RESEARCH REPORT DOCUMENTATION PAGE

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MR 2013-01	February 2020	N/A	SOIA-7-002(119)053

5. Title and Subtitle

Evaluation of East Jordan Iron Works 3025 SELFLEVEL Manhole Casting

6. Report Type

Work Plan ☐
Construction ☐
Evaluation ☐
Final ☒

7. Project No.

8. Project No.

9. Project No.

10. Project No.

11. Author(s)/Principal Investigator(s)

T.J. Murphy, P.E.

12. Performing Organization Name and Address

NDDOT M+R ☒
NDDOT OTHER* ☐
NDSU ☐
UND ☐
UGPTI ☐
OTHER* ☐
*see supplementary notes

North Dakota DOT
Materials and Research Division
300 Airport Road
Bismarck ND 58504-6005

13. Sponsoring Agency Name and Address

North Dakota DOT
Materials and Research Division
300 Airport Road
Bismarck ND 58504-6005

14. Supplementary Notes

15. Abstract

Purpose and Need

NDDOT currently specifies the Neenah R-1955-1 floating manhole casting or approved equal. The vendor for East Jordan Iron Works (EJIW) has a product the 3025 SELFLEVEL Assembly manhole casting that they claim as an “equivalent” product. The EJIW product number 00302511A01,
3025 SELFLEVEL manhole casting assembly has been selected for evaluation by the Design Division. This work plan will outline the installation and evaluation process.

Objective

The objective of this experimental project is to evaluate the performance of the EJIW product number 00302511A01, 3025 SELFLEVEL manhole casting assembly as acceptable equal to the Neenah R-1955-1.

Scope

NDDOT plans to incorporate EJIW 3025 Selflevel manhole castings as part of project and SOIA-7-002(119)053. This project is located near Ray, ND on US 2.

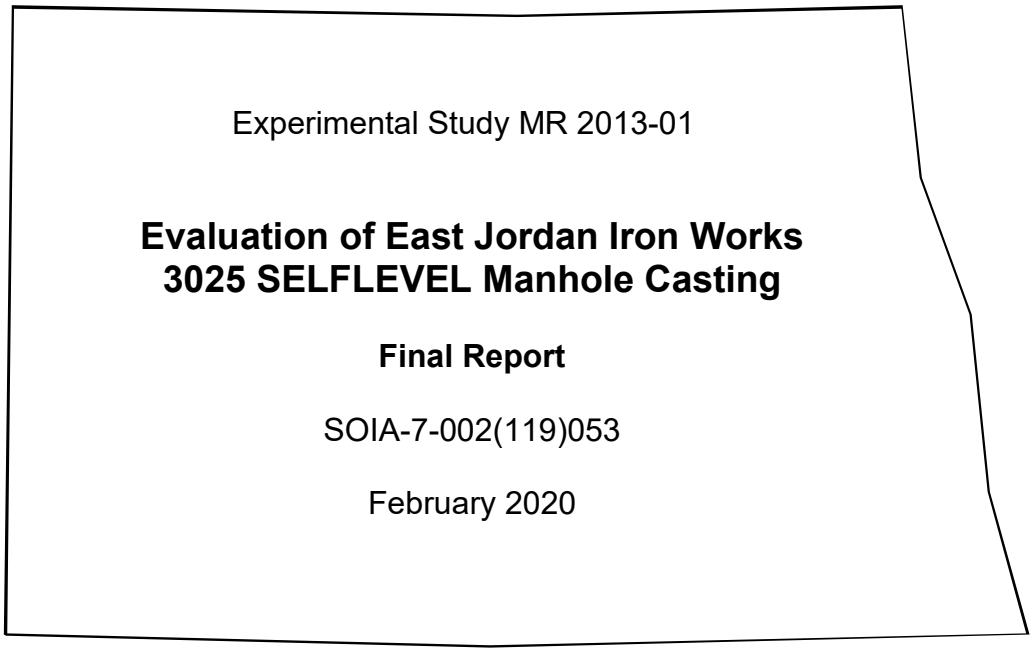
Summary

The six experimental EJ manhole castings, (product number 00302511A01 assembly with 1-1/2" thick 1040 cover), were installed in accordance with the plans; no notable issues occurred. The underground contractor commented on the ease of installation due to the reduction in weight and found the height adjustments contractor friendly. The general contractor ACME Construction also found the height adjustments user friendly. They found the new castings easy to pave around, adjust and incorporate into the roadway. The project engineer found the new castings contractor friendly without presenting any unusual problems. Visual inspection completed on July 27, 2016, showed the six castings performing adequately with no notable durability issues. NDDOT has developed details allowing both manhole castings.

16. Key Words	17. Distribution Statement	18. No. of Pages
East Jordan Manhole Casting SELFLEVEL	No restrictions. This document is available by clicking this link North Dakota Department of Transportation Materials and Research Division: 300 Airport Road Bismarck ND 58504-6005	60 19. File type/Size pdf/14.8 mb

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

MATERIALS AND RESEARCH DIVISION



Experimental Study MR 2013-01

Evaluation of East Jordan Iron Works 3025 SELFLEVEL Manhole Casting

Final Report

SOIA-7-002(119)053

February 2020

Prepared by

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
BISMARCK, NORTH DAKOTA
www.dot.nd.gov

DIRECTOR
William Panos

MATERIALS AND RESEARCH DIVISION
Matt Linneman, P.E.

Experimental Study MR 2013-01

Evaluation of East Jordan Iron Works 3025 SELFLEVEL Manhole Casting

Final Report

SOIA-7-002(119)053

February 2020

Written by
T.J. Murphy, PE

Disclaimer

The contents of this report reflect the views of the author or authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not reflect the official views of the North Dakota Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, Specification, or regulation.

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Construction-Evaluation of East Jordan Iron Works 3025 SELFLEVEL Manhole Casting

Purpose and Need

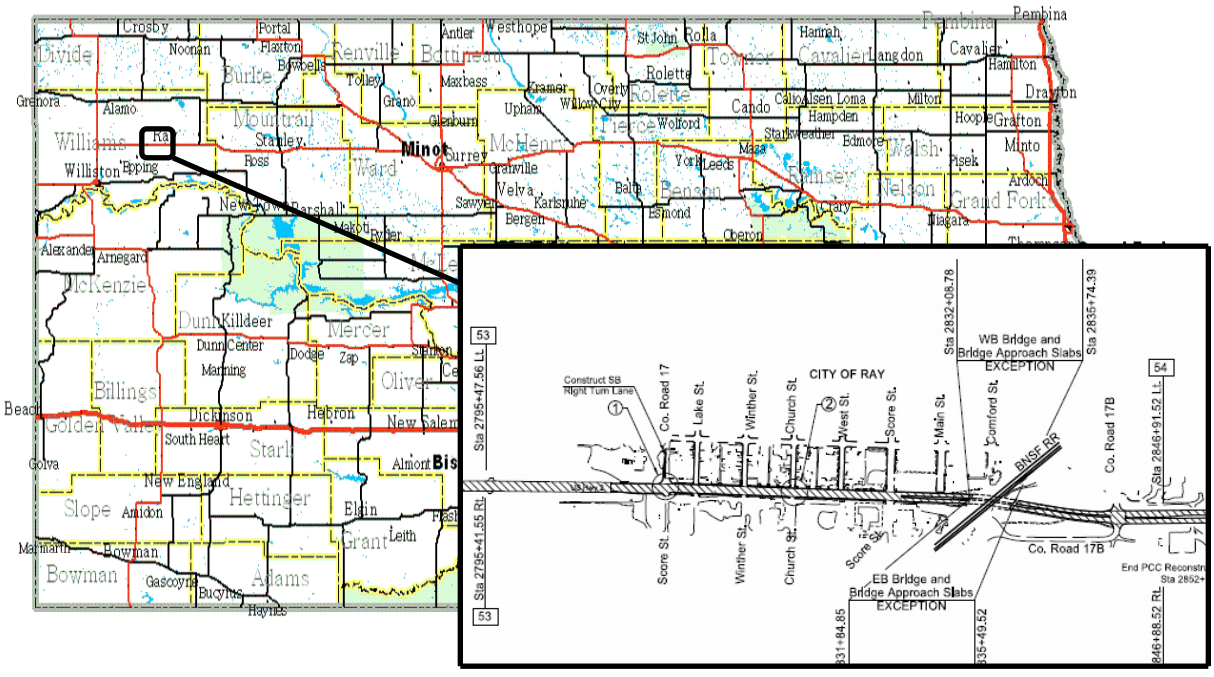
NDDOT currently specifies the Neenah R-1955-1 floating manhole casting or approved equal. The vendor for East Jordan Iron Works (EJIW) has a product the 3025 SELFLEVEL Assembly manhole casting that they claim as an “equivalent” product. The EJIW product number 00302511A01, 3025 SELFLEVEL manhole casting assembly has been selected for evaluation by the Design Division. This work plan will outline the installation and evaluation process.

Objective

The objective of this experimental project is to evaluate the performance of the EJIW product number 00302511A01, 3025 SELFLEVEL manhole casting assembly as an acceptable equal to the Neenah R-1955-1. The EJIW product details can be found in Appendix A.

Location

NDDOT plans to incorporate EJIW 3025 SELFLEVEL manhole castings as part of project SOIA-7-002(119)053. This project is located near Ray, ND on US 2.



Design

NDDOT plans to incorporate EJIW 3025 SELFLEVEL manhole on US 2 as part of project SOIA-7-002(119)053. The EJIW 3025 SELFLEVEL manhole casting will be incorporated with a plan note which is included below.

722-P01 MANHOLE CASTING TYPE 1 AND MANHOLE CASTING TYPE 2:
These two pay items consist of removing the existing manhole castings that are located in paved roadway, furnishing, and installing the new manhole castings.

The manhole castings specified under the pay item "Manhole Casting Type 2" shall be replaced with EJ castings. The product number 00302511A01 assembly and the 1040 cover 1-1/2" thick shall be used. For information regarding the EJ castings the Contractor shall call Sales Representative Mark Garrison at (715) 271-9014 or email mark.garrison@ejco.com.

All remaining castings shall be as specified on Standard Drawing D-722-05A.

All castings shall be placed flush to within 1/8 inch below the pavement.

The price bid shall include all equipment materials, and labor necessary to remove the existing casting, install the new casting, and adjust to the final grade. This will be measured and paid for as "Manhole Casting Type 1" and "Manhole Casting Type 2" each.

SOIA-7-002(119)053

This project consists of PCC Reconstruction, Turn Lanes, Turn Lane Extension, Traffic Signal, HAWK System, Guardrail, Sidewalk Canopy, Bridge Approach Slabs Joints Seal, and Incidentals. The project will have twelve manhole casting installed; six of which will be the experimental “Manhole Casting Type 1” (EJIW) and six of which will be the control “Manhole Casting Type 2” (Neenah). The design sheets showing the exact manhole casting locations can be found in Appendix B.

NDDOT intends to evaluate the EJIW product number 00302511A01, 3025 SELFLEVEL manhole casting assembly along with the control Neenah R-1955-1 floating manhole casting.

Evaluation

The project will be evaluated during construction then followed up with an annual evaluation for the next ten years.

To assure quality construction practices the concrete used to set the casting (control and experimental) shall be tested for slump and air. A set of 6 test cylinders shall be cast from the same batch for compressive strength testing. All tests shall conform to section 802.03 of the Field Sampling and Testing Manual.

The project will be evaluated on the following criteria:

- Visual Inspection
- Durability Issues
- Photos

Materials and Research will publish a biennial report documenting the observations of this project and future performance.

Construction

Project SOIA-7-002(119)053 was constructed over the 2013 construction season and incorporated six EJIW 3025 SELFLEVEL manhole castings along with six control manhole castings. The project was constructed in two major phases. Phase one allowed for construction of the west bound roadway while the existing eastbound roadway provided service. Phase one incorporated three of the control castings and was constructed in July of 2013. The remaining three controls casting where installed during phase two. Phase two was constructed late August through October of 2013 and included construction of the east bound roadway followed by median paving. All six experimental “manhole casting type 2” were placed during phase two. Exact locations of the control and experimental manhole casting see Appendix B.

The 3025 SELFLEVEL manhole casting assembly was placed prior to the paving operation by the underground sub-contractor Park Construction. Illustrated in photo one the EJ 3025 SELFLEVEL manhole casting is installed and ready for paving.

Photo 1: EJ 3025 SELFLEVEL manhole casting installed.

The underground sub-contractor found the new EJ 3025 SELFLEVEL manhole casting light weight and easily installed without use of mechanical assistance. They also found the elevation adjustments to be contractor friendly. The contractor preferred installation of the EJ 3025 SELFLEVEL manhole casting over the current standard mainly because its reduced weight and ease of adjustment. The contractor could not comment on long term durability but felt the EJ castings rubber gasket and steel sleeve may have better resilience and provide a better platform for vertical movement; then the plastic wrap used in the current standard pictured in Photo 2.

Photo 2: NDDOT typical "Manhole Casting Type 1"

Once adjusted and fixed to the existing manhole the castings are ready for concrete placement. Concrete is then placed in advance of the paving operation to serve as a platform for the required rebar placement pictured in photo 3.

Photo 3: Rebar installation prior to paving train.

The paving operation then traveled over the experimental manhole castings at this time a boom fork lift was used to suspend a concrete finisher over the casting. The concrete finisher made final elevation adjustments to the casting to assure proper alignment. After aligned the concrete finisher finished off the surrounding concrete.

Photo 4: Concrete Finisher making elevation adjustments.

Once the concrete set, the adjustment bolts where removed from both the control and experimental castings. PCC quality assurance was taken to assure the mix had adequate properties. All samples taken were within the specified limits for air, slump and strength with the exception of the air in the concrete sample taken from STA 2822+35 having 4.8% air content. This concrete sample with a 0.2% under the plan specified air content was placed around a control “manhole casting type 1” located at STA. 2822+34 in the eastbound roadway. The full summary of QC test data can be found in Appendix C.

1st Evaluation-2014

Six EJ manhole castings installed during the 2013 construction season on US 2 in Ray, ND were last visually inspected on June 11, 2014. All six installations successfully performed over the winter with no notable signs of distress. Images of the control and experimental casting are pictured below.

EJ Castings	Performance	Control Castings	Performance
MH-1	Satisfactory	2822+34	Satisfactory
MH-2	Satisfactory	MH-4	Satisfactory
2811+35	Satisfactory	2826+06 LT	Satisfactory
2815+02	Satisfactory	MH-9	Satisfactory
MH-3	Satisfactory	2826+07 RT	Satisfactory
2818+67	Satisfactory	2843+54	Satisfactory

Photo 5: MH-1 performance evaluation 6/11/14

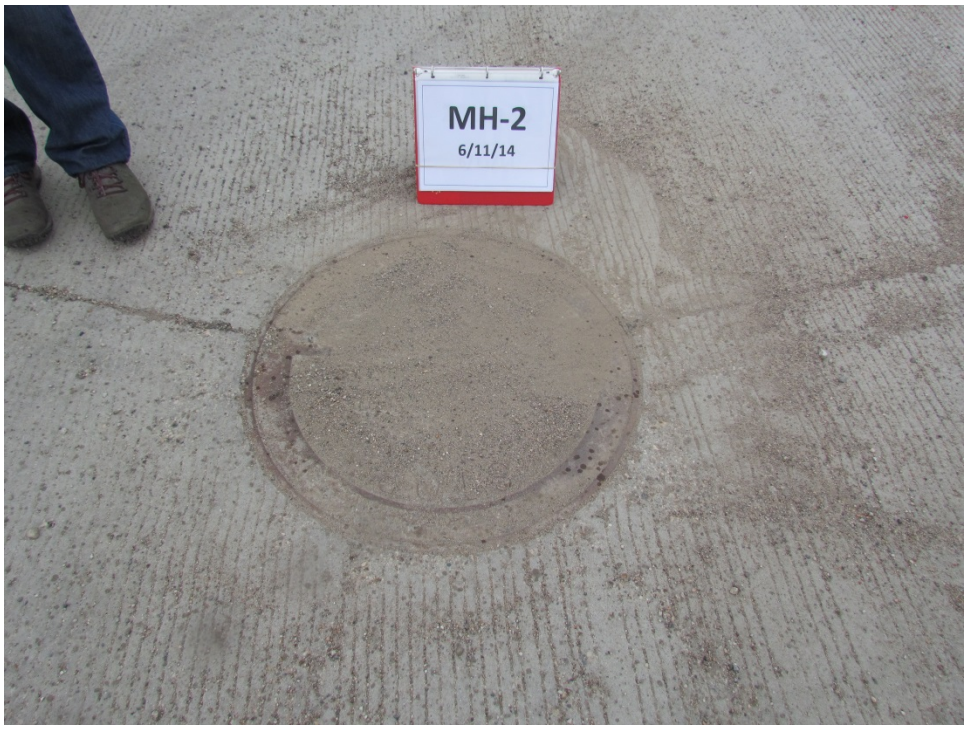


Photo 6: MH-2 performance evaluation 6/11/14

Photo 7: 2811+35 performance evaluation 6/11/14

Photo 8: 2815+02 performance evaluation 6/11/14

Photo 9: MH-3 performance evaluation 6/11/14

Photo 10: 2818+67 performance evaluation 6/11/14

Photo 11: 2822+34 control performance evaluation 6/11/14

Photo 12: MH-4 control performance evaluation 6/11/14

Photo 13: 2826+06 control performance evaluation 6/11/14

Photo 14: MH-9 control performance evaluation 6/11/14

Photo 15: 2826+07 performance evaluation 6/11/14

Photo 16: 2843+54 control performance evaluation 6/11/14

2nd Evaluation-2016

Six EJ manhole castings installed during the 2013 construction season on US 2 in Ray, ND were last visually inspected on July 27, 2016. All six installations successfully performed over the winter with no notable signs of distress. Images of the control and experimental casting are pictured below.

EJ Castings	Performance	Control Castings	Performance
MH-1	Satisfactory	2822+34	Satisfactory
MH-2	Satisfactory	MH-4	Satisfactory
2811+35	Satisfactory Hairline Crack	2826+06 LT	Satisfactory
2815+02	Satisfactory	MH-9	Satisfactory
MH-3	Satisfactory	2826+07 RT	Satisfactory
2818+67	Satisfactory	2843+54	Satisfactory

Photo 17: MH-1 performance evaluation 7/27/16

Photo 18: MH-2 performance evaluation 7/27/16

Photo 19: 2811+35 performance evaluation 7/27/16, Hairline Crack Present.

