, V^10, V^25, V^50, V^100, Notes, Boundary, Segment Length. Includes rows for segments 1-5 (EB) and 1-5 (WB).

Summary table with columns: Avg. Per Mile (EB + WB), Full Buildout, Existing, Delta. Values: Avg. Per Mile (EB + WB) 0.457, Avg. Culvert Crossings Per Mile 0, Per Culvert Crossing 0.080, 0.051, 0.030.

Calculations for Sizing of First Flush Treatment Ponds (Per Mile). Table with columns: Bottom Width, Depth, Side Slope, Area of Ditch, Segment Length, % of Typical Mile, V_F FLUSH, A_IMPACTED, A_UNIMPACTED, V_PROV.

Calculations for Sizing of First Flush Treatment Ponds (Per Culvert Crossing). Table with columns: Bottom Width, Depth, Side Slope, Area of Ditch, Segment Length, % of Typical Mile, V_F FLUSH, A_IMPACTED, A_UNIMPACTED, V_PROV.

Chosen Bottom Width

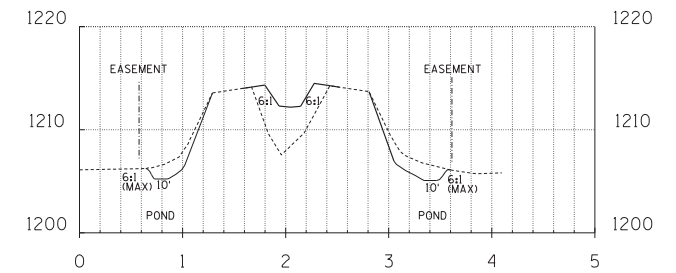
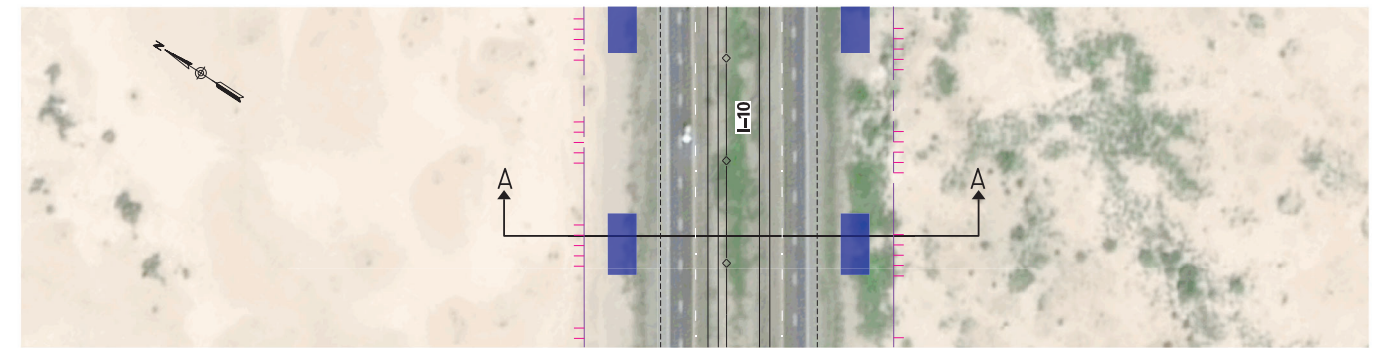


WESTBOUND DITCH EXISTING PROFILE

DRAFT
FOR INTERNAL REVIEW ONLY
August 25, 2020

I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
TREATMENT POND PLAN AND PROFILE

LEGEND
Existing Easements
Treatment Ponds
V-Ditch



SECTION A-A

VOLUME REQUIRED: 0.724 AC-FT PER MILE
VOLUME PROVIDED: 0.727 AC-FT PER MILE
TREATMENT POND DEPTH: 2 FT

DRAFT
FOR INTERNAL REVIEW ONLY
August 25, 2020

I-10 / LOOP 202 TO SR 387
WILD HORSE PASS CORRIDOR
TREATMENT POND CROSS SECTION

LEGEND
Existing Easements
Treatment Ponds
V-Ditch

Appendix J. AASHTO Controlling Design Criteria Report

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**PHOENIX – CASA GRANDE HIGHWAY
I-10**

**I-10; SR 202 (SANTAN) TO SR 587
TRACS NO. 010-C(222)S F0252 01L & 02L**

AASHTO CONTROLLING DESIGN CRITERIA REPORT

March 2021

PREPARED FOR:

ARIZONA DEPARTMENT OF TRANSPORTATION

PREPARED BY:

**HDR, INC.
20 E. THOMAS RD, SUITE 2500
PHOENIX, AZ 85012**

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Summary of Nonconforming Existing Design Features iii-v
Summary of AASHTO Controlling Design Criteria 1-5

SUMMARY OF NONCONFORMING EXISTING DESIGN FEATURES

(Note: The analysis of all design features is based upon the 2018 AASHTO Green Book.)

I-10 – Mainline (M.P. 162 to 187 – EB & WB)

The existing cross slope is 1.5%. AASHTO has an allowable range of 1.5% to 2.5%

I-10 – Mainline (M.P. 173.1 to 173.5 – EB & WB)

The existing shoulder widths are less than the recommended minimum of 10' (outside) and 4' (inside) as follows:

1. Existing Outside shoulder = 2.5'
2. Existing Inside shoulder = 2.5'

I-10 – Mainline (Structures)

The existing bridges do not meet minimum bridge standards at the following locations:

1. Riggs Rd Underpass (M.P. 167.47) has a clear width of 27' – 3' less than the recommended 30'
2. Goodyear Rd Underpass (M.P. 168.85) has a clear width of 26' – 4' less than the recommended 30'
3. Gila River Bridges (M.P. 173.12) do not have adequate bridge barrier.
4. Nelson Rd Underpass (M.P. 174.63) has a clear width of 26' – 4' less than the recommended 30'
5. Casa Blanca Rd Underpass (M.P. 175.81) has a clear width of 27.5' – 2.5' less than the recommended 30'
6. Gas Line Rd Underpass (M.P. 177.76) has a clear width of 26' – 4' less than the recommended 30'
7. Seed Farm Rd Underpass (M.P. 179.39) has a clear width of 26' – 4' less than the recommended 30'
8. Dirk Lay Rd Underpass (M.P. 181.44) has a clear width of 26' – 4' less than the recommended 30'

Queen Creek Rd T.I. (M.P. 164.50)

The following existing ramps do not meet horizontal curve standards as follows:

1. Ramp A has superelevations of 0.069 and 0.079 – 0.009 and 0.019 higher than recommended 0.020-0.060 range
2. Ramp C has superelevations of 0.069 and 0.079 – 0.009 and 0.019 higher than recommended 0.020-0.060 range

Riggs Rd T.I. (M.P. 167.47)

The following existing ramps do not meet horizontal curve standards as follows:

1. Ramp B has a superelevation of 0.100 – 0.040 higher than recommended range
2. Ramp B has a degree of curvature of 77°-25' – exceeds recommended maximum of 24°-48'
3. Ramp D has a superelevation of 0.100 – 0.040 higher than recommended range
4. Ramp D has a degree of curvature of 77°-25' – exceeds recommended maximum of 24°-48'

Casa Blanca Rd T.I. (M.P. 175.81)

The following existing ramps do not meet horizontal curve standards as follows:

1. Ramp A has a superelevation of 0.080 – 0.020 higher than recommended range
2. Ramp B has a superelevation of 0.015 – 0.005 less than recommended range
3. Ramp C has a superelevation of 0.080 – 0.020 higher than recommended range
4. Ramp C has a degree of curvature of 34°-00' – exceeds recommended maximum of 24°-48'
5. Ramp D has a superelevation of 0.015 – 0.005 less than recommended range
6. Ramp E has a superelevation of 0.080 – 0.020 higher than recommended range
7. Ramp E has a degree of curvature of 37°-00' – exceeds recommended maximum of 24°-48'
8. Ramp F has a superelevation of 0.080 – 0.020 higher than recommended range
9. Ramp F has a degree of curvature of 38°-00' – exceeds recommended maximum of 24°-48'
10. SR 587 has a superelevation of 0.100 – 0.040 higher than recommended range

Hwy 387 T.I. (M.P. 185.26)

The following existing ramps do not meet horizontal curve standards as follows:

1. Ramp B has a superelevations of 0.015 and 0.120 – 0.005 and 0.060 less than and greater than recommended 0.020-0.060 range
2. Ramp B has a degree of curvature of 28°-38' – exceeds recommended maximum of 24°-48'
3. Ramp D has a degree of curvature of 28°-20' – exceeds recommended maximum of 24°-48'
4. Ramp D has a superelevations of 0.015 and 0.120 – 0.005 and 0.060 less than and greater than recommended 0.020-0.060 range

**SUMMARY OF AASHTO CONTROLLING DESIGN CRITERIA
I-10 MAINLINE SUMMARY (DIVIDED)**

TRACS NUMBER:		ROUTE:	I-10
PROJECT LOCATION:	I-10; PHOENIX – CASA GRANDE HIGHWAY	BEGIN MP:	161.0
HIGHWAY SECTION:	PECOS RD TO VAL VISTA RD	END MP:	187.0
FUNCTIONAL CLASSIFICATION:	PRINCIPAL ARTERIAL INTERSTATE - RURAL		

LANE AND SHOULDER WIDTHS	MILEPOST BEGIN (MP)	MILEPOST END (MP)	EXISTING (FEET)	AASHTO RECOMMENDED MINIMUM (FEET)
LANE WIDTH	161.0	173.1	12	12
	173.1	173.5	12.5	12
	173.5	187.0	12	12
INSIDE SHOULDER	161.0	173.1	4	4
	173.1	173.5	2.5	4
	173.5	187.0	4	4
OUTSIDE SHOULDER	161.0	173.1	10	10
	173.1	173.5	2.5	10
	173.5	187.0	10	10

DESIGN SPEED		
THE AASHTO RECOMMENDED DESIGN SPEED OF THE ROADWAY IS: 70MPH		AS-BUILT DESIGN SPEED IS: 70-80 MPH
THE POSTED SPEED LIMIT IS: 65 MPH (MP 161.0 to MP 165.2) 75 MPH (MP 165.2 to MP 187.0)		TERRAIN IS LEVEL. AVERAGE PROJECT ELEVATION: 1,280

GRADES		
EXISTING MAXIMUM GRADE IS: 1.5%		AASHTO ALLOWABLE MAXIMUM GRADE IS: 3.0%

CROSS SLOPE		
EXISTING CROSS SLOPE IS: 1.5%		AASHTO ALLOWABLE RANGE IS: 1.5% - 2%

**SUMMARY OF AASHTO CONTROLLING DESIGN CRITERIA
I-10 MAINLINE SUMMARY (DIVIDED)**

SEGMENT	Existing 2018 ADT (VPD)	DESIGN YEAR 2040 ADT (VPD)	TRAFFIC FACTORS		
			K=	D=	T=
Chandler Blvd – Maricopa Rd / Wild Horse Pass Rd	90,000	100,800	7%	56%	12%
Maricopa Rd / Wild Horse Pass Rd – Queen Creek Rd	109,940	153,366	8%	54%	12%
Queen Creek Rd – Riggs Rd	61,849	75,765	7%	55%	13%
Riggs Rd – SR 587 / Casa Blanca Rd	57,768	90,407	9%	52%	11%
SR 587 / Casa Blanca Rd – SR 387 / Pinal Ave	61,214	93,963	9%	51%	11%
SR 387 / Pinal Ave – McCartney Rd	41,860	63,906	7%	55%	15%

STRUCTURE	MILEPOST	PRECONSTRUCTION CLEARANCE	POSTCONSTRUCTION CLEARANCE	AASHTO
				MINIMUM ALLOWABLE CLEARANCE
Wild Horse Pass Blvd TI UP	162.54	99.99'	16.84'	16.00'
Queen Creek Rd TI UP	164.50	99.99'	16.71'	16.00'
Riggs Rd TI UP	167.47	99.99'	16.02'	16.00'
Goodyear Rd UP	169.85	99.99'	16.12'	16.00'
Nelson Rd UP	174.63	99.99'	16.15'	16.00'
Casa Blanca TI UP	175.81	99.99'	16.14'	16.00'
Gas Line Rd UP	177.76	99.99'	16.16'	16.00'
Seed Farm Rd UP	179.39	99.99'	16.07'	16.00'
Dirk Lay Rd UP	181.44	99.99'	16.27'	16.00'
SR 387 TI UP	185.26	99.99'	16.61'	16.00'