Photo 20: 2815+02 performance evaluation 7/27/16

Photo 21: MH-3 performance evaluation 7/27/16

Photo 22: 2818+67 performance evaluation 7/27/16

Photo 23: 2822+34 control performance evaluation 7/27/16

Photo 24: MH-4 control performance evaluation 7/27/16

Photo 25: 2826+06 control performance evaluation 7/27/16

Photo 26: MH-9 performance evaluation 7/27/16

Photo 27: 2826+07 control performance evaluation 7/27/16

Photo 28: 2843+54 control performance evaluation 7/27/16

Summary

The construction summary of the six experimental EJ manhole castings, (product number 00302511A01 assembly with 1-1/2" thick 1040 cover), were installed in accordance with the plans; no notable issues occurred. Park Construction, the underground contractor commented on the ease of installation due to the reduction in weight and found the height adjustments contractor friendly. The general contractor ACME Construction also found the height adjustments user friendly, but did express concerns about the spalling of concrete in the flange areas of both styles of casting, but felt that the larger flange handle design of the EJ casting may help to reduce the risk of spalling. They found the new castings easy to pave around, adjust and incorporate into the roadway. The project engineer found the new castings contractor friendly without presenting any unusual problems.

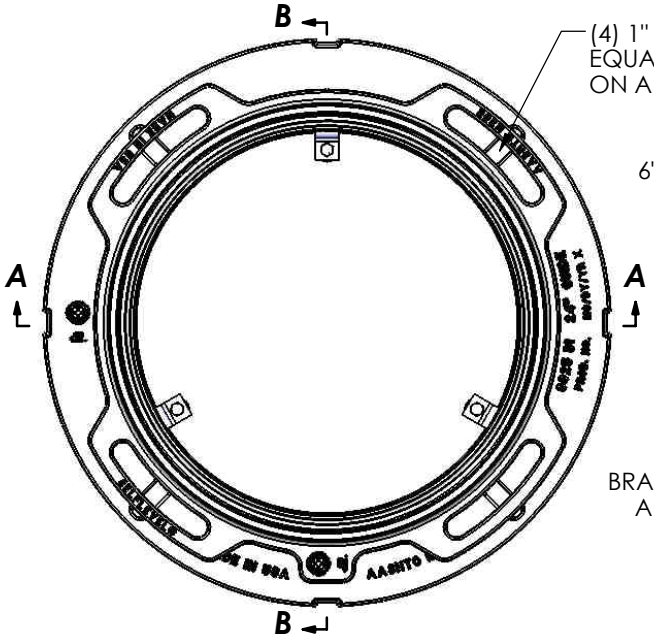
Visual inspection completed on July 27, 2016 showed the six castings performed adequately over three winters. The only notable durability issues was on the casting at STA 2811+35 exhibiting a tight hairline crack.

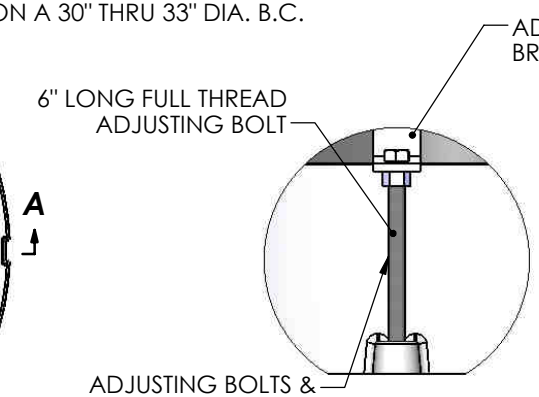
Recommendation

M&R deemed EJ 3025 SELFLEVEL manhole castings as an approved equal to the current Neenah R-1955-1 floating manhole casting after four years of satisfactory field performance. NDDOT has developed details allowing both manhole castings allowing contractors to have a competitive bid environment.

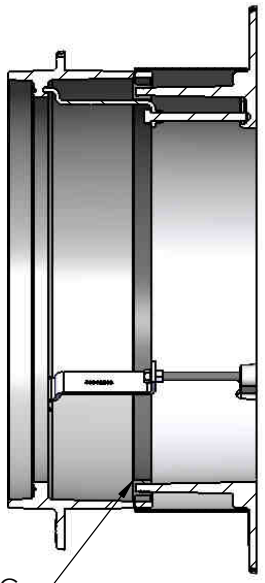
Appendix A

3025 SELFLEVEL Assembly

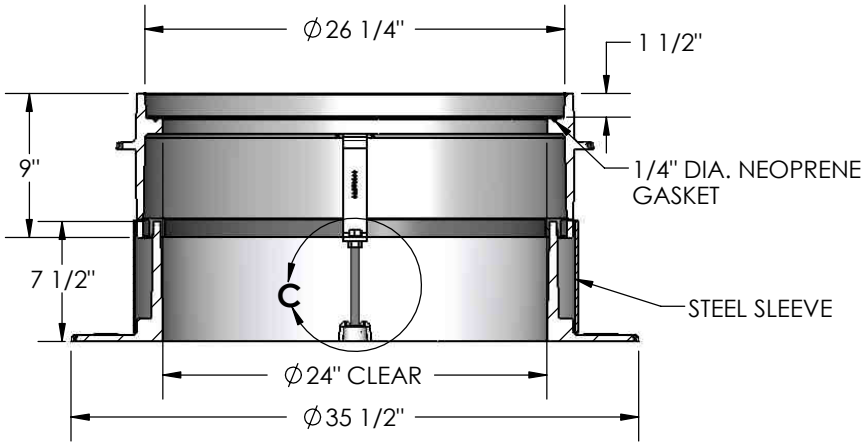




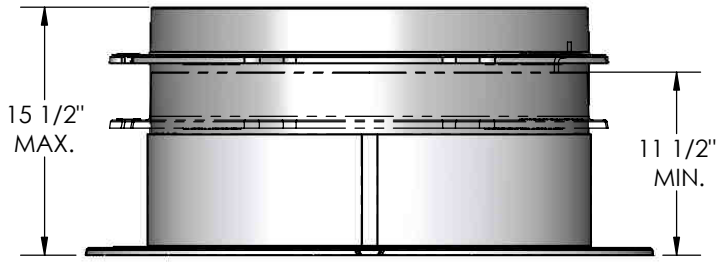
ADJUSTING BRACKET DETAIL C



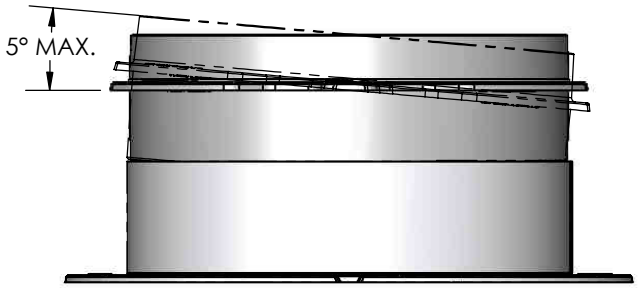
SECTION B-B



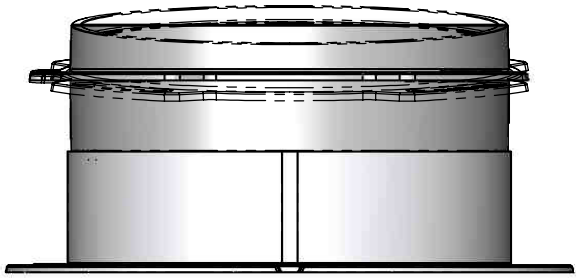
SECTION A-A



SIDE VIEW
(SHOWING TRAVEL OF UPPER FRAME)



FRONT VIEW
(SHOWING MAXIMUM TIP @ 5° ANGLE)



SIDE VIEW
(SHOWING MAXIMUM TIP @ 5° ANGLE)

Product Number

00302511A01

Design Features

-Materials
  Frame
    Ductile Iron (70-50-05)
  Frame
    Ductile Iron (70-50-05)
  Accessory
    Steel

-Design Load
  Heavy Duty
-Open Area
  n/a
-Coating
  Undipped
-√ Designates Machined Surface

Certification

-ASTM A536
-AASHTO M306
-
-Country of Origin: USA

Major Components

00302511
00302519
00302596

Drawing Revision

2/28/2009 Designer: JIJ
06/01/2012 Revised By: JIJ

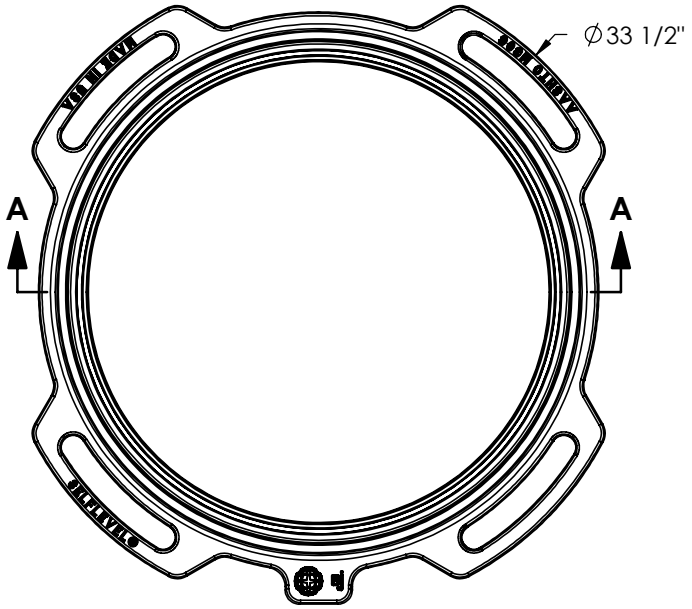
Disclaimer

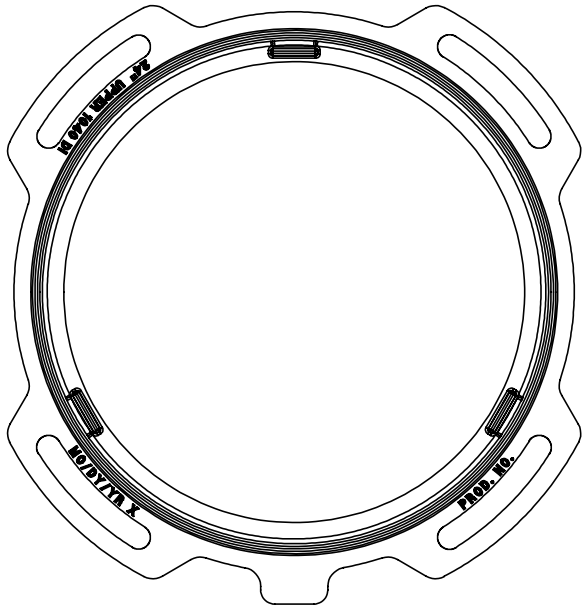
Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact

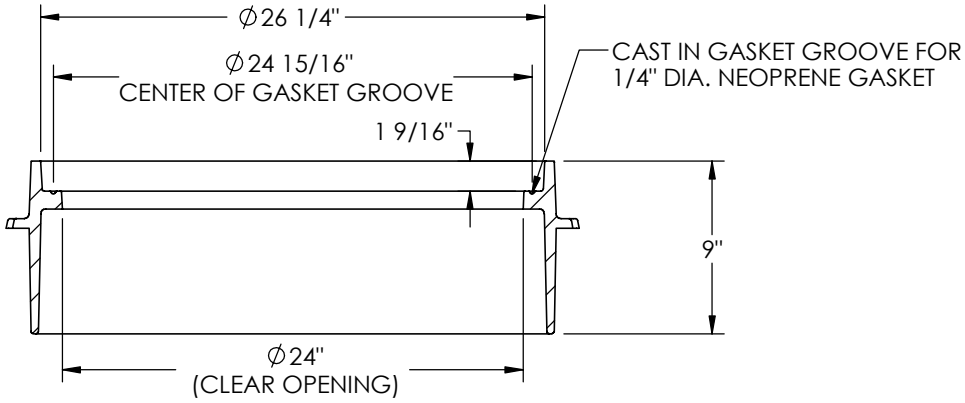
800.626.4653
ejco.com

3025 SELFLEVEL Frame





BOTTOM VIEW



SECTION A-A

Product Number

00302511

Design Features

-Materials
  Ductile Iron (80-55-06)
-Design Load
  Heavy Duty
-Open Area
  n/a
-Coating
  Undipped
-√ Designates Machined Surface

Certification

-ASTM A536
-
-
-Country of Origin: USA

Drawing Revision

3/14/2012 Designer: JIJ
06/05/2012 Revised By: JIJ

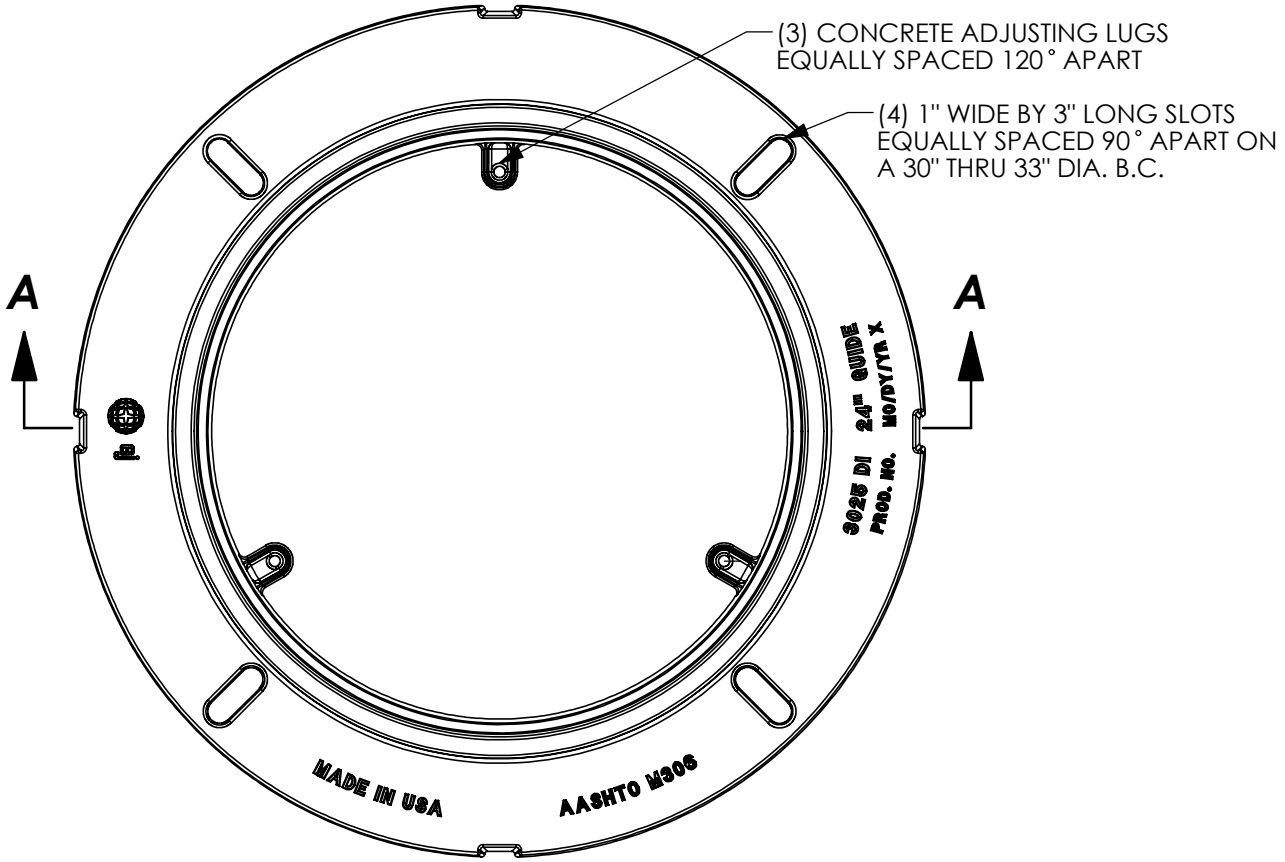
Disclaimer

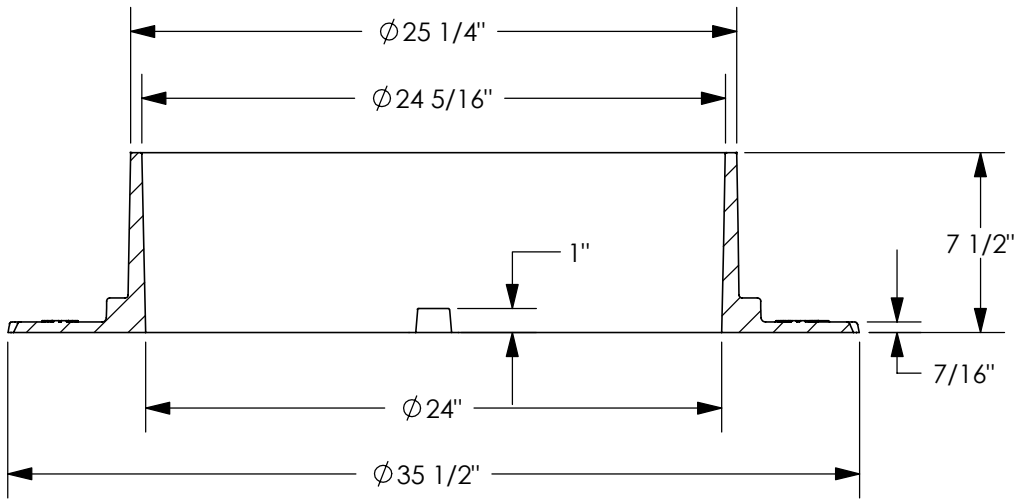
Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact

800 626 4653
ejco.com

3025 SELFLEVEL Frame





SECTION A-A

Product Number

00302519

Design Features

-Materials
  Ductile Iron (80-55-06)
-Design Load
  Heavy Duty
-Open Area
  n/a
-Coating
  Undipped
-√ Designates Machined Surface