STRUCTURE	MP	EXISTING BRIDGE CLEAR WIDTH (FEET)	RECOMMENDED BRIDGE CLEAR WIDTH (FEET)	BRIDGE RAIL GEOMETRY ADEQUATE	BRIDGE RAIL STRUCTURE ADEQUATE	EXISTING STRUCTURAL CAPACITY	RECOMMENDED
							STRUCTURAL CAPACITY
Wild Horse Pass Blvd TI UP	162.54	92.0	92.0	Yes	Yes	HS-20	HS-20
Queen Creek Rd TI UP	164.50	96.0	96.0	Yes	Yes	HS-20	HS-20
Riggs Rd TI UP	167.47	26.0	40.0	Yes	Yes	HS-20	HS-20
Goodyear Rd UP	169.85	26.0	30.0	Yes	Yes	HS-20	HS-20
Gila River Br EB	173.12	30.0	38.0	No	No	HS-20	HS-20
Gila River Br WB	173.12	30.0	38.0	No	No	HS-20	HS-20
Nelson Rd UP	174.63	26.0	30.0	Yes	Yes	HS-20	HS-20
Casa Blanca TI UP	175.81	30.7	40.0	Yes	Yes	HS-20	HS-20
Gas Line Rd UP	177.76	26.0	30.0	Yes	Yes	HS-20	HS-20
Seed Farm Rd UP	179.39	26.0	30.0	Yes	Yes	HS-20	HS-20
Dirk Lay Rd UP	181.44	26.0	30.0	Yes	Yes	HS-20	HS-20
SR 387 TI UP	185.26	30.2	40.0	Yes	Yes	HS-20	HS-20

**SUMMARY OF AASHTO CONTROLLING DESIGN CRITERIA
I-10 MAINLINE SUMMARY (DIVIDED)**

VERTICAL ALIGNMENT AND STOPPING SIGHT DISTANCE

VPI STATION	APPROACH GRADE (%)	DEPARTURE GRADE (%)	LENGTH OF CURVE (FEET)	EXISTING SIGHT DISTANCE (FEET)	RECOMMENDED AASHTO SIGHT DISTANCE (FEET)	EXISTING SPEED (MPH)	RECOMMENDED DESIGN SPEED (MPH)
SEE ATTACHMENT #1							

HORIZONTAL ALIGNMENT, SUPERELEVATION, AND STOPPING SIGHT DISTANCE

HPI STATION	MILEPOST (MP)	SUPERELEVATION			EXISTING SPEED (MPH)	DEGREE OF CURVE	
		MINIMUM (FT/FT)	EXISTING (FT/FT)	MAXIMUM (FT/FT)		EXISTING (DEGREE)	MAXIMUM (DEGREE)
I-10 EB Cst Centerline							
893+54.94	161.99	0.020	0.015	0.060	75	0°-29.86'	2°-18'
2010+47.63	183.15	0.020	0.015	0.060	75	0°-15.00'	2°-18'
2033+39.13	183.58	0.020	0.015	0.060	75	0°-30.00'	2°-18'
2056+24.98	184.02	0.020	0.015	0.060	75	0°-15.00'	2°-18'
I-10 WB Cst Centerline							
893+22.97	161.99	0.020	0.015	0.060	75	0°-30.14'	2°-18'
2010+51.70	183.15	0.020	0.015	0.060	75	0°-15.00'	2°-18'
2033+33.70	183.58	0.020	0.015	0.060	75	0°-30.00'	2°-18'
2056+13.67	184.01	0.020	0.015	0.060	75	0°-15.00'	2°-18'
I-10/SR 202 Ramp N-W Cst Centerline							
12+26.30	160	0.020	0.030	0.060	55	1°-40.00'	5°-24'
18+34.06	160	0.020	0.050	0.060	55	2°-30.00'	5°-24'
50+47.77	160	0.020	0.050	0.060	55	6°-00.00'	5°-24'
52+16.12	160	0.020	0.050	0.060	55	0°-30.00'	5°-24'
I-10/SR 202 Ramp W-S Cst Centerline							
40+68.83	160	0.020	0.028	0.060	55	5°-37.03'	5°-24'
51+43.41	160	0.020	0.028	0.060	55	1°-23.04'	5°-24'
WHP Cst Centerline							
10+67.70	162.5	0.020	0.040	0.060	50	6°-00.00'	6°-53'
WHP Ramp A Cst Centerline							
6+64.12	162.5	0.020	0.020	0.060	50	1°-00.00'	6°-53'
WHP Ramp B Cst Centerline							
4+12.57	162.5	0.020	0.020	0.060	50	0°-15.00'	6°-53'

HPI STATION	MILEPOST (MP)	SUPERELEVATION			EXISTING SPEED (MPH)	DEGREE OF CURVE	
		MINIMUM (FT/FT)	EXISTING (FT/FT)	MAXIMUM (FT/FT)		EXISTING (DEGREE)	MAXIMUM (DEGREE)
12+34.55	162.5	0.020	0.024	0.060	50	1°-15.00'	6°-53'
WHP Ramp C Cst Centerline							
14+16.03	162.5	0.020	0.020	0.060	50	0°-30.00'	6°-53'
WHP Ramp D Cst Centerline							
12+65.73	162.5	0.020	0.020	0.060	50	0°-30.00'	6°-53'
QC Ramp A Cst Centerline							
4+85.00	164.5	0.020	0.079	0.060	50	3°-00.00'	6°-53'
11+82.44	164.5	0.020	0.069	0.060	50	2°-30.00'	6°-53'
QC Ramp B Cst Centerline							
10+02.61	164.5	0.020	0.046	0.060	50	1°-30.00'	6°-53'
QC Ramp C Cst Centerline							
4+30.00	164.5	0.020	0.069	0.060	50	2°-30.00'	6°-53'
11+42.04	164.5	0.020	0.079	0.060	50	3°-00.00'	6°-53'
QC Ramp D Cst Centerline							
9+94.18	164.5	0.020	0.046	0.060	50	1°-30.00'	6°-53'
Riggs Ramp A Cst Centerline							
6+99.34	167.5	0.020	0.040	0.060	50	6°-00.00'	6°-53'
Riggs Ramp B Cst Centerline							
1+27.76	167.5	0.020	0.100	0.060	30	77°-25.60'	24°-48'
11+09.08	167.5	0.020	0.040	0.060	50	6°-00.00'	6°-53'
Riggs Ramp C Cst Centerline							
9+97.69	167.5	0.020	0.040	0.060	50	6°-00.00'	6°-53'
Riggs Ramp D Cst Centerline							
3+36.54	167.5	0.020	0.040	0.060	50	6°-00.00'	6°-53'
13+07.14	167.5	0.020	0.100	0.060	30	77°-25.0'	24°-48'
CB Cst Centerline							
11+30.36	175.8	0.020	0.030	0.060	45	6°-00.00'	8°-55'
28+85.51	175.8	0.020	0.030	0.060	45	6°-00.00'	8°-55'
38+27.32	175.8	0.020	0.100	0.060	45	6°-00.00'	8°-55'
CB Ramp A Cst Centerline							
8+11.88	175.8	0.020	0.080	0.060	40	6°-00.00'	11°-49'
16+59.08	175.8	0.020	0.080	0.060	40	8°-00.00'	11°-49'