Certification

-ASTM A536
-
-
-Country of Origin: USA

Drawing Revision

03/14/2012 Designer: JIJ
06/05/2012 Revised By: JIJ

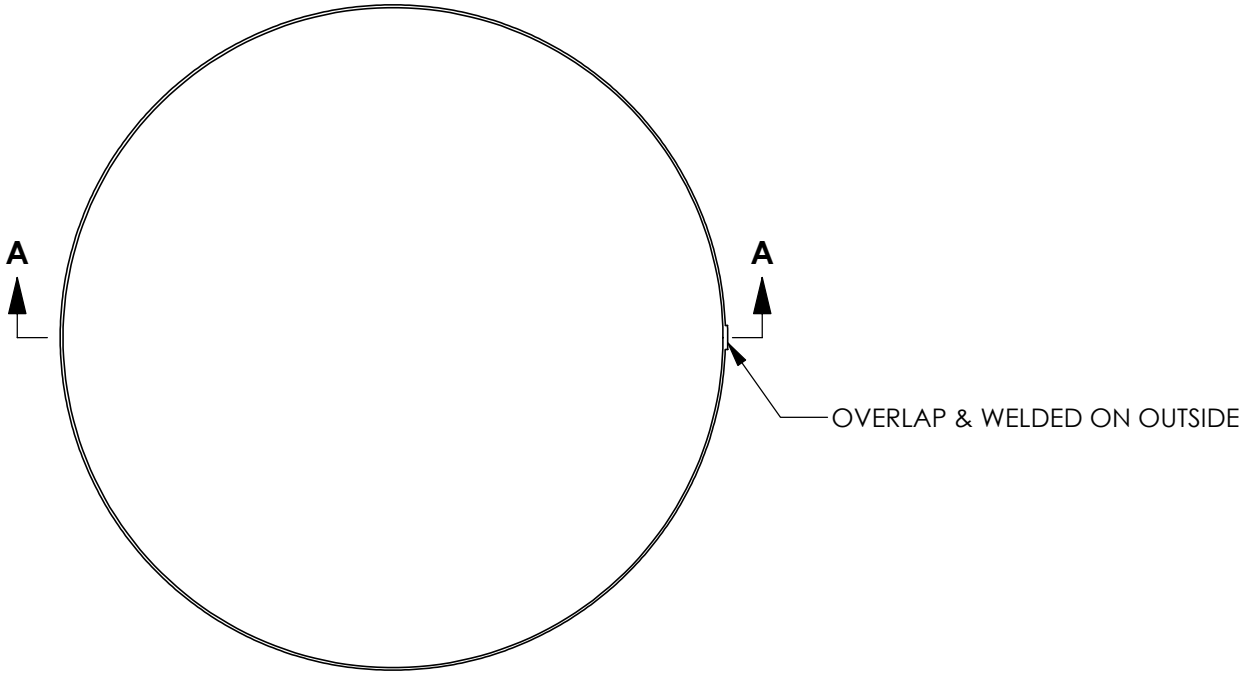
Disclaimer

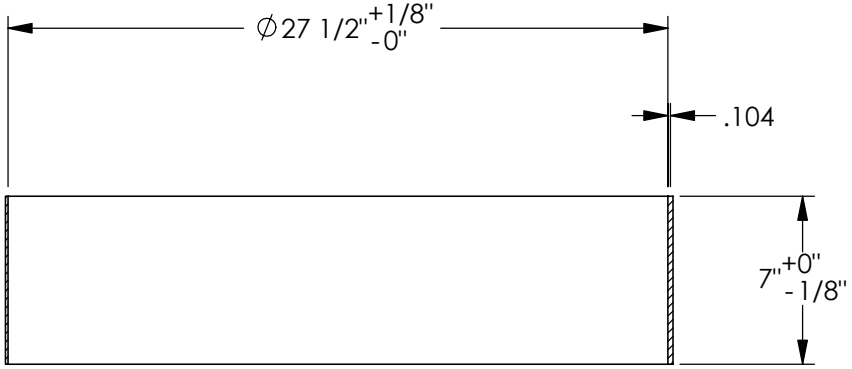
Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact

800 626 4653
ejco.com

3025 Selflevel Steel Sleeve





SECTION A-A

Product Number

00302596

Design Features

-Materials
Steel (12 gage Hot Rolled)
-Design Load
n/a
-Open Area
n/a
-Coating
Paint (Flat Black Rustoleum)
-√Designates Machined Surface

Certification

-
-
-
-Country of Origin: USA

Drawing Revision

06/04/2012 Designer: JIJ
06/05/2012 Revised By: JIJ

Disclaimer

Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact

800 626 4653
ejco.com

EJ SELF LEVEL® Specification – Concrete Installation

General

This specification is applicable where a height adjustable manhole frame with a cover or grate is being installed in a concrete slab. Frames shall be made from ductile iron. Frame castings shall be EJ SELF LEVEL® Model 3025 or approved equal. Covers shall be either EJ Model 1040 or 1905 and be made from either gray or ductile iron.

Material

Manufacturer shall certify that the ductile iron conforms to ASTM A536 grade 70-50-05 or 80-55-06. Gray iron castings shall conform to ASTM A48 Class 35B. Castings must contain a minimum of 85% recycled content.

Markings

All products shall have the product name or series number, country of origin, specific part number, production date, material information, and the manufactures identification or name (EJ) permanently cast on the product. The top of manhole covers shall have the country of origin and manufacturers identification. Bottom of the casting shall have the product name or series number, part number, production date (example: mm/dd/yy) for tracking purposes, and material quality (such as ASTM A536) to verify the materials used. Castings without proper markings shall be rejected.

Product Specifics

This product shall be available with a 24" clear opening design and be designed to accept covers that are 26" Diameter x 1-1/2" thick. Castings shall be adjust able and have a minimum height adjustment of 11-1/2" and a maximum height adjustment of 15-1/2". The product shall be provided with a steel outer sleeve which will allow the upper frame to move in either an up or down direction after installation. The upper frame shall be provided with a minimum of 4 protrusions that will allow the upper frame to be securely imbedded into the concrete slab. The product shall be provided with 3 adjusting bolts and brackets that will allow the frame to be held at the correct elevation while the product is being installed. Adjusting bolts and brackets shall be removed after frame installation and concrete curing.

For locations not placed in direct traffic paths the covers shall be suitable for traffic loading and shall have passed a 50,000 pound proof load test as outlined in AASHTO M306. For locations where the traffic path will be over the product the covers shall be suitable for traffic loading and shall have passed a 150,000 pound proof load test as outlined in AASHTO M306 and weigh a minimum of 175 pounds. Covers shall be labeled as per the bidding documents. Cover dimensions shall be 26" diameter x 1-1/2" seat thickness.

Castings shall be of uniform quality, free from sand holes, gas holes, cracks, shrinkage and other surface defects. Castings shall be reasonably well cleaned by shot blasting. Runners, risers, fins and other cast-on pieces shall be removed from the castings and such areas shall be ground smooth. As-cast

dimensions may vary within accepted foundry tolerances as outlined in the Iron Castings Handbook published by the American Foundrymen's Society, Inc. Nominally, casting dimensional tolerances shall be +/- 1/16 inch per foot. Castings shall be furnished uncoated.

Product Options

It is recommended for installations that will be subject to traffic that an appropriate INFRA-RISER product be installed underneath the lower guide frame. This will help cushion the impact of traffic onto the underlying infrastructure.

Certification

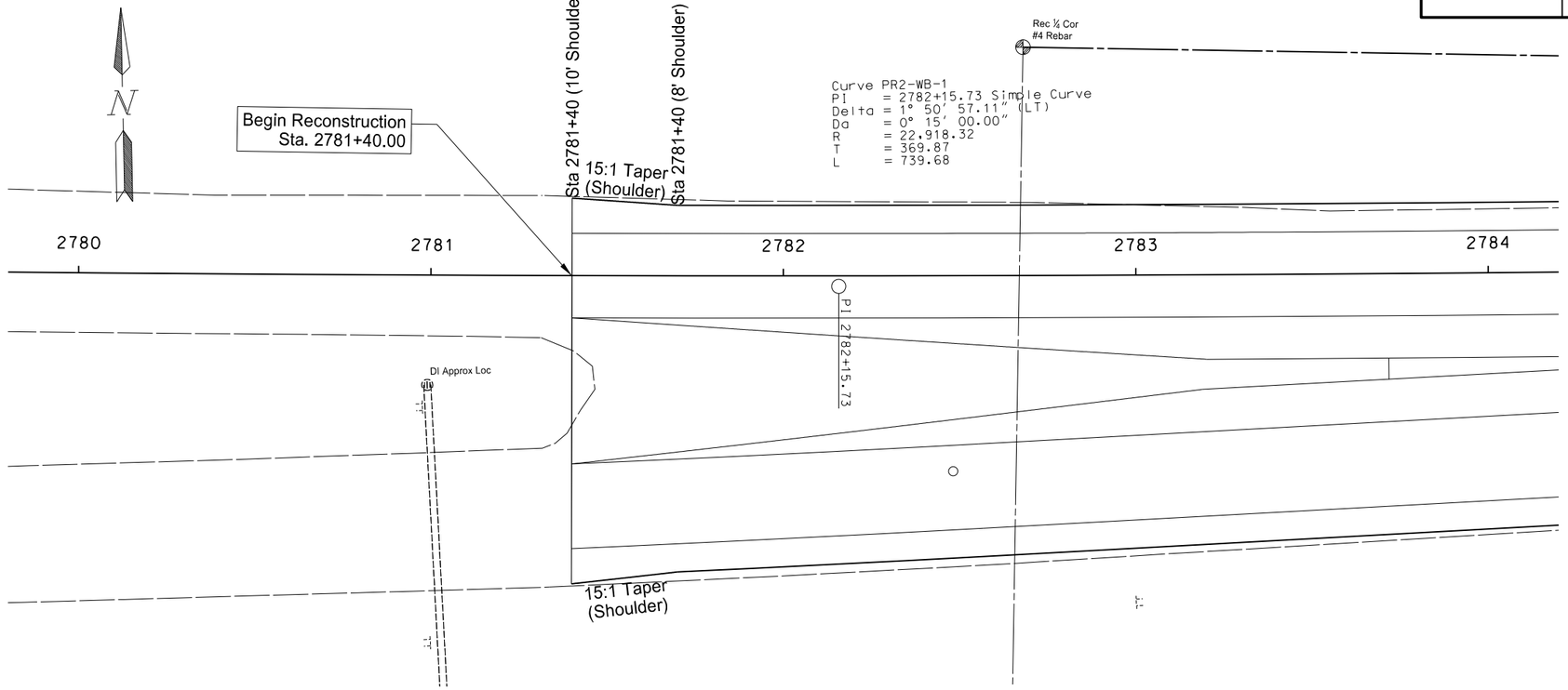
ASTM A48 Class 35B	Material
AASHTO M105 Class 35B	Material
ASTM A536 70-50-05	Material
ASTM A536 80-55-05	Material
AASHTO M306	Performance
ISO 9001:2008	Quality Assurance

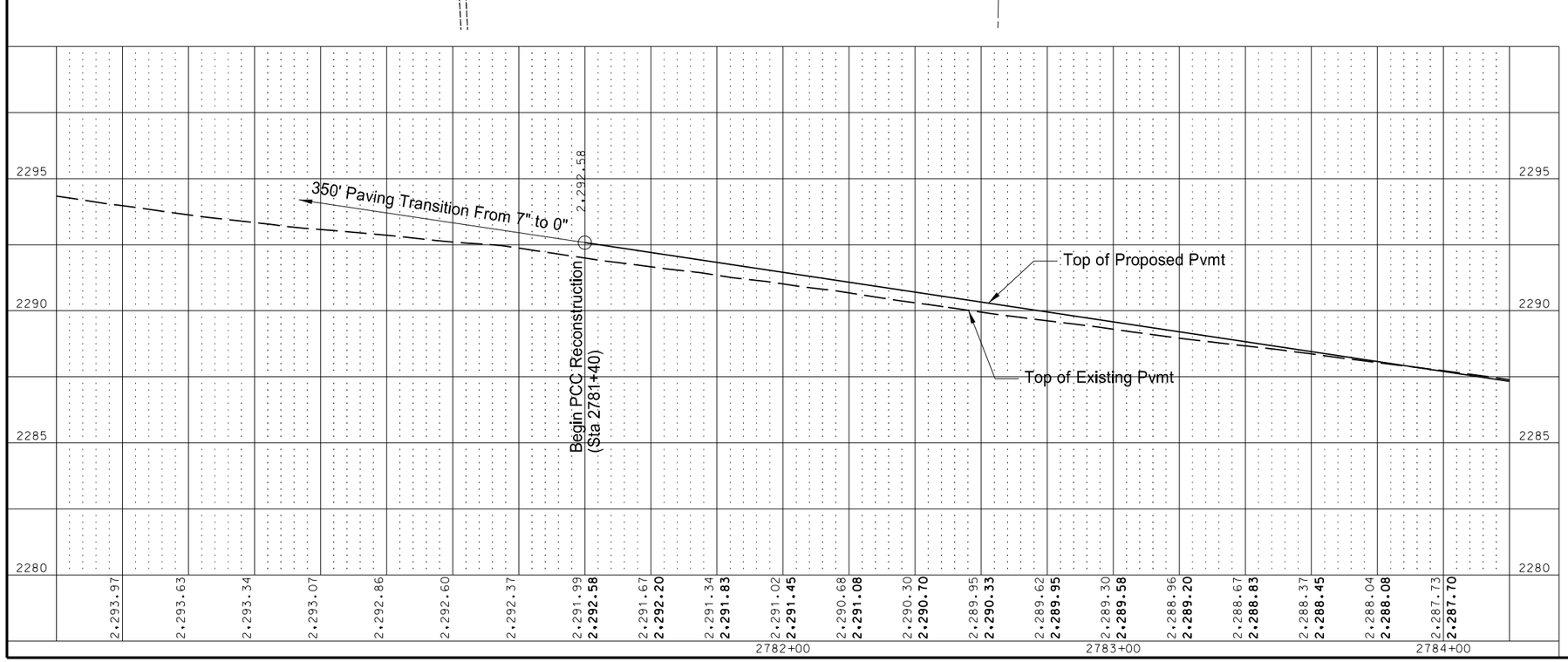
Quality Assurance

System of manufacturing quality assurance must conform to the requirements of ISO 9001:2008 and be certified by a third party.

Appendix B

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIA-7-002(119)053	60	1

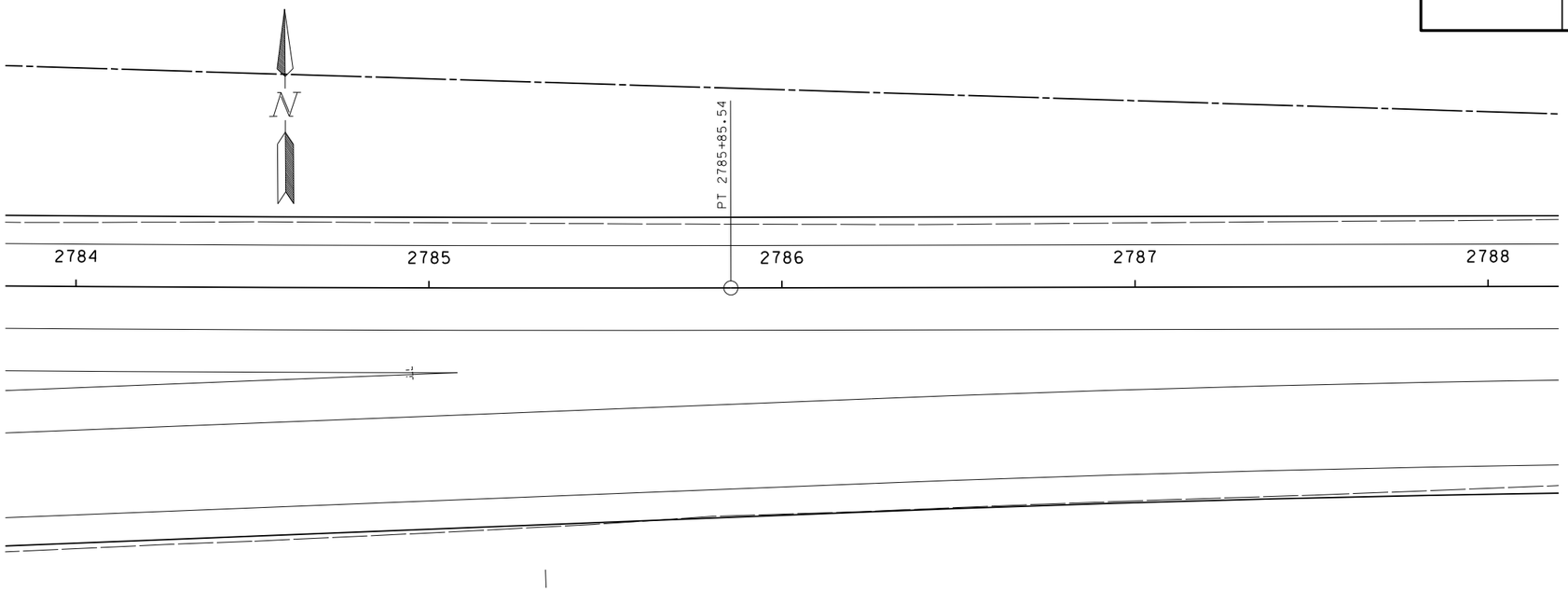


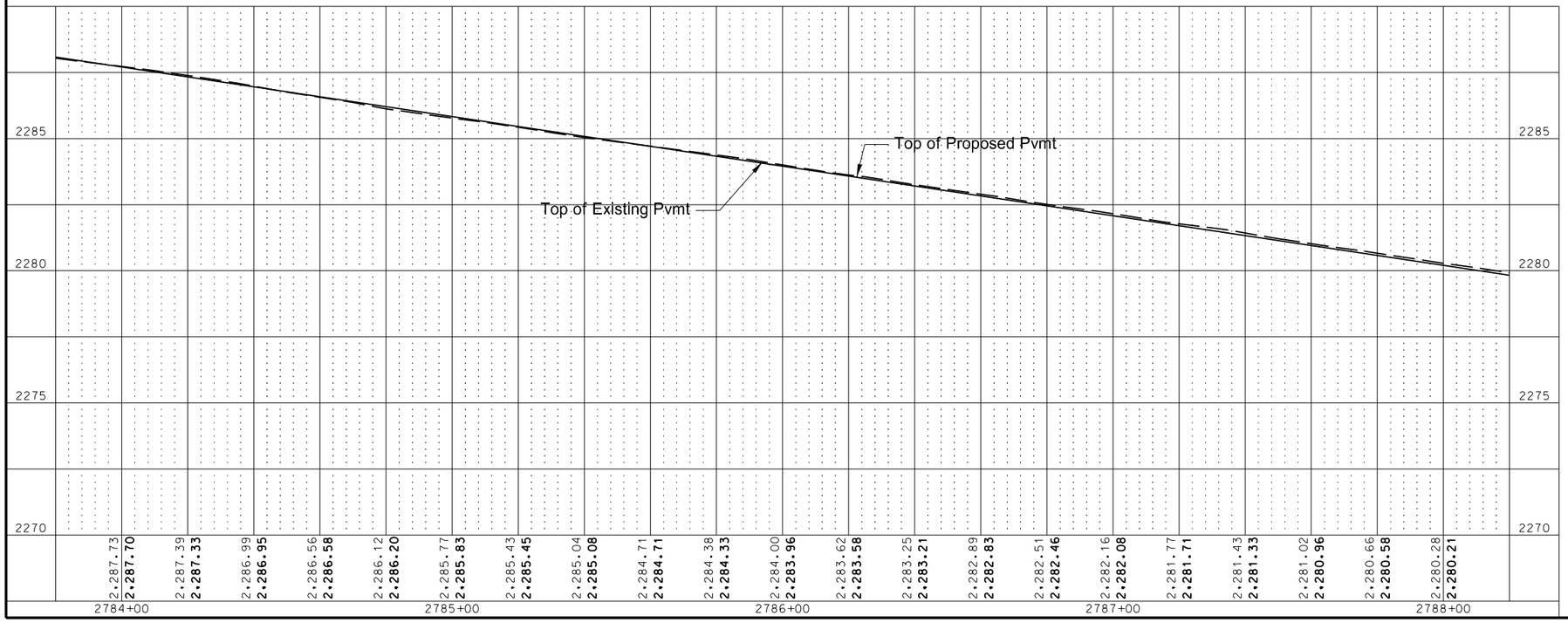


PLAN AND PROFILE

2781+40 TO 2784+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIA-7-002(119)053	60	2

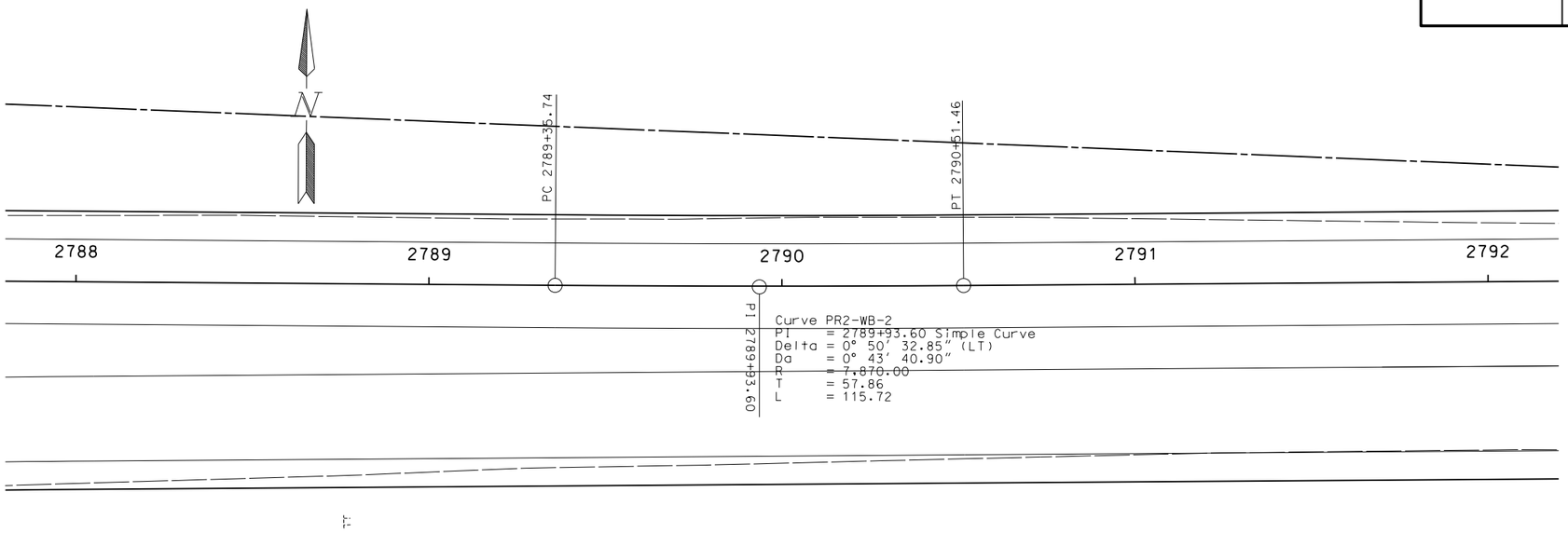


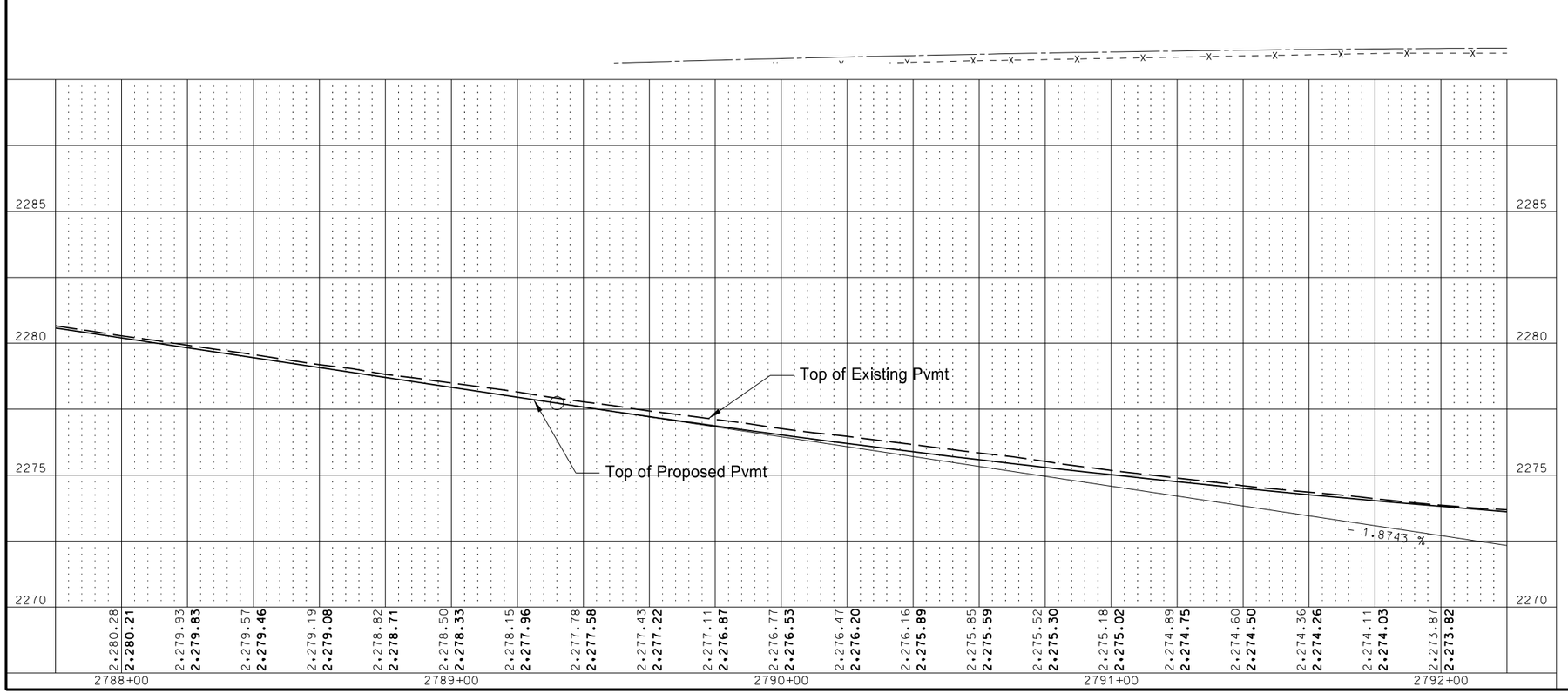


PLAN AND PROFILE

2784+00 TO 2788+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIA-7-002(119)053	60	3

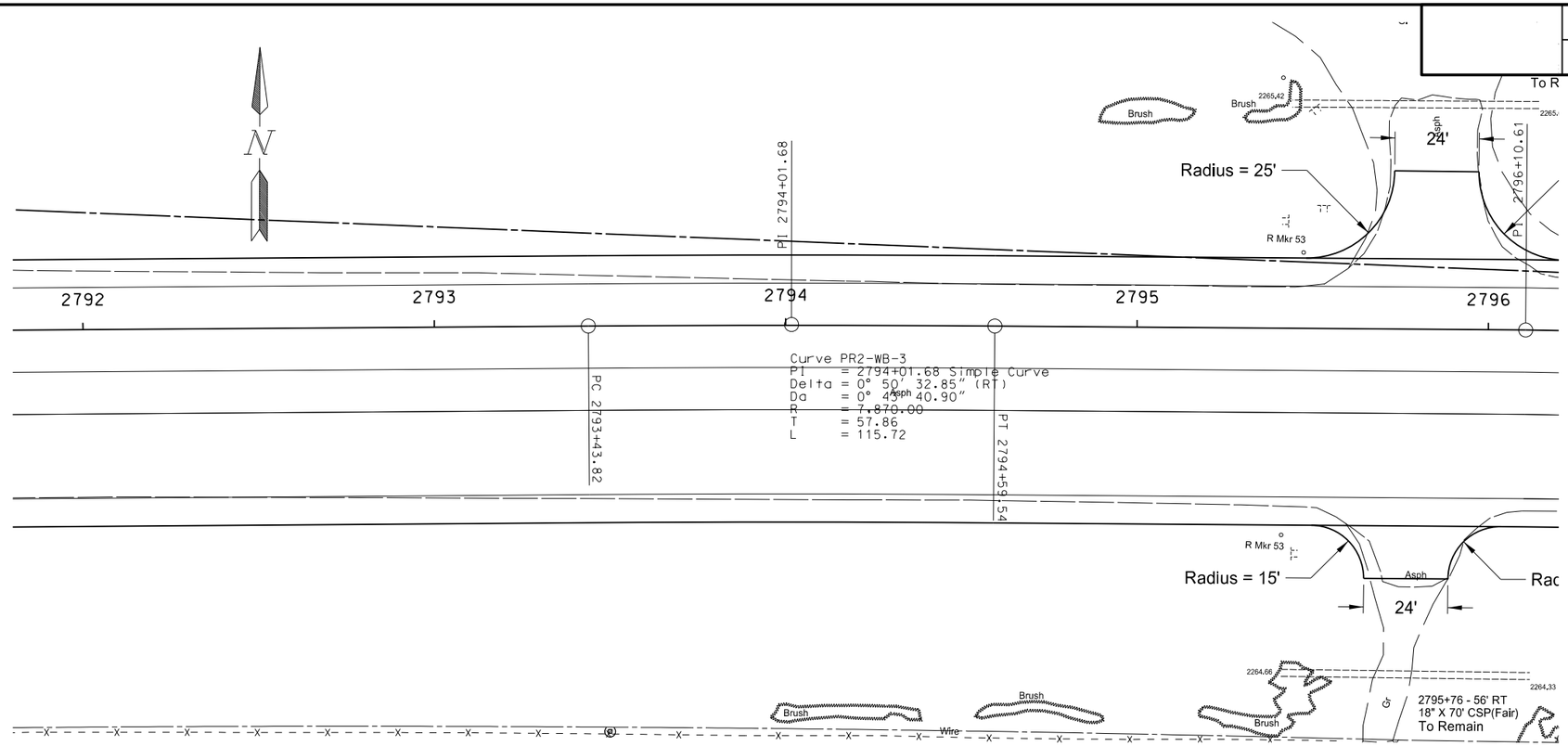




PLAN AND PROFILE

2788+00 TO 2792+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	4



PLAN AND PROFILE

2792+00 TO 2796+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	5

2795+80 - 106' LT
30" X 70' CSP(Fair)
2 CSES(Fair)
To Remain

2265.02

24'

2796+10.61
PI

Radius = 25'

N

2796 2797 2798 2799 2800

Radius = 15'

2264.33

2795+76 - 56' RT
18" X 70' CSP(Fair)
To Remain

Brush

Brush

2275
2270
2265
2260

Top of Existing Pvmt

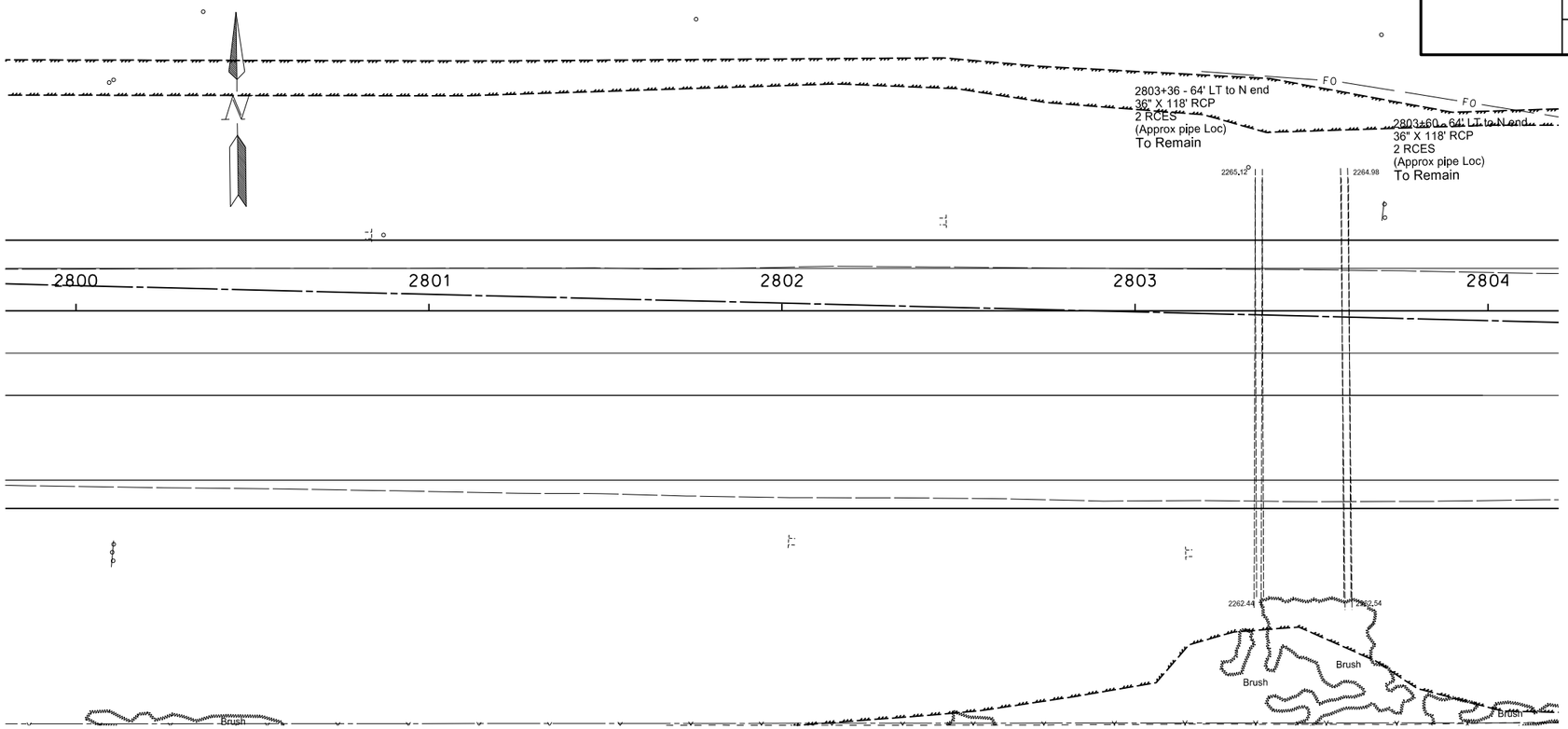
Top of Proposed Pvmt

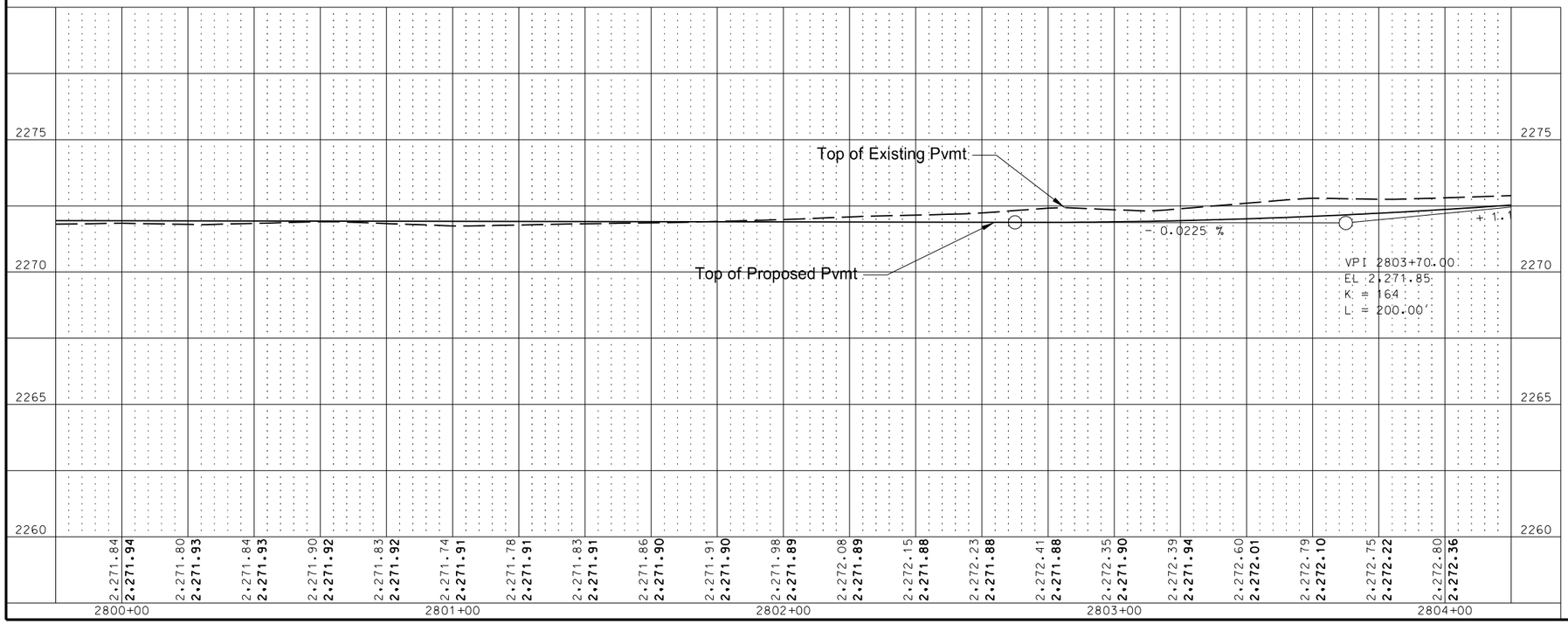
2796+00	2797+00	2798+00	2799+00	2800+00
2,271.87 / **2,272.03**	2,271.83 / **2,272.02**	2,271.80 / **2,272.02**	2,271.76 / **2,272.01**	2,271.75 / **2,272.01**
2,271.80 / **2,272.00**	2,271.86 / **2,272.00**	2,271.90 / **2,272.00**	2,271.92 / **2,271.99**	2,271.91 / **2,271.99**
2,271.90 / **2,271.98**	2,271.90 / **2,271.98**	2,271.81 / **2,271.97**	2,271.76 / **2,271.97**	2,271.78 / **2,271.96**
2,271.81 / **2,271.96**	2,271.82 / **2,271.96**	2,271.81 / **2,271.95**	2,271.78 / **2,271.95**	2,271.81 / **2,271.94**
2,271.84 / **2,271.94**				