HPI STATION	MILEPOST (MP)	SUPERELEVATION			EXISTING SPEED (MPH)	DEGREE OF CURVE	
		MINIMUM (FT/FT)	EXISTING (FT/FT)	MAXIMUM (FT/FT)		EXISTING (DEGREE)	MAXIMUM (DEGREE)
CB Ramp B Cst Centerline							
26+65.91	175.8	0.020	0.015	0.060	50	6°-00.00'	6°-53'
CB Ramp C Cst Centerline							
22+89.20	175.8	0.020	0.080	0.060	30	34°-00.00'	24°-48'
CB Ramp D Cst Centerline							
22+20.24	175.8	0.020	0.015	0.060	50	6°-00.00'	6°-53'
CB Ramp E Cst Centerline							
25+37.25	175.8	0.020	0.080	0.060	30	37°-00.00'	24°-48'
CB Ramp F Cst Centerline							
31+82.01	175.8	0.020	0.080	0.060	40	38°-00.00'	11°-49'
37+74.78	175.8	0.020	0.080	0.060	40	6°-00.00'	11°-49'
Hwy 387 Ramp A Cst Centerline							
4+27.87	185.3	0.020	0.040	0.060	50	5°-59.00'	6°-53'
Hwy 387 Ramp B Cst Centerline							
2+00.00	185.3	0.020	0.015	0.060	30	28°-38.75'	24°-48'
8+49.08	185.3	0.020	0.120	0.060	50	6°-02.50'	6°-53'
Hwy 387 Ramp C Cst Centerline							
8+97.99	185.3	0.020	0.040	0.060	50	5°-59.17'	6°-53'
Hwy 387 Ramp D Cst Centerline							
8+90.00	185.3	0.020	0.120	0.060	50	6°-00.20'	6°-53'
18+29.94	185.3	0.020	0.015	0.060	30	28°-20.85'	24°-48'

ATTACHMENT 1 - VERTICAL CURVE INVENTORY

Project Name: I-10; Phoenix - Casa Grande Highway
Project Number: 010-C(222)S F0252 01L & 02L
Roadway Type: Principal Arterial Interstate - Rural

VPI STATION	MILEPOST		TRAFFIC DIRECTION (1w, 1a or 2)	GRADE IN (%)	GRADE OUT (%)	CURVE LENGTH (ft)	CURVE TYPE	STOPPING SIGHT DISTANCE		SPEED	
	BEGIN	END						AVAILABLE (ft)	AASHTO MINIMUM (ft)	AVAILABLE (mph)	DESIGN (mph)
I-10 EB											70
882+00.00	161.63	161.93	1w	-0.1905	-1.2500	1600	Crest	1818	744	+100	70
899+00.00	161.93	162.25	1w	-1.2500	-0.0759	1600	Sag	+9999	744	+100	70
930+00.00	162.79	162.79	1w	-0.0759	0.0668	0	GB	GB	GB	GB	70
955+00.00	163.26	163.26	1w	0.0668	0.1117	0	GB	GB	GB	GB	70
967+00.00	163.49	163.49	1w	0.1117	0.0797	0	GB	GB	GB	GB	70
1100+00.00	166.01	166.01	1w	0.0797	0.2300	0	GB	GB	GB	GB	70
1110+00.00	166.20	166.20	1w	0.2300	0.0797	0	GB	GB	GB	GB	70
1165+00.00	167.21	167.21	1w	0.0797	0.1075	0	GB	GB	GB	GB	70
1173+00.00	167.37	167.37	1w	0.1075	0.0797	0	GB	GB	GB	GB	70
1180+00.00	167.50	167.50	1w	0.0797	0.1395	0	GB	GB	GB	GB	70
1183+00.00	167.56	167.56	1w	0.1395	0.2642	0	GB	GB	GB	GB	70
1195+00.00	167.78	167.78	1w	0.2642	0.1395	0	GB	GB	GB	GB	70
1266+00.00	169.12	169.12	1w	0.1395	0.2353	0	GB	GB	GB	GB	70
1279+00.00	169.37	169.37	1w	0.2353	0.0991	0	GB	GB	GB	GB	70
1290+00.00	169.58	169.58	1w	0.0991	0.2353	0	GB	GB	GB	GB	70
1300+00.00	169.77	169.77	1w	0.2353	0.1207	0	GB	GB	GB	GB	70
1358+00.00	170.79	170.94	1w	0.1207	-0.1333	800	Crest	4648	729	+100	70
1388+00.00	171.36	171.51	1w	-0.1333	0.1143	800	Sag	+9999	729	+100	70
1458+00.00	172.76	172.76	1w	0.1143	0.0681	0	GB	GB	GB	GB	70
1505+00.00	173.65	173.65	1w	0.0681	0.1200	0	GB	GB	GB	GB	70
1610+00.00	175.64	175.64	1w	0.1200	0.2104	0	GB	GB	GB	GB	70
1668+00.00	176.68	176.83	1w	0.2104	1.5000	800	Sag	+9999	724	+100	70
1683+00.00	176.98	177.12	1w	1.5000	0.1000	800	Crest	1171	725	93	70
1703+00.00	177.34	177.50	1w	0.1000	0.7314	800	Sag	+9999	725	+100	70

Notes: Traffic Direction:
1w = One Way Traffic in Station direction
1a = One Way Traffic against Station direction
2 = Two Way Traffic

Grades are with respect to Station direction.
* Indicates design exception required.
GB indicates grade break. Stopping Sight Distance and Speed not calculated.
Calculations are based on AASHTO 2001 and ADOT 2004 Roadway Design Guidelines formulas with adjustments for effective grade.

ATTACHMENT 1 - VERTICAL CURVE INVENTORY

Page 2

Project Name: I-10; Phoenix - Casa Grande Highway
Project Number: 010-C(222)S F0252 01L & 02L
Roadway Type: Principal Arterial Interstate - Rural

VPI STATION	MILEPOST		TRAFFIC DIRECTION (1w, 1a or 2)	GRADE IN (%)	GRADE OUT (%)	CURVE LENGTH (ft)	CURVE TYPE	STOPPING SIGHT DISTANCE		SPEED	
	BEGIN	END						AVAILABLE (ft)	AASHTO MINIMUM (ft)	AVAILABLE (mph)	DESIGN (mph)
I-10 EB											70
1833+50.00	179.82	179.97	1w	0.8315	1.5000	800	Sag	+9999	716	+100	70
1848+50.00	180.09	180.26	1w	1.5000	0.1000	800	Crest	1171	725	93	70
1868+50.00	180.33	180.78	1w	0.1000	0.8900	2400	Sag	+9999	725	+100	70
1888+00.00	180.85	181.00	1w	0.8900	0.4000	800	Crest	2602	721	+100	70
1906+00.00	181.19	181.34	1w	0.4000	0.9189	800	Sag	+9999	721	+100	70
1942+00.00	181.87	182.03	1w	0.9189	1.1800	800	Sag	+9999	715	+100	70
1973+00.00	182.46	182.61	1w	1.1800	0.5842	800	Crest	2211	719	+100	70
1985+00.00	182.69	182.81	1w	0.5842	1.5357	800	Sag	+9999	719	+100	70
2015+00.00	183.14	183.52	1w	1.5357	-0.2008	2000	Crest	1577	730	+100	70
2051+00.00	184.02	184.02	1w	-0.2008	-0.1093	0	GB	GB	GB	GB	70
2086+00.00	184.56	184.79	1w	-0.1093	1.1707	1200	Sag	+9999	728	+100	70
2127+00.00	185.27	185.64	1w	1.1707	-0.1711	2000	Crest	1793	729	+100	70
2165+00.00	186.09	186.24	1w	-0.1711	-0.4600	800	Crest	4135	733	+100	70
2190+00.00	186.64	186.64	1w	-0.4600	-0.3846	0	GB	GB	GB	GB	70
2216+00.00	187.13	187.13	1w	-0.3846	-0.4425	0	GB	GB	GB	GB	70
2242+00.00	187.63	187.63	1w	-0.4425	-0.6000	0	GB	GB	GB	GB	70
2267+00.00	188.10	188.10	1w	-0.6000	-0.5000	0	GB	GB	GB	GB	70
I-10 WB											70
881+00.00	161.62	161.92	1a	-0.1951	-1.2500	1600	Crest	1823	724	+100	70
898+00.00	161.94	162.24	1a	-1.2500	-0.0751	1600	Sag	+9999	726	+100	70
930+00.00	162.70	162.70	1a	-0.0751	0.0668	0	GB	GB	GB	GB	70
955+00.00	163.17	163.17	1a	0.0668	0.1117	0	GB	GB	GB	GB	70
967+00.00	163.40	193.40	1a	0.1117	0.0797	0	GB	GB	GB	GB	70
1100+00.00	166.01	166.01	1a	0.0797	0.2300	0	GB	GB	GB	GB	70

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ATTACHMENT 1 - VERTICAL CURVE INVENTORY

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Project Name: I-10; Phoenix - Casa Grande Highway
Project Number: 010-C(222)S F0252 01L & 02L
Roadway Type: Principal Arterial Interstate - Rural

VPI STATION	MILEPOST		TRAFFIC DIRECTION (1w, 1a or 2)	GRADE IN (%)	GRADE OUT (%)	CURVE LENGTH (ft)	CURVE TYPE	STOPPING SIGHT DISTANCE		SPEED	
	BEGIN	END						AVAILABLE (ft)	AASHTO MINIMUM (ft)	AVAILABLE (mph)	DESIGN (mph)
I-10 WB											70
1110+00.00	166.20	166.20	1a	0.2300	0.0797	0	GB	GB	GB	GB	70
1165+00.00	167.24	167.24	1a	0.0797	0.1075	0	GB	GB	GB	GB	70
1173+00.00	167.35	167.35	1a	0.1075	0.0797	0	GB	GB	GB	GB	70
1180+00.00	167.48	167.48	1a	0.0797	0.1395	0	GB	GB	GB	GB	70
1183+00.00	167.54	167.54	1a	0.1395	0.2642	0	GB	GB	GB	GB	70
1195+00.00	167.76	167.76	1a	0.2642	0.1395	0	GB	GB	GB	GB	70
1266+00.00	169.12	169.12	1a	0.1395	0.2353	0	GB	GB	GB	GB	70
1279+00.00	169.37	169.37	1a	0.2353	0.0991	0	GB	GB	GB	GB	70
1290+00.00	169.58	169.58	1a	0.0991	0.2353	0	GB	GB	GB	GB	70
1300+00.00	169.77	169.77	1a	0.2353	0.1207	0	GB	GB	GB	GB	70
1358+00.00	170.79	170.94	1a	0.1207	-0.1333	800	Crest	4648	728	+100	70
1388+00.00	171.36	171.51	1a	-0.1333	0.1143	800	Sag	+9999	728	+100	70
1458+00.00	172.76	172.76	1a	0.1143	0.0681	0	GB	GB	GB	GB	70
1505+00.00	173.65	173.65	1a	0.0681	0.1200	0	GB	GB	GB	GB	70
1610+00.00	175.64	175.64	1a	0.1200	0.2138	0	GB	GB	GB	GB	70
1668+00.00	176.68	176.83	1a	0.2138	1.5000	800	Sag	+9999	748	+100	70
1683+00.00	177.00	177.12	1a	1.5000	0.1000	800	Crest	1171	748	91	70
1704+00.00	177.36	177.51	1a	0.1000	0.7213	800	Sag	+9999	737	+100	70
1765+00.00	178.59	178.59	1a	0.7213	0.8326	0	GB	GB	GB	GB	70
1832+50.00	179.78	179.94	1a	0.8326	1.5000	800	Sag	+9999	748	+100	70
1848+50.00	180.09	180.24	1a	1.5000	0.1000	800	Crest	1171	748	91	70
1868+50.00	180.31	180.77	1a	0.1000	0.9750	2400	Sag	+9999	740	+100	70
1890+00.00	180.87	181.02	1a	0.9750	0.4000	800	Crest	2277	740	+100	70
1906+00.00	181.18	181.33	1a	0.4000	0.9189	800	Sag	+9999	740	+100	70

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ATTACHMENT 1 - VERTICAL CURVE INVENTORY