PLAN AND PROFILE

2796+00 TO 2800+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIA-7-002(119)053	60	6

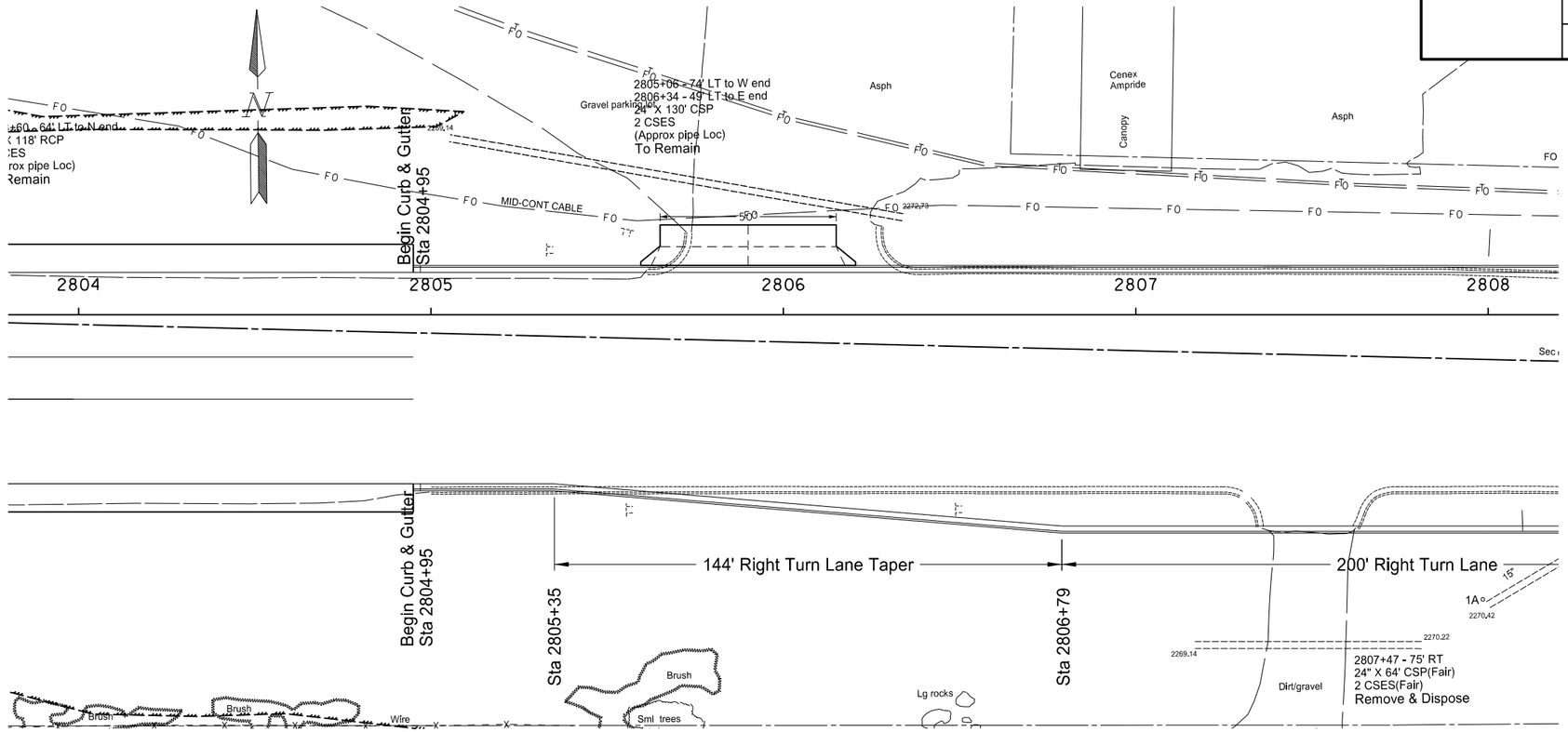


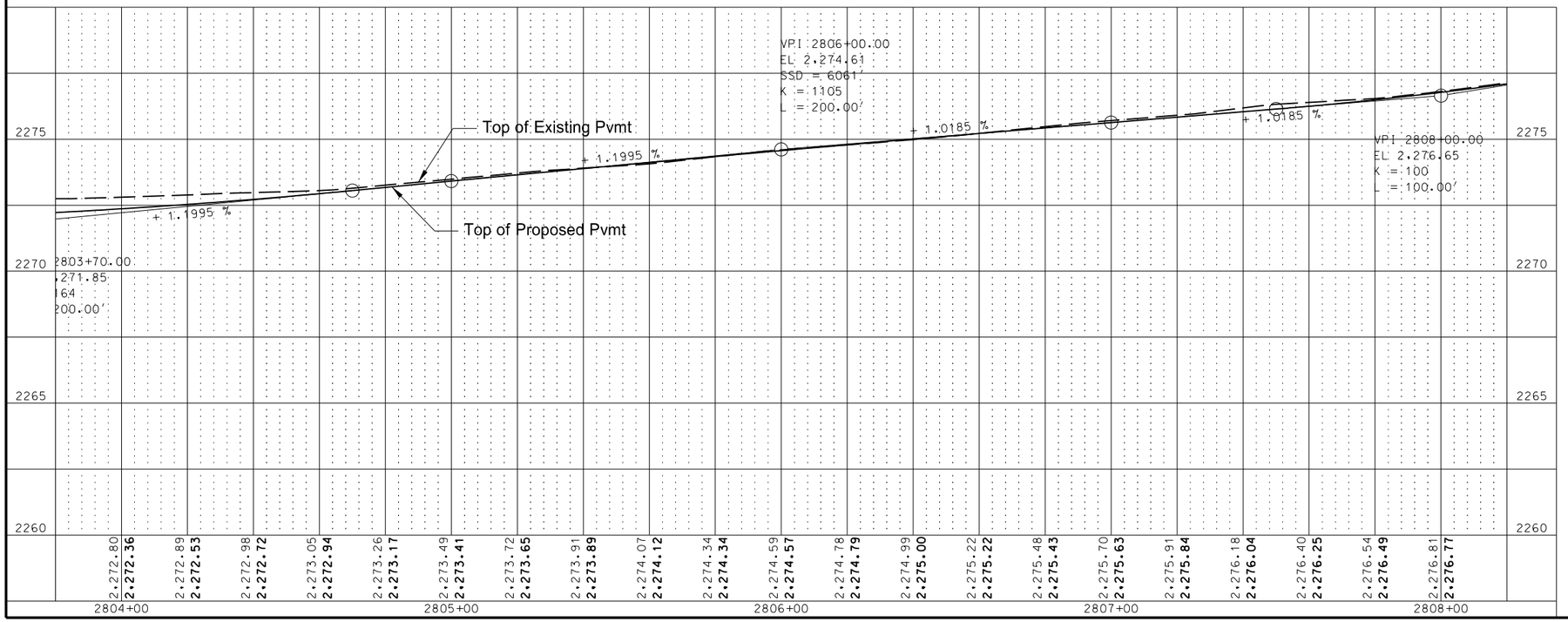


PLAN AND PROFILE

2800+00 TO 2804+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	7





SPEC CODE	BID ITEM		UNIT	QUANTITY
202	174	REMOVAL OF PIPE ALL TYPES & SIZES		
		2807+47 - 94' Rt	LF	64

PLAN AND PROFILE

2804+00 TO 2808+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	8

SPEC CODE	BID ITEM	UNIT	QUANTITY
202 174	**REMOVAL OF PIPE ALL TYPES & SIZES**		
	2808+72 - 76' Lt to 142' Lt	LF	66
	1D	LF	5
	2D	LF	8
202 230	**REMOVAL OF INLETS**		
	CB #2, CI #3	EA	2
	CB #4, CB #5, CB #6, CB #7	EA	4
714 4092	**PIPE CONDUIT 12 IN - STORM DRAIN**		
	2C	LF	4
714 4097	**PIPE CONDUIT 15 IN - STORM DRAIN**		
	1-2 to 1C	LF	42
	2-2 to 2A	LF	14
	2-3 to 2B	LF	12
722 100	**MANHOLE 48 IN**		
	MH 1-2	EA	1
	MH 2-2	EA	1
	MH 2-3	EA	1
722 318	**MANHOLE CASTING TYPE 2**		
	MH 1	EA	1
	MH 2	EA	1
	2811+35 - 35.2' Rt (San)	EA	1
722 1100	**MANHOLE RISER 48 IN**		
	MH 1-2	LF	4.9
	MH 2-2	LF	4.87
	MH 2-3	LF	5.36
722 3510	**INLET - TYPE 2**		
	1C	EA	1
	1D	EA	1
	2B	EA	1
	2C	EA	1
	2D	EA	1
722 4050	**INLET MOUNTABLE CURB - TYPE A**		
	2A	EA	1
722 6240	**ADJUST UTILITY APPURTENANCE**		
	2811+69 - 4.3' Rt	EA	1
	2811+77 - 4.2' Rt	EA	1

PLAN AND PROFILE

2808+00 TO 2812+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

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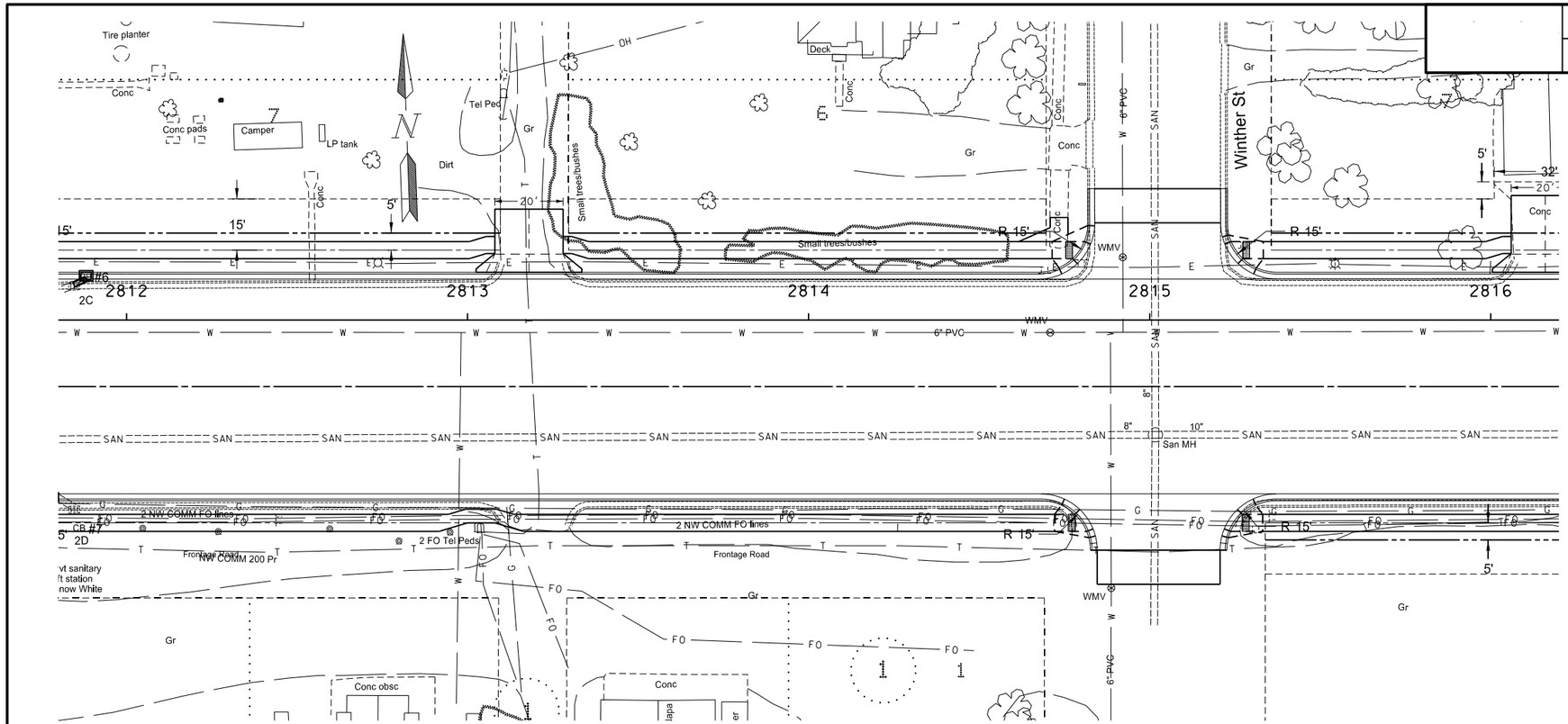
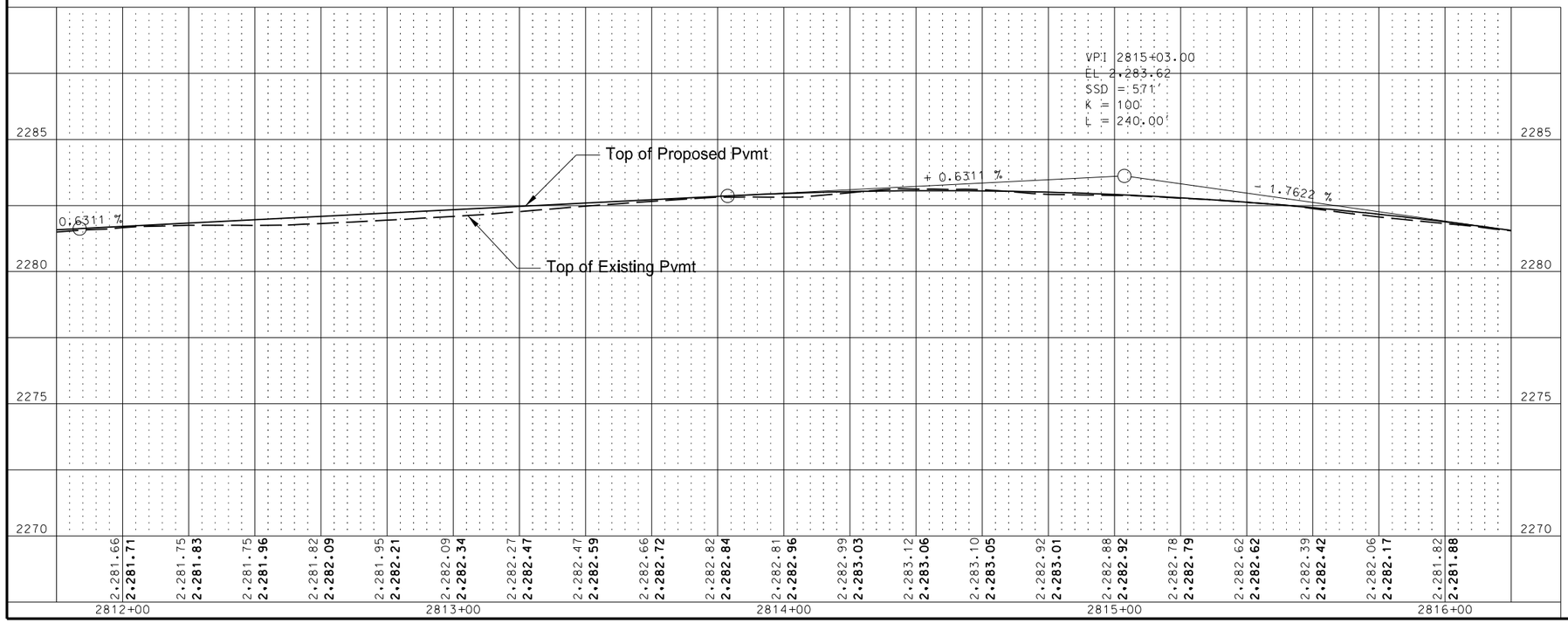
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	9

SPEC CODE	BID ITEM	UNIT	QUANTITY
722 318	**MANHOLE CASTING TYPE 2**		
	2815+02 - 33.7' Rt (San)	EA	1
722 6240	**ADJUST UTILITY APPURTENANCE**		
	2814+71 - 3.7' Rt	EA	1
	2814+92 - 18.3' Lt	EA	1