Project Name: I-10; Phoenix - Casa Grande Highway
Project Number: 010-C(222)S F0252 01L & 02L
Roadway Type: Principal Arterial Interstate - Rural

VPI STATION	MILEPOST		TRAFFIC DIRECTION (1w, 1a or 2)	GRADE IN (%)	GRADE OUT (%)	CURVE LENGTH (ft)	CURVE TYPE	STOPPING SIGHT DISTANCE		SPEED	
	BEGIN	END						AVAILABLE (ft)	AASHTO MINIMUM (ft)	AVAILABLE (mph)	DESIGN (mph)
I-10 WB											70
1942+00.00	181.88	182.03	1a	0.9189	1.1800	800	Sag	+9999	743	+100	70
1973+00.00	182.46	182.61	1a	1.1800	0.5842	800	Crest	2211	743	+100	70
1985+00.00	182.69	182.84	1a	0.5842	1.5357	800	Sag	+9999	749	+100	70
2013+00.00	183.10	183.48	1a	1.5357	-0.1095	2000	Crest	1620	749	+100	70
2086+00.00	184.56	184.79	1a	-0.1095	1.2195	1200	Sag	+9999	744	+100	70
2127+00.00	185.27	185.64	1a	1.2195	-0.1711	2000	Crest	1762	744	+100	70
2165+00.00	186.09	186.24	1a	-0.1711	-0.4600	800	Crest	4135	725	+100	70
2190+00.00	186.64	186.64	1a	-0.4600	-0.3462	0	GB	GB	GB	GB	70
2216+00.00	187.13	187.13	1a	-0.3462	-0.4808	0	GB	GB	GB	GB	70
2242+00.00	187.63	287.63	1a	-0.4808	-0.6000	0	GB	GB	GB	GB	70
2267+00.00	188.10	188.10	1a	-0.6000	-0.5000	0	GB	GB	GB	GB	70
I-10/SR 202 RAMP N-W											
	RAMP	RAMP	1w	2.9989	-0.5000	600	Crest	608	571	62	60
I-10/SR 202 RAMP S-W											
50+00.00	RAMP	RAMP	1W	-2.0112	0.5720	400	Sag	860	510	76	55
Wild Horse Pass											
3+13.36	CROSSROAD	CROSSROAD	2	-1.0000	-0.5000	0	GB	GB	GB	GB	50
3+70.00	CROSSROAD	CROSSROAD	2	-0.5000	0.5000	100	Sag	+9999	427	+100	50
10+80.12	CROSSROAD	CROSSROAD	2	0.5000	3.5000	360	Sag	592	450	59	50
20+00.00	CROSSROAD	CROSSROAD	2	3.5000	-3.5000	1300	Crest	633	450	62	50
31+40.00	CROSSROAD	CROSSROAD	2	-3.5000	-0.4006	360	Sag	562	450	57	50
WHP Ramp A											
10+20.00	RAMP	RAMP	1a	-0.1787	2.5558	400	Sag	759	442	70	50
18+25.00	RAMP	RAMP	1a	2.5558	1.8587	200	Crest	1648	593	+100	60

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ATTACHMENT 1 - VERTICAL CURVE INVENTORY

Project Name: I-10; Phoenix - Casa Grande Highway
Project Number: 010-C(222)S F0252 01L & 02L
Roadway Type: Principal Arterial Interstate - Rural

VPI STATION	MILEPOST		TRAFFIC DIRECTION (1w, 1a or 2)	GRADE IN (%)	GRADE OUT (%)	CURVE LENGTH (ft)	CURVE TYPE	STOPPING SIGHT DISTANCE		SPEED	
	BEGIN	END						AVAILABLE (ft)	AASHTO MINIMUM (ft)	AVAILABLE (mph)	DESIGN (mph)
WHP Ramp B											
12+50.00	RAMP	RAMP	1w	-0.0453	2.9521	400	Sag	641	424	65	50
19+00.00	RAMP	RAMP	1w	2.9521	2.0127	200	Crest	1249	547	99	60
WHP Ramp C											
2+00.00	RAMP	RAMP	1a	-2.0200	-2.9304	200	Crest	1285	410	101	50
9+50.00	RAMP	RAMP	1a	-2.9304	-0.0600	400	Sag	691	423	68	50
WHP Ramp D											
2+00.00	RAMP	RAMP	1w	-1.7068	-3.2948	200	Crest	779	448	70	50
8+80.00	RAMP	RAMP	1w	-3.2948	-0.0298	400	Sag	563	448	58	50
Queen Creek											
2841+00.00	CROSSROAD	CROSSROAD	2	2.2100	-1.9500	1400	Crest	852	589	75	60
QC Ramp A											
5+00.00	RAMP	RAMP	1a	0.2000	2.1431	400	Sag	3048	511	+100	55
QC Ramp B											
10+00.00	RAMP	RAMP	1a	-2.4245	0.2004	400	Sag	829	494	76	55
QC Ramp C											
10+50.00	RAMP	RAMP	1w	-2.1316	0.2072	400	Sag	1134	511	89	55
QC Ramp D											
9+50.00	RAMP	RAMP	1w	0.2006	2.1474	400	Sag	2995	490	+100	55
Riggs Road											
7+00.00	CROSSROAD	CROSSROAD	2	0.8000	4.0000	400	Sag	579	530	58	55
15+00.00	CROSSROAD	CROSSROAD	2	4.0000	-4.0000	1000	Crest	519 *	530	54	55
23+00.00	CROSSROAD	CROSSROAD	2	-4.0000	-0.8000	400	Sag	579	530	58	55
Riggs Ramp A											
3+91.01	RAMP	RAMP	1w	-0.0511	-0.0393	0	GB	GB	GB	GB	60

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ATTACHMENT 1 - VERTICAL CURVE INVENTORY

Project Name: I-10; Phoenix - Casa Grande Highway
 Project Number: 010-C(222)S F0252 01L & 02L
 Roadway Type: Principal Arterial Interstate - Rural

VPI STATION	MILEPOST		TRAFFIC DIRECTION (1w, 1a or 2)	GRADE IN (%)	GRADE OUT (%)	CURVE LENGTH (ft)	CURVE TYPE	STOPPING SIGHT DISTANCE		SPEED	
	BEGIN	END						AVAILABLE (ft)	AASHTO MINIMUM (ft)	AVAILABLE (mph)	DESIGN (mph)
Riggs Ramp B											
10+00.00	RAMP	RAMP	1w	-0.0661	0.0250	0	GB	GB	GB	GB	60
14+19.66	RAMP	RAMP	1w	0.0250	0.1395	0	GB	GB	GB	GB	60
Riggs Ramp C											
6+00.00	RAMP	RAMP	1a	0.0077	0.2096	0	GB	GB	GB	GB	60
12+96.48	RAMP	RAMP	1a	0.2096	0.3959	0	GB	GB	GB	GB	60
16+87.49	RAMP	RAMP	1a	0.3959	0.1795	0	GB	GB	GB	GB	60
Riggs Ramp D											
3+50.00	RAMP	RAMP	1a	0.1215	0.1779	0	GB	GB	GB	GB	60
Goodyear Road											
2+00.00	CROSSROAD	CROSSROAD	2	0.5000	4.0556	400	Sag	505 *	530	53	55
11+00.00	CROSSROAD	CROSSROAD	2	4.0556	-3.6111	1000	Crest	531	530	55	55
20+00.00	CROSSROAD	CROSSROAD	2	-3.6111	0.1200	400	Sag	478 *	526	52	55
Nelson Road											
6+50.00	CROSSROAD	CROSSROAD	2	-0.1200	3.8240	400	Sag	451 *	528	50	55
15+00.00	CROSSROAD	CROSSROAD	2	3.8240	-3.8888	800	Crest	473 *	529	51	55
24+00.00	CROSSROAD	CROSSROAD	2	-3.8888	-0.1400	400	Sag	475 *	529	51	55
Casa Blanca Road											
11+50.00	CROSSROAD	CROSSROAD	2	0.1000	3.9148	400	Sag	466	454	51	50
20+30.00	CROSSROAD	CROSSROAD	2	3.9148	-3.8960	1200	Crest	576	454	58	50
29+00.00	CROSSROAD	CROSSROAD	2	-3.8960	0.2000	400	Sag	434 *	454	49	50

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ATTACHMENT 1 - VERTICAL CURVE INVENTORY

Project Name: I-10; Phoenix - Casa Grande Highway
 Project Number: 010-C(222)S F0252 01L & 02L
 Roadway Type: Principal Arterial Interstate - Rural

VPI STATION	MILEPOST		TRAFFIC DIRECTION (1w, 1a or 2)	GRADE IN (%)	GRADE OUT (%)	CURVE LENGTH (ft)	CURVE TYPE	STOPPING SIGHT DISTANCE		SPEED	
	BEGIN	END						AVAILABLE (ft)	AASHTO MINIMUM (ft)	AVAILABLE (mph)	DESIGN (mph)
Casa Blanca Ramp A											
10+00.00	RAMP	RAMP	2	0.1500	1.4320	400	Sag	+9999	434	+100	50
17+79.00	RAMP	RAMP	2	1.4320	-2.0000	400	Crest	514	253	55	35
19+79.00	RAMP	RAMP	2	-2.0000	-3.6000	0	GB	GB	GB	GB	35
20+21.00	RAMP	RAMP	2	-3.6000	-2.0000	0	GB	GB	GB	GB	35
21+21.00	RAMP	RAMP	2	-2.0000	0.1000	200	Sag	1171	253	91	35
Casa Blanca Ramp B											
30+00.00	RAMP	RAMP	1w	0.2640	0.2404	0	GB	GB	GB	GB	55
Casa Blanca Ramp C											
25+40.00	RAMP	RAMP	1a	0.1000	-0.1060	0	GB	GB	GB	GB	35
Casa Blanca Ramp D											
23+60.00	RAMP	RAMP	1a	0.0900	-0.1000	0	GB	GB	GB	GB	50
Casa Blanca Ramp E											
23+15.00	RAMP	RAMP	1w	-0.3196	-0.1000	0	GB	GB	GB	GB	35
Casa Blanca Ramp F											
27+80.00	RAMP	RAMP	2	-0.1000	1.1500	400	Sag	+9999	250	+100	35
29+80.00	RAMP	RAMP	2	1.1500	3.0000	0	GB	GB	GB	GB	35
30+20.00	RAMP	RAMP	2	3.0000	1.1500	0	GB	GB	GB	GB	35
32+20.00	RAMP	RAMP	2	1.1500	-1.8080	400	Crest	565	252	59	35
36+20.00	RAMP	RAMP	2	-1.8080	-0.3622	400	Sag	+9999	436	+100	50
42+00.00	RAMP	RAMP	2	-0.3622	0.2200	0	GB	GB	GB	GB	55
Gas Line											
5+20.00	CROSSROAD	CROSSROAD	2	1.0700	3.9336	400	Sag	694	454	65	50
15+85.00	CROSSROAD	CROSSROAD	2	3.9336	-3.9460	800	Crest	468	454	51	50
22+50.00	CROSSROAD	CROSSROAD	2	-3.9460	0.8400	500	Sag	457	454	50	50

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Project Name: I-10; Phoenix - Casa Grande Highway
 Project Number: 010-C(222)S F0252 01L & 02L
 Roadway Type: Principal Arterial Interstate - Rural

VPI STATION	MILEPOST		TRAFFIC DIRECTION (1w, 1a or 2)	GRADE IN (%)	GRADE OUT (%)	CURVE LENGTH (ft)	CURVE TYPE	STOPPING SIGHT DISTANCE		SPEED	
	BEGIN	END						AVAILABLE (ft)	AASHTO MINIMUM (ft)	AVAILABLE (mph)	DESIGN (mph)
Seed Farm Road											
5+00.00	CROSSROAD	CROSSROAD	2	0.1000	3.0232	400	Sag	669	446	64	50
15+80.00	CROSSROAD	CROSSROAD	2	3.0232	-3.8960	800	Crest	500	454	53	50
23+50.00	CROSSROAD	CROSSROAD	2	-3.8960	0.0000	400	Sag	456	454	50	50
Dirk Lay											
42+00.00	CROSSROAD	CROSSROAD	2	-0.8000	3.0000	500	Sag	561	446	58	50
50+00.00	CROSSROAD	CROSSROAD	2	3.0000	-5.0000	1000	Crest	519	464	54	50
59+00.00	CROSSROAD	CROSSROAD	2	-5.0000	-1.9687	300	Sag	511	464	53	50
SR 187/Pinal Ave											
10+00.00	CROSSROAD	CROSSROAD	2	0.7000	4.0000	400	Sag	555	454	57	50
20+00.00	CROSSROAD	CROSSROAD	2	4.0000	-4.0000	1000	Crest	519	454	54	50
28+00.00	CROSSROAD	CROSSROAD	2	-4.0000	0.2000	400	Sag	424 *	454	48	50
SR 187/Pinal Ave Ramp A											
1+50.00	RAMP	RAMP	1a	1.2067	2.3829	300	Sag	+9999	591	+100	60
8+50.00	RAMP	RAMP	1a	2.3829	0.4483	300	Crest	708	441	67	50
SR 187/Pinal Ave Ramp B											
5+00.00	RAMP	RAMP	1a	-0.4483	0.5862	400	Sag	+9999	427	+100	50
SR 187/Pinal Ave Ramp C											
2+50.00	RAMP	RAMP	1w	-0.3236	1.8988	300	Sag	1129	569	91	60
10+00.00	RAMP	RAMP	1w	1.8988	0.9022	400	Crest	1283	417	99	50
SR 187/Pinal Ave Ramp D											
7+50.00	RAMP	RAMP	1w	1.0862	0.3236	300	Crest	1565	421	+100	50