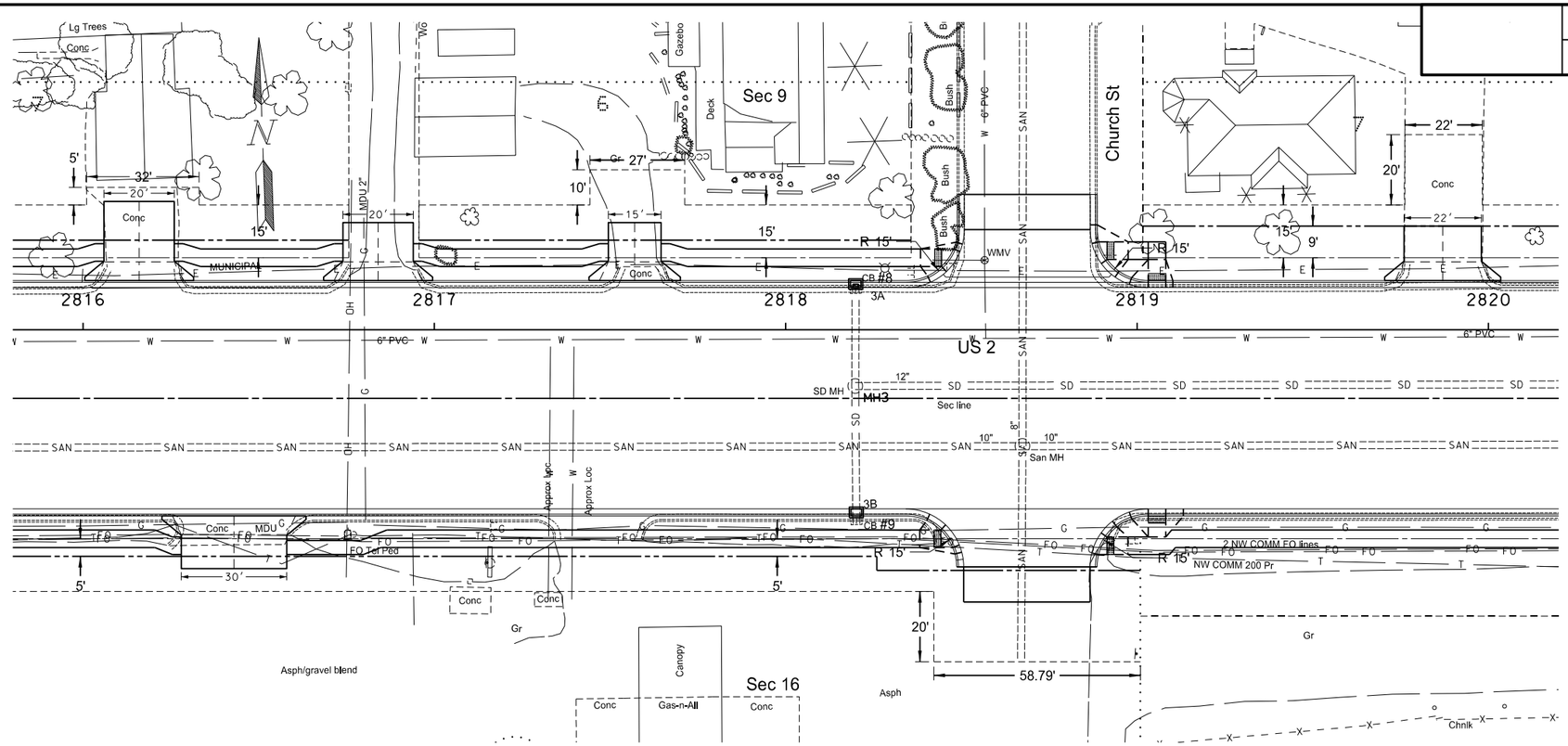


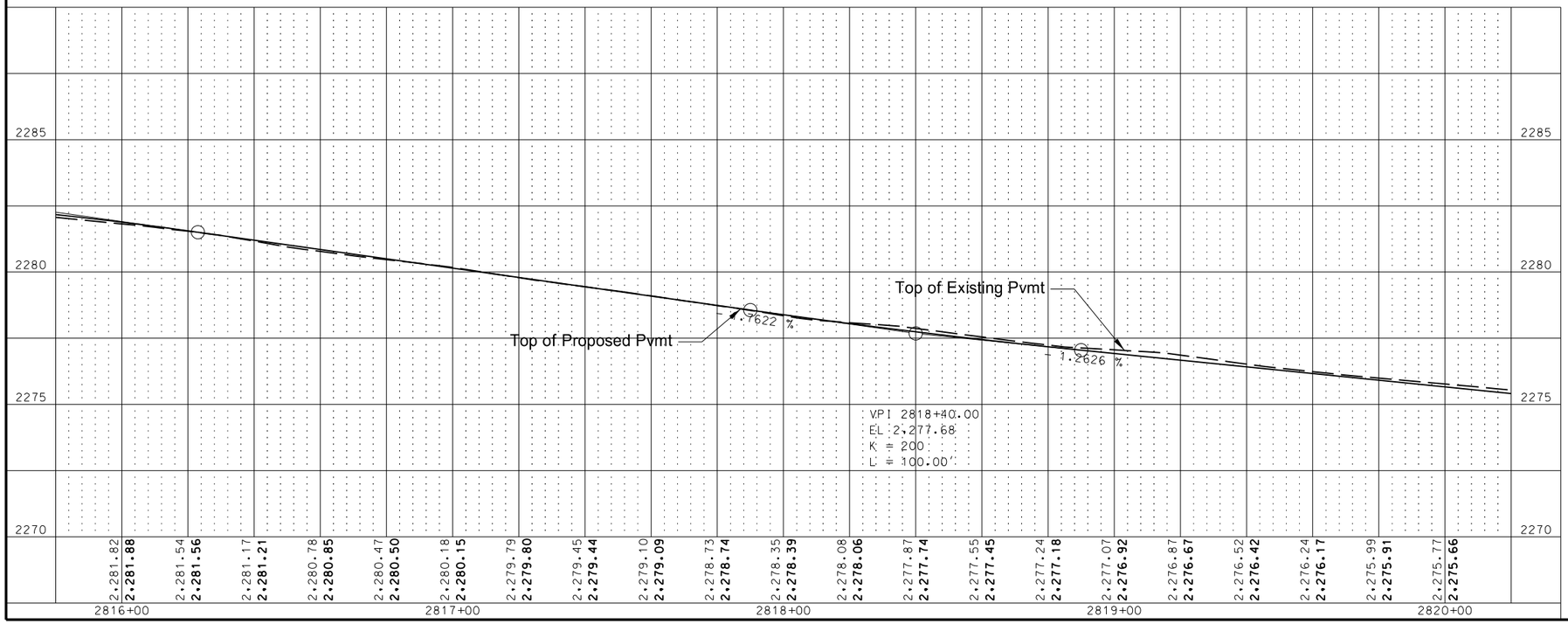
PLAN AND PROFILE

2812+00 TO 2816+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	10

SPEC CODE	BID ITEM	UNIT	QUANTITY
202 174	**REMOVAL OF PIPE ALL TYPES & SIZES**		
	3B	LF	2
202 230	**REMOVAL OF INLETS**		
	CB #8, CI #9	EA	2
714 4092	**PIPE CONDUIT 12 IN - STORM DRAIN**		
	3A	LF	2
722 318	**MANHOLE CASTING TYPE 2**		
	MH 3	EA	1
	2818+67 - 33.1' Rt (San)	EA	1
722 3510	**INLET - TYPE 2**		
	3A	EA	1
	3B	EA	1
722 6240	**ADJUST UTILITY APPURTENANCE**		
	2818+57 - 19.7' Lt	EA	1



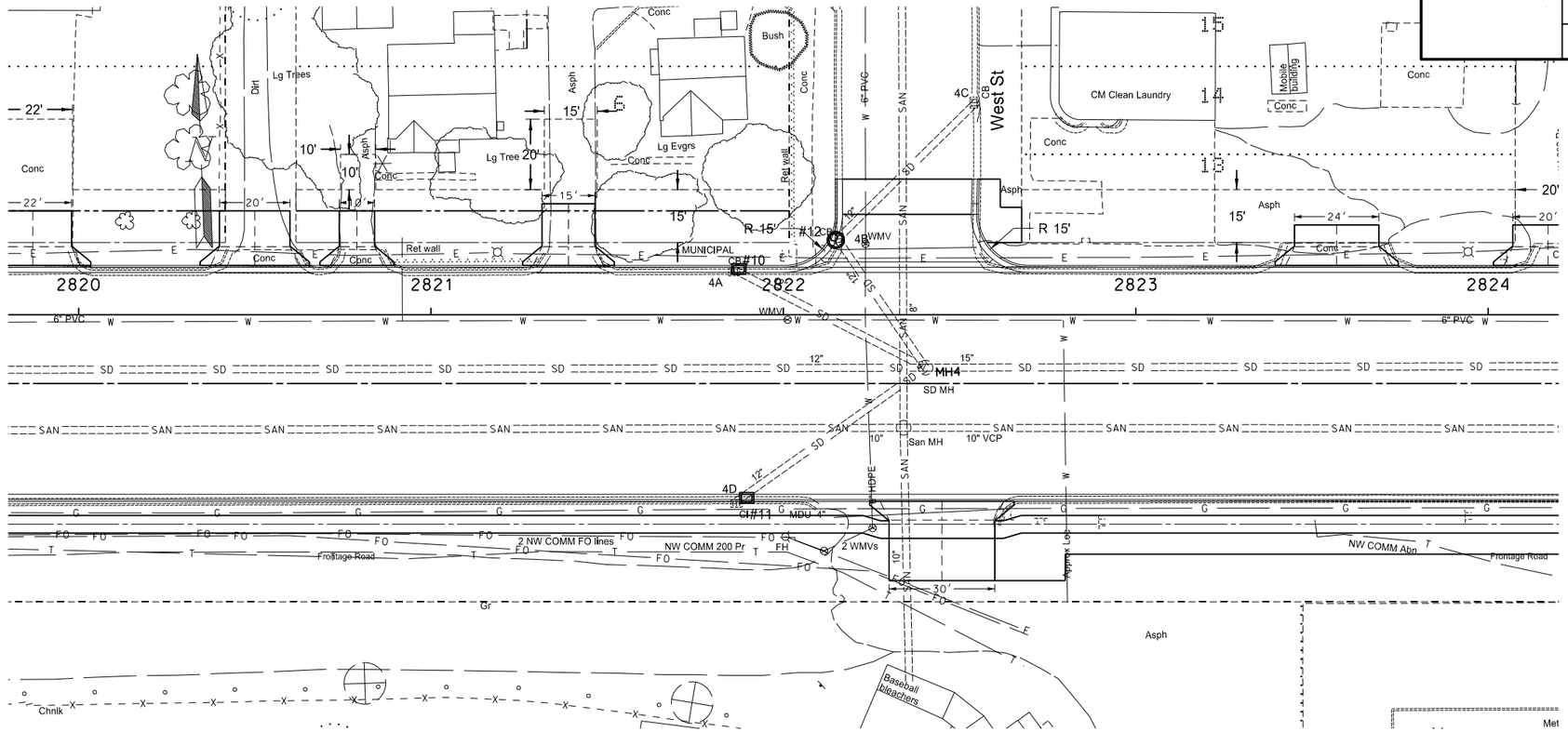


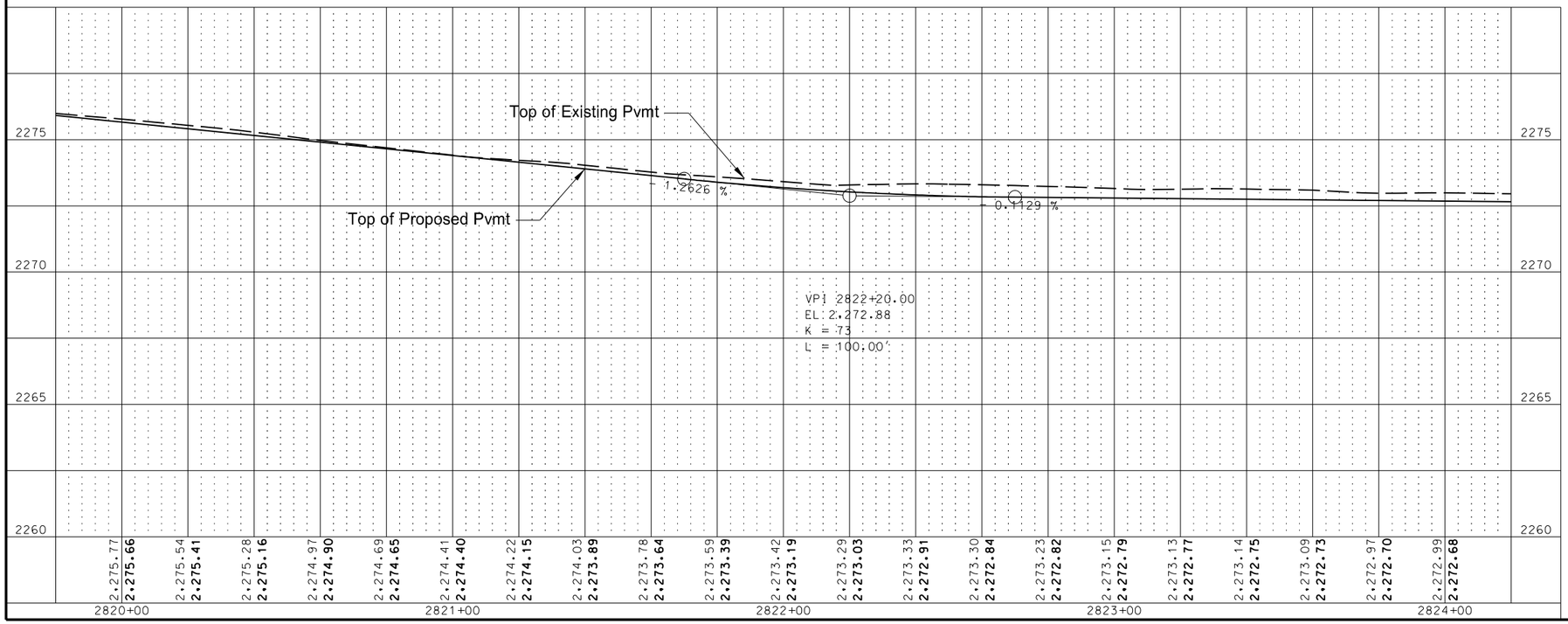
PLAN AND PROFILE

2816+00 TO 2820+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	11

SPEC CODE	BID ITEM	UNIT	QUANTITY
202 174	**REMOVAL OF PIPE ALL TYPES & SIZES**		
	4D	LF	2
202 230	**REMOVAL OF INLETS**		
	CB #10, CI #11, CB #12	EA	3
722 317	**MANHOLE CASTING TYPE 1**		
	2822+34 - 32.2' Rt (San)	EA	1
	MH 4	EA	1
722 3510	**INLET - TYPE 2**		
	4A	EA	1
	4D	EA	1
722 3701	**INLET SPECIAL - TYPE 2 - 48 IN**		
	4B	EA	1
722 6240	**ADJUST UTILITY APPURTENANCE**		
	2822+01 - 1.5' Rt	EA	1
	2822+12 - 67.1' Rt	EA	1
	2822+23 - 20.0' Lt	EA	1
	2822+25 - 60.6' Rt	EA	1
724 427	**ADJUST HYDRANT**		
	2822+01 - 63.1' Rt	EA	1