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ROADWAY ENGINEERING GROUP
 ROADWAY PREDESIGN SECTION

ATTACHMENT 2
 ADOT BRIDGE EVALUATION

DATE: 8/26/2019

TO: Amin Aman
 BRIDGE GROUP
 BRIDGE MANAGEMENT SECTION, MD 635E

FEDERAL REFERENCE NO: F0252 TRACS NO: _____
 HIGHWAY: _____
 LOCATION: I-10
 MP LIMITS: 161.50 TO: 187.00
 PROJECT DESCRIPTION: Pavement Preservation

FROM: Gregory Lingor
 602-522-7739
 HDR

SUBJECT: BRIDGE EVALUATION REQUEST 5

Please evaluate the following structures per AASHTO guidelines:

ROUTE NO.	MILEPOST	STR. NO. AND NAME	BRIDGE LENGTH	BRIDGE ROADWAY WIDTH	BRIDGE RAIL / BARRIER				AC OVERLAY			VERTICAL CLEARANCE (MINIMUM)		BRIDGE LOAD RATING	BRIDGE SUFFICIENCY RATING	
					TYPE	GEOM. OK	STRUC OK	Railings OK	Transitions OK	THICKNESS (EXISTING)	REMOVE (MINIMUM)	REPLACE / NEW (MAXIMUM)	NB/EB			SB/WB
I 10	162.84	02612 Wild Horse Pass Blvd TI UP	279	92	Single Rail w/Parapet	Yes	Yes	Yes	NA	0"	NA	NA	16.88	16.84	HS 20+	92.50
Comments: Replacement of existing substandard barrier.																
I 10	164.5	02302 Queen Creek Rd TI UP	264	96	Concrete Barrier	Yes	Yes	Yes	NA	0"	NA	NA	16.71	16.91	HS 20+	86.40
Comments:																
I 10	167.47	01148 Riggs Rd TI UP	301	26	Single Rail w/Parapet	Yes	Yes	Yes	Yes	0"	NA	NA	16.03	15.92	HS 20+	F 56.4
Comments: Replacement of existing substandard barrier. Seal the deck with PPC																
I 10	169.85	01149 Goodyear Rd UP	301	26	Single Rail w/Parapet	Yes	Yes	Yes	No	1" epoxy conc.OL	NA	NA	16.06	16.17	HS 20	98.0
Comments: Pavement Exception.																
I 10	173.12	01085 Gila River Br EB	1337	30	Single Rail w/Parapet	No	No	No	No	1" epoxy conc.OL	NA	NA	NA	NA	HS 20+	76.5
Comments: Replace the existing substandard barrier with a standard Concrete Barrier. Pavement Exception.																

Please evaluate the following structures per AASHTO guidelines:

ROUTE NO.	MILEPOST	STR. NO. AND NAME	BRIDGE LENGTH	BRIDGE ROADWAY WIDTH	BRIDGE RAIL / BARRIER					AC OVERLAY			VERTICAL CLEARANCE (MINIMUM)		BRIDGE LOAD RATING	BRIDGE SUFFICIENCY RATING
					TYPE	GEOM. OK	STRUC. OK	Railings OK	Transition OK	THICKNESS (EXISTING)	REMOVE	REPLACE / NEW	NB/EB	SB/WB		
N7*	N11	N8 & A209	N49	N51	A206A	A206B	A206C	N36A	N36B	A201	(MINIMUM)	(MAXIMUM)	NB/EB	SB/WB	N66	SRB
I 10	173.12	Gila River Br WB	1337	30	Single Rail w/Parapet	No	No	No	No	1" epoxy conc.OL	NA	NA	NA	NA	HS 20+	76.7
Comments: Replace the existing substandard barrier with a standard Concrete Barrier. Pavement Exception.																
I 10	174.63	Nelson Rd UP	292	26	Single Rail w/Parapet	Yes	Yes	Yes	No	1" epoxy conc.OL	NA	NA	16.24	16.15	HS 20	F 95.0
Comments: Replace the existing substandard barrier with a standard Concrete Barrier. Pavement Exception.																
I 10	175.81	Casa Blanca TI UP	298	30.7	Concrete Barrier	Yes	Yes	Yes	Yes	1" epoxy conc.OL	NA	NA	16.15	16.14	HS 20	F 79.7
Comments:																
I 10	177.76	Gas Line Rd UP	450	26	Single Rail w/Parapet	Yes	Yes	Yes	No	1" epoxy conc.OL	NA	NA	16.16	16.34	HS 20	F 93.8
Comments: Replace the existing substandard barrier with a standard Concrete Barrier. Pavement Exception.																
I 10	179.39	Seed Farm Rd UP	292	26	Single Rail w/Parapet	Yes	Yes	Yes	No	1" epoxy conc.OL	NA	NA	16.40	16.07	HS 20	F 85.0
Comments: Replace the existing substandard barrier with a standard Concrete Barrier. Pavement Exception.																
I 10	181.44	Dirk Lay Rd UP	470	26	Single Rail w/Parapet	Yes	Yes	Yes	No	1" epoxy conc.OL	NA	NA	16.27	16.89	HS 20+	F 94.0
Comments: Replace the existing substandard barrier with a standard Concrete Barrier. Pavement Exception.																
I 10	185.26	Hwy 387 TI UP	287	30.2	Concrete Barrier	Yes	Yes	Yes	No	0"	NA	NA	16.62	16.61	HS 20+	72.8
Comments:																

Evaluation Completed by: Masudur Rahman

Date: 8/26/2019

Note: *N numbers are NBI numbers and A numbers are Arizona Items Number for bridge inventory