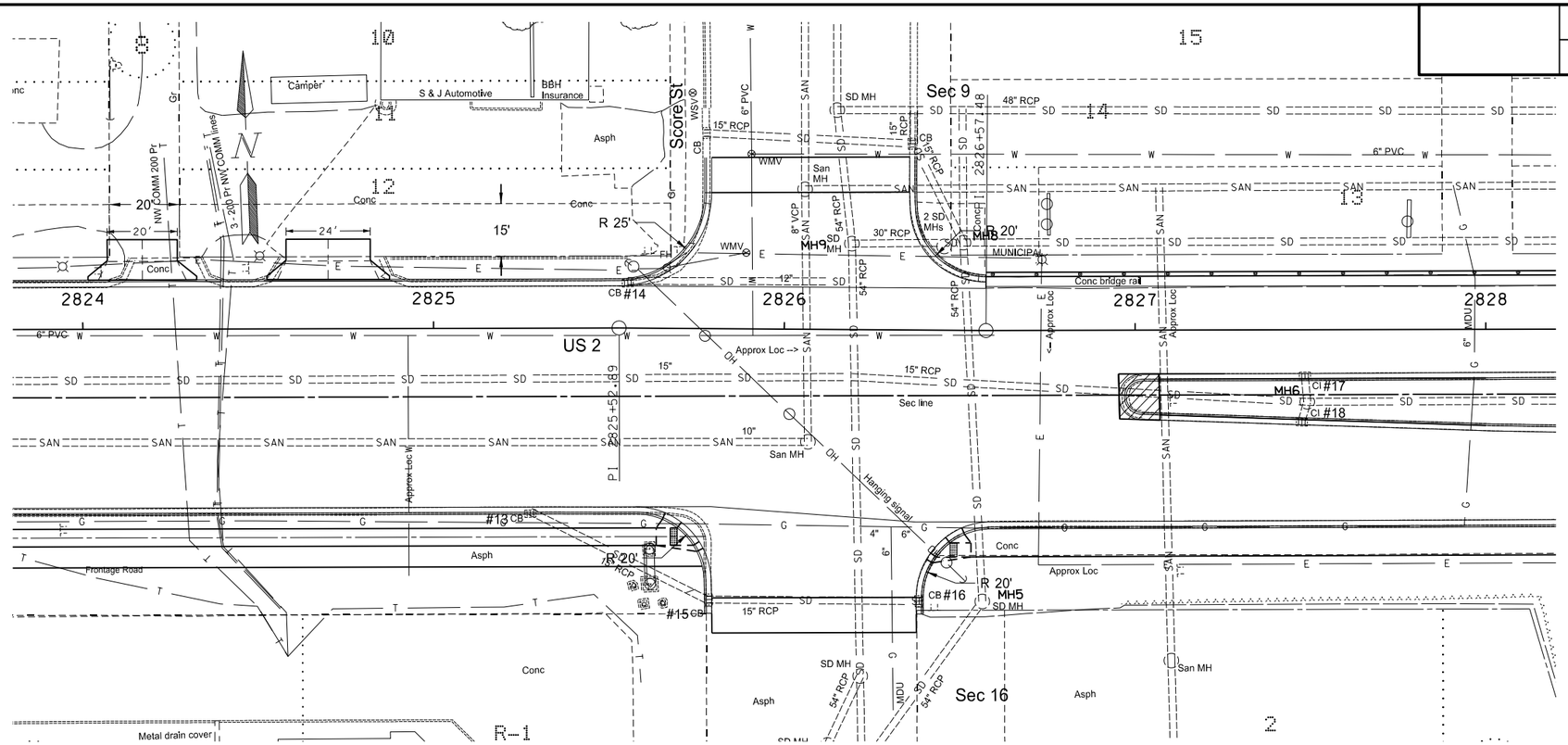


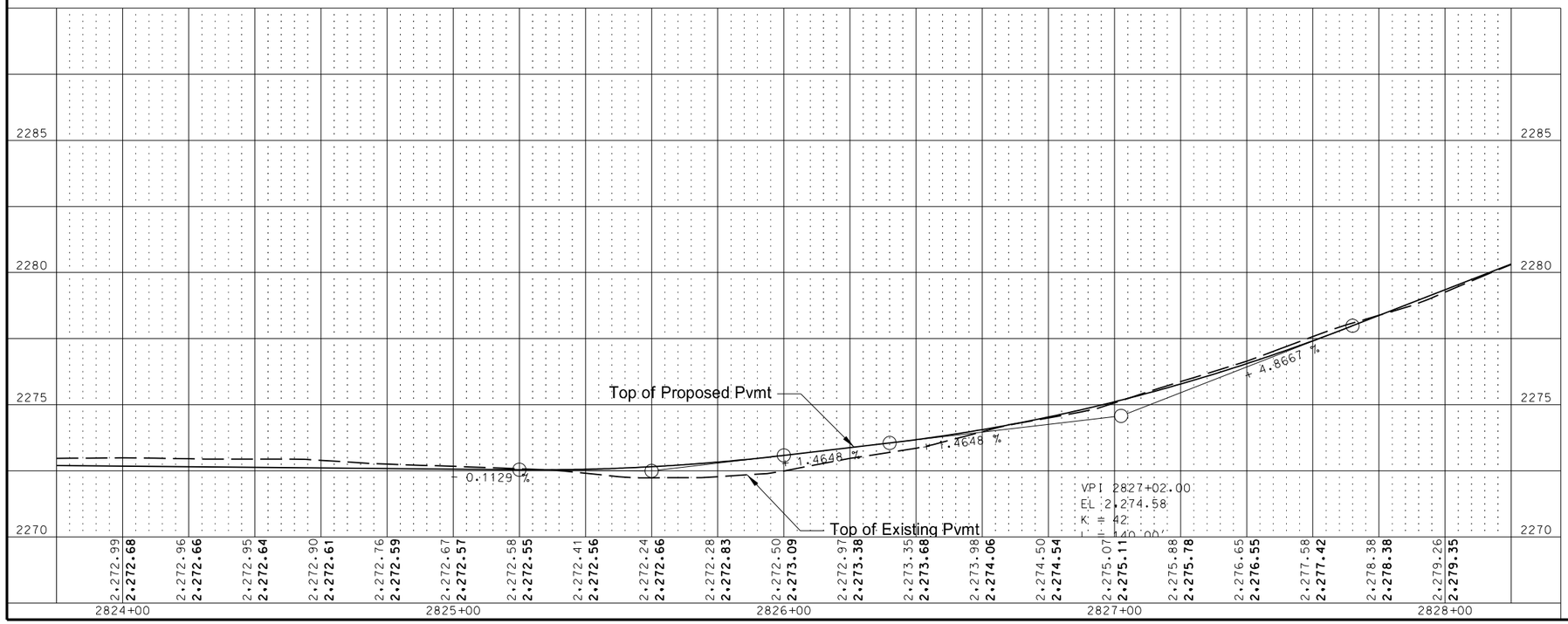
PLAN AND PROFILE

2820+00 TO 2824+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	12

SPEC CODE	BID ITEM	UNIT	QUANTITY
722 317	**MANHOLE CASTING TYPE 1**		
	2826+06 - 39.8' Lt (San)	EA	1
	2826+07 - 32.1' Rt (San)	EA	1
	MH 9	EA	1
722 6160	**ADJUST INLET**		
	CB #13, CB #14, CB #15, CB #16	EA	4
	CI #17, CI #18	EA	2
722 6200	**ADJUST MANHOLE**		
	MH 6	EA	1
722 6240	**ADJUST UTILITY APPURTENANCE**		
	2825+89 - 21.6' Lt	EA	1



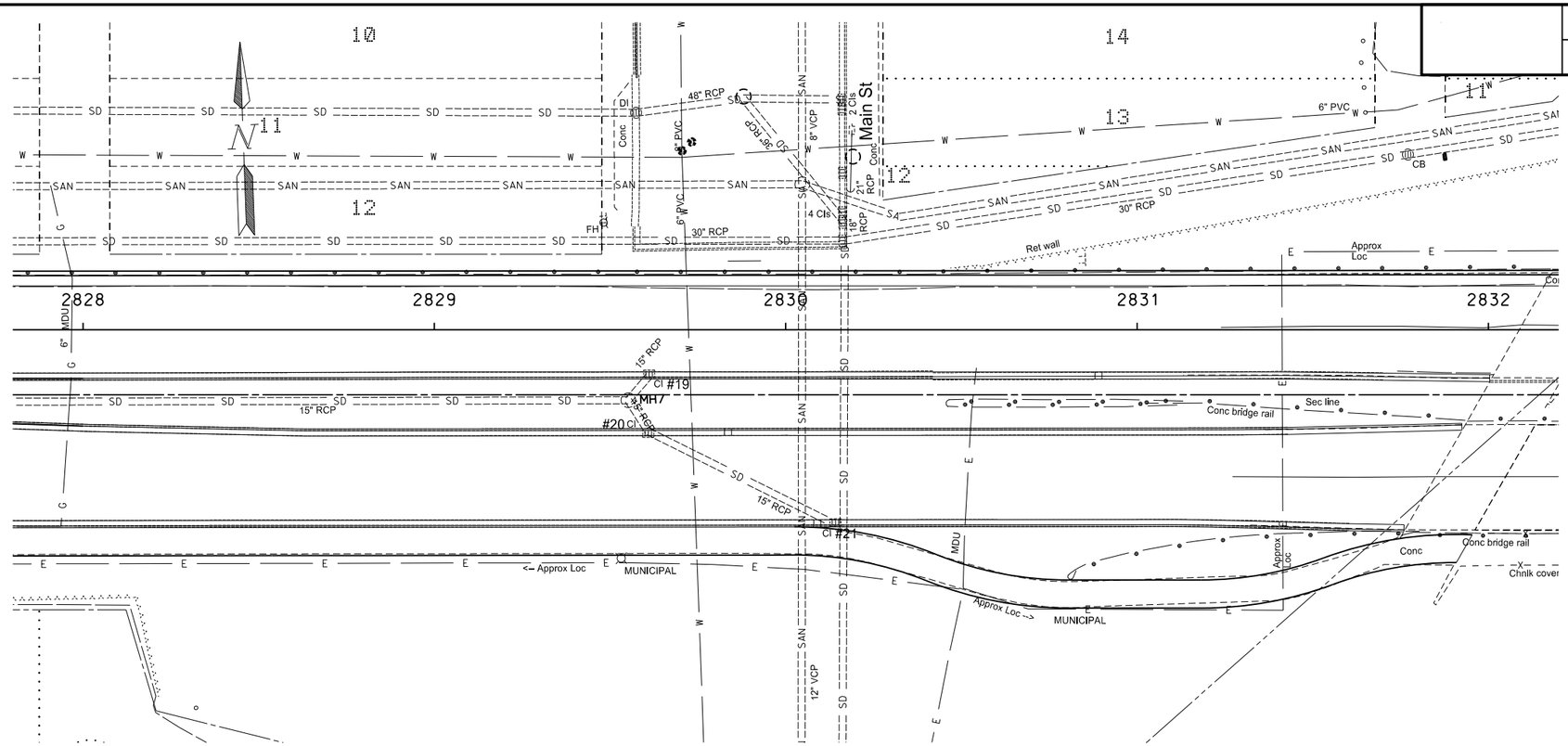


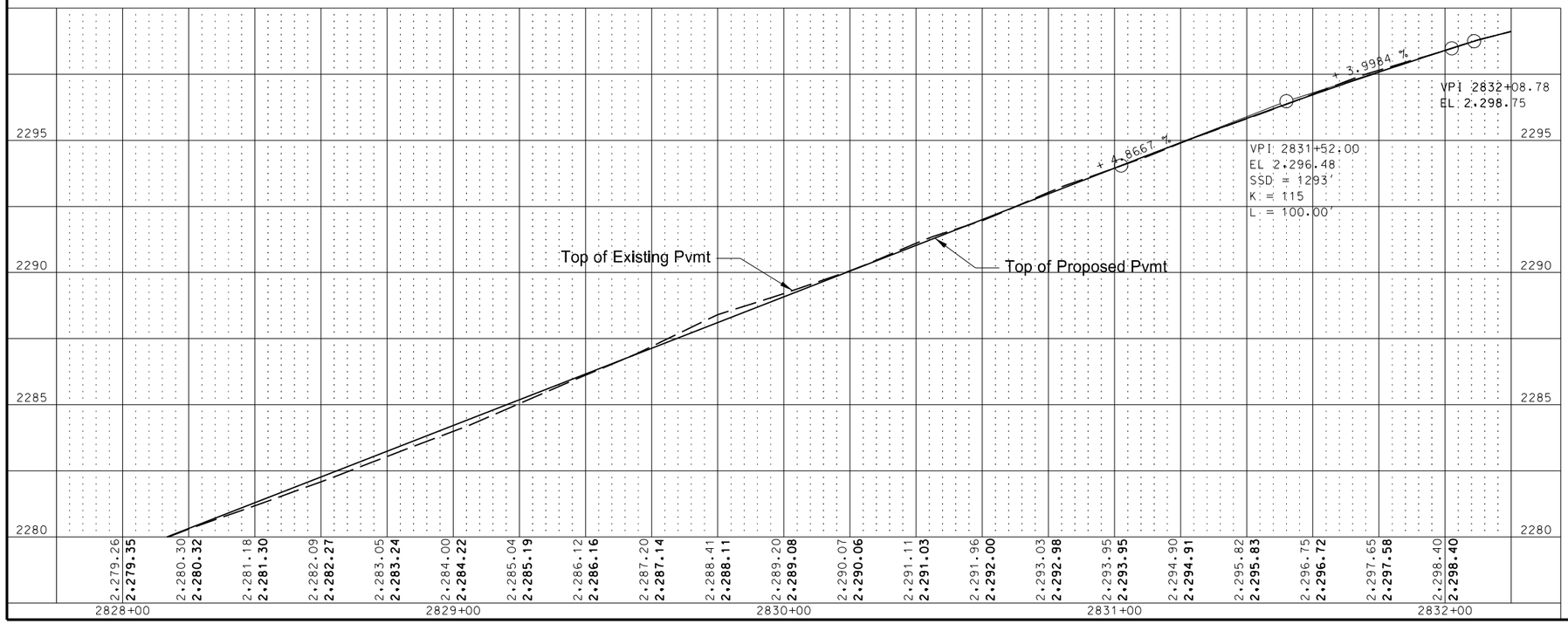
PLAN AND PROFILE

2824+00 TO 2828+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	13

SPEC CODE	BID ITEM	UNIT	QUANTITY
722 6160	ADJUST INLET		
	CI #20, CI #21	EA	2

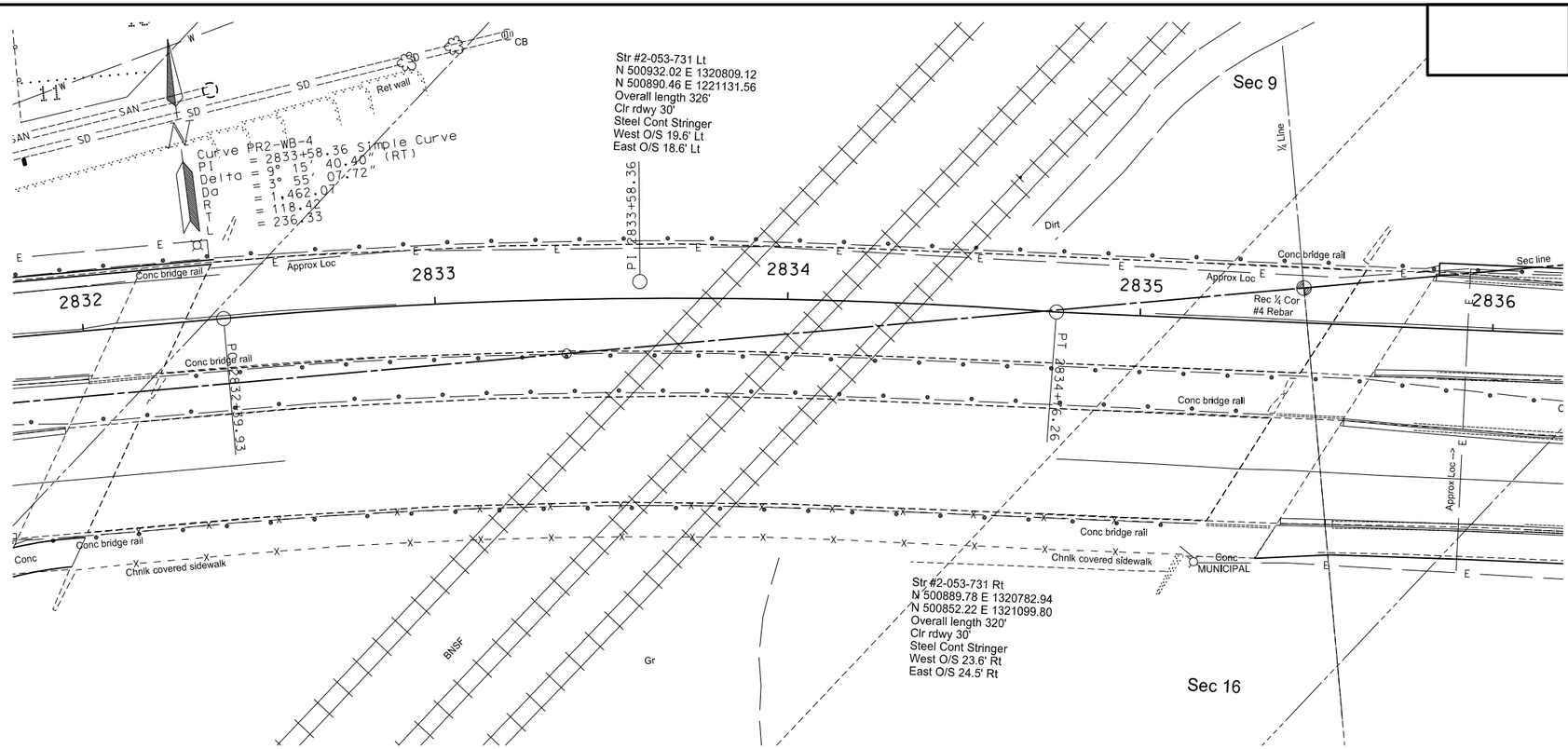


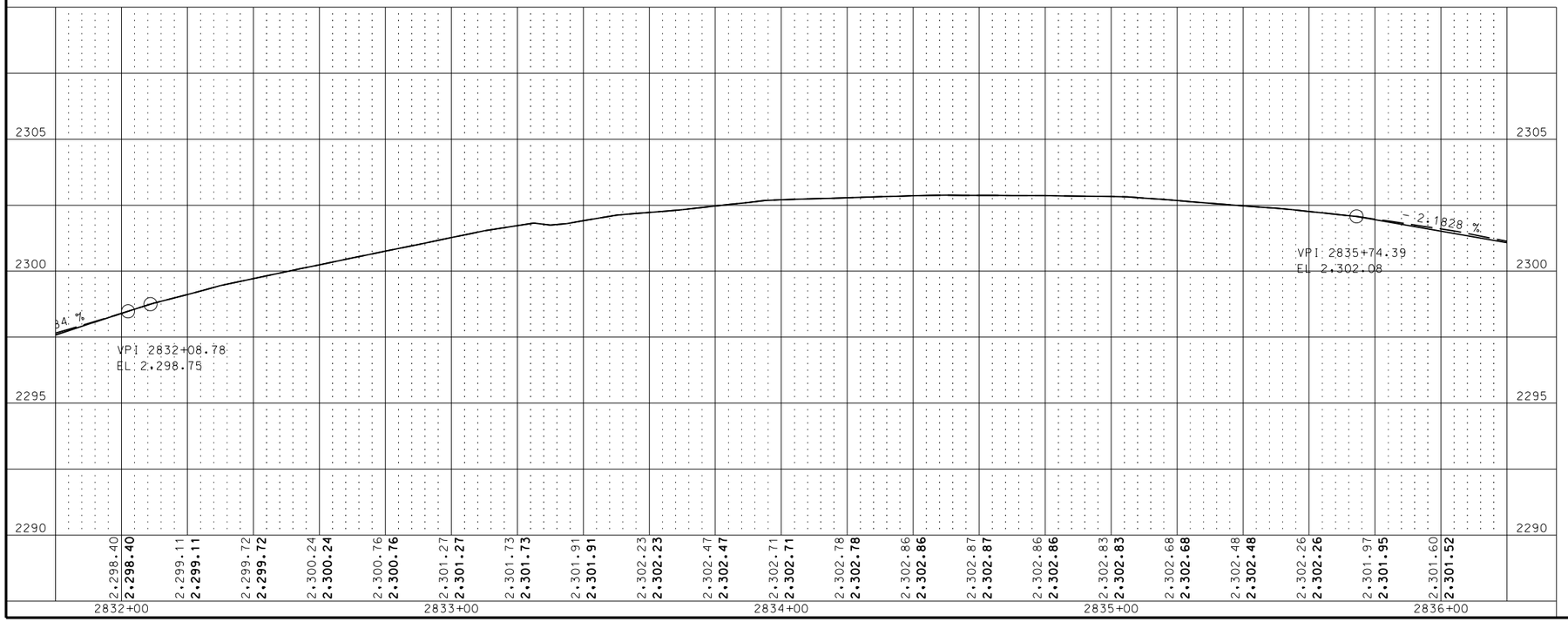


PLAN AND PROFILE

2828+00 TO 2832+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIA-7-002(119)053	60	14



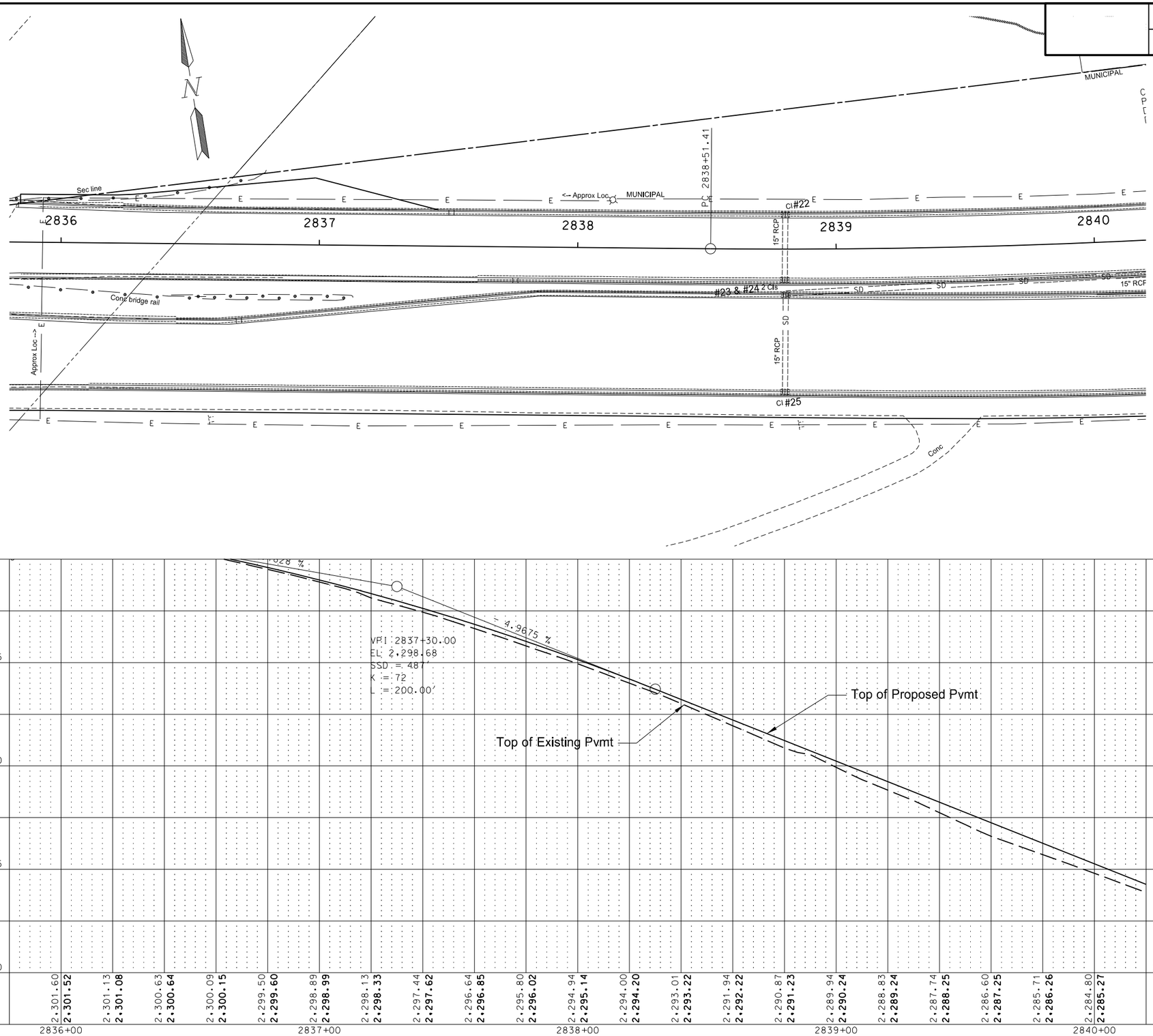


PLAN AND PROFILE

2832+00 TO 2836+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	15

SPEC CODE	BID ITEM	UNIT	QUANTITY
722 6160	ADJUST INLET		
	CI #22, CI #23, CI #24, CI #25	EA	4

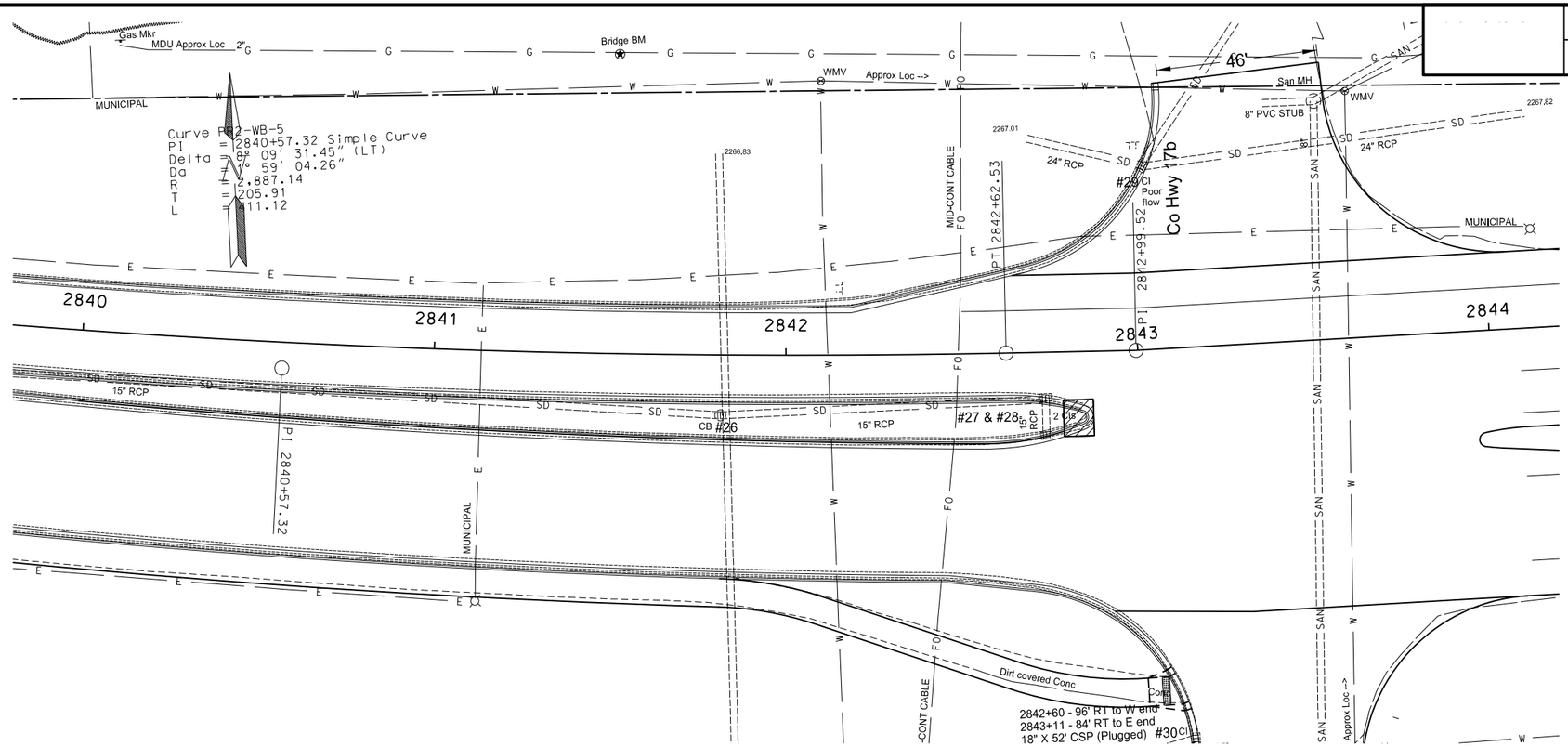


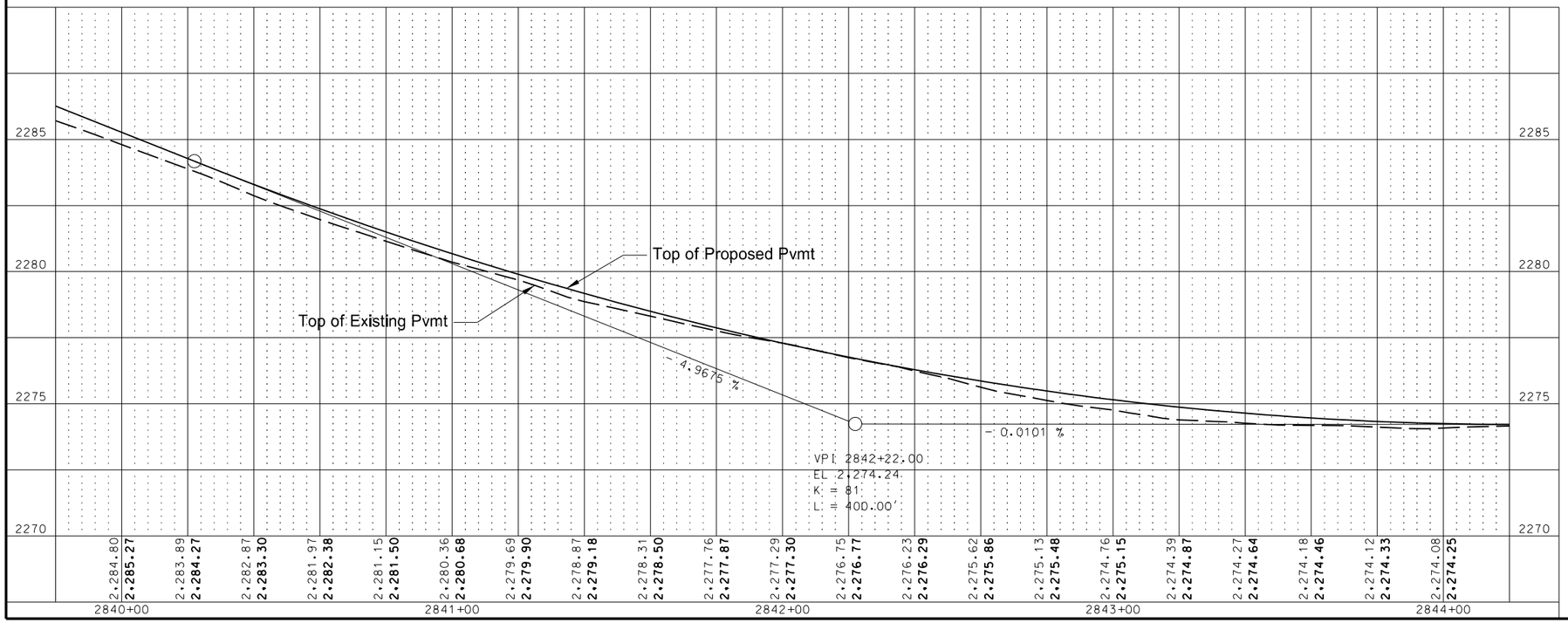
PLAN AND PROFILE

2836+00 TO 2840+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIA-7-002(119)053	60	16

SPEC CODE	BID ITEM	UNIT	QUANTITY
722 317	**MANHOLE CASTING TYPE 1**		
	2843+54 - 67.8' Lt (San)	EA	1
722 6160	**ADJUST INLET**		
	CB #26, CI #27, CI #28, CI #29, CI #30	EA	5





PLAN AND PROFILE

2840+00 TO 2844+00
PR2-WB
US 2 Reconstruction Through Ray
RP 52.7334 to RP 54.4759

Appendix C

BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 12/4/2013
Sample: 15618

Bismarck
1341 South 20th Street
Suite 5
Bismarck, ND 58504
Phone: 701-255-7180

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details

Set #:	67	**Cast By:**	Pennala, Kip
Pour Location:	Paving - Roadway	**Date Cast:**	10/05/13
Location Details:	2811+35 eastbound	**Time Batched:**	15:30 CDT
Specimens In Set:	6	**Time Sampled:**	15:40 CDT
Specimen Size:	4" X 8"	**Time Cast:**	15:55 CDT
Contractor:	allied	**Time Truck Empty:**	15:55 CDT
Truck #:		**Total Placement Time (min):**	25
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	2811+35

Mix and Specifications

Supplier:	Acme	**Specified Strength (psi):**	3000
Plant:	Ray	**Specified Air (%):**	5.0 - 8.0
Mix Design:	mainline	**Specified Slump:**	0.25 - 3.0
Admixtures:	None		

Field Measurements

Slump (in):	1 (ASTM C143)	**Load Volume (yd^3):**	10
Weather:	clear	**Air Content (%):**	5.1 (ASTM C231)
Air Temperature (F):	50	**Unit Weight:**	147.1 (ASTM C567)
Concrete Temp (F):	60 (ASTM C1064)		

Lab Test Results

Testing Lab: Williston, 5806 Baldwin Lane, Unit #5, Williston, ND, 58801

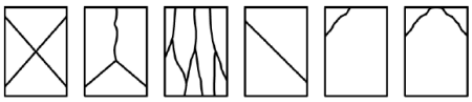
Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in^2)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
67-1	3	10/08/13	1 / 2	4.02	12.66	40,180	3,170	2	A1	N
67-2	3	10/08/13	1 / 2	3.99	12.50	48,890	3,910	2	A1	N
67-4	7	10/12/13	1 / 6	4.00	12.57	58,310	4,640	2	D2	N
67-3	7	10/12/13	1 / 6	4.00	12.57	61,120	4,860	2	D2	N
67-5	28	11/02/13	1 / 27	4.00	12.57	90,770	7,220	2	E1	N
67-6	28	11/02/13	1 / 27	4.00	12.53	91,530	7,310	2	E1	N

Break Remarks

A1: Result is reported per contractor request
D2: The 7 day test result meets or exceeds the 28 day specified strength.
E1: The average 28 day test result meets or exceeds the specified strength.

Capping Methods

N: ASTM C1231, Unbonded Caps



BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 12/4/2013
Sample: 15619

Bismarck
1341 South 20th Street
Suite 5
Bismarck, ND 58504
Phone: 701-255-7180

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details

Set #:	68	**Cast By:**	Pennala, Kip
Pour Location:	Paving - Roadway	**Date Cast:**	10/05/13
Location Details:	2815+00 eastbound	**Time Batched:**	17:40 CDT
Specimens In Set:	6	**Time Sampled:**	17:50 CDT
Specimen Size:	4" X 8"	**Time Cast:**	18:10 CDT
Contractor:	allied	**Time Truck Empty:**	18:05 CDT
Truck #:		**Total Placement Time (min):**	25
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	2815+00

Mix and Specifications

Supplier:	Acme	**Specified Strength (psi):**	3000
Plant:	Ray	**Specified Air (%):**	5.0 - 8.0
Mix Design:	mainline	**Specified Slump:**	0.25 - 3.0
Admixtures:	None		

Field Measurements

Slump (in):	1.5 (ASTM C143)	**Load Volume (yd³):**	10
Weather:	clear	**Air Content (%):**	5.7 (ASTM C231)
Air Temperature (F):	48	**Unit Weight:**	145 (ASTM C567)
Concrete Temp (F):	60 (ASTM C1064)		

Lab Test Results

Testing Lab: Williston, 5806 Baldwin Lane, Unit #5, Williston, ND, 58801

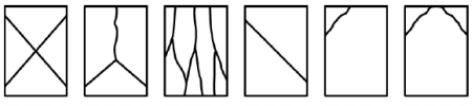
Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in²)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
68-1	3	10/08/13	1 / 2	3.94	12.19	26,350	2,160	3	ZZ	N
68-2	3	10/08/13	1 / 2	3.75	10.96	28,520	2,600	2	A1	N
68-4	7	10/12/13	1 / 6	4.00	12.57	42,820	3,410	2	D2	N
68-3	7	10/12/13	1 / 6	4.00	12.57	45,030	3,580	2	D2	N
68-5	28	11/02/13	1 / 27	3.99	12.50	66,230	5,300	2	E1	N
68-6	28	11/02/13	1 / 27	4.00	12.53	69,910	5,580	2	E1	N

Break Remarks

A1: Result is reported per contractor request
D2: The 7 day test result meets or exceeds the 28 day specified strength.
E1: The average 28 day test result meets or exceeds the specified strength.
ZZ: The low break result should be evaluated per ACI 318, Chapter 5.

Capping Methods

N: ASTM C1231, Unbonded Caps



BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 12/4/2013
Sample: 15622

Bismarck
1341 South 20th Street
Suite 5
Bismarck, ND 58504
Phone: 701-255-7180

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details

Set #:	70	**Cast By:**	Pennala, Kip
Pour Location:	Paving - Roadway	**Date Cast:**	10/06/13
Location Details:	2822+35 eastbound at manhole	**Time Batched:**	12:00 CDT
Specimens In Set:	6	**Time Sampled:**	12:10 CDT
Specimen Size:	4" X 8"	**Time Cast:**	12:30 CDT
Contractor:	allied	**Time Truck Empty:**	12:20 CDT
Truck #:	at 380 yards	**Total Placement Time (min):**	20
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	2822+35

Mix and Specifications

Supplier:	Acme	**Specified Strength (psi):**	3000
Plant:	Ray	**Specified Air (%):**	5.0 - 8.0
Mix Design:	mainline	**Specified Slump:**	0.25 - 3.0
Admixtures:	None		

Field Measurements

Slump (in):	0.75 (ASTM C143)	**Load Volume (yd^3):**	10
Weather:	clear	**Air Content (%):**	4.8 (ASTM C231)
Air Temperature (F):	50	**Unit Weight:**	148.7 (ASTM C567)
Concrete Temp (F):	61 (ASTM C1064)		

Lab Test Results

Testing Lab: Williston, 5806 Baldwin Lane, Unit #5, Williston, ND, 58801

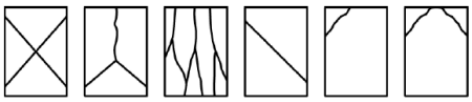
Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in^2)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
70-1	3	10/09/13	1 / 2	4.01	12.63	50,580	4,010	2	A1	N
70-2	3	10/09/13	1 / 2	4.01	12.60	44,810	3,560	6	A1	N
70-4	7	10/13/13	1 / 6	4.01	12.60	53,480	4,240	2	D2	N
70-3	7	10/13/13	1 / 6	4.00	12.57	48,190	3,830	2	D2	N
70-5	28	11/03/13	1 / 27	4.02	12.66	77,350	6,110	2	E1	N
70-6	28	11/03/13	1 / 27	4.01	12.63	63,020	4,990	2	E1	N

Break Remarks

A1: Result is reported per contractor request
D2: The 7 day test result meets or exceeds the 28 day specified strength.
E1: The average 28 day test result meets or exceeds the specified strength.

Capping Methods

N: ASTM C1231, Unbonded Caps



BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 12/4/2013
Sample: 15623

Bismarck
1341 South 20th Street
Suite 5
Bismarck, ND 58504
Phone: 701-255-7180

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details

Set #:	71	**Cast By:**	Pennala, Kip
Pour Location:	Paving - Roadway	**Date Cast:**	10/06/13
Location Details:	2826+00 eastbound at manhole	**Time Batched:**	15:05 CDT
Specimens In Set:	6	**Time Sampled:**	15:15 CDT
Specimen Size:	4" X 8"	**Time Cast:**	15:35 CDT
Contractor:	allied	**Time Truck Empty:**	15:25 CDT
Truck #:	at 800 yds	**Total Placement Time (min):**	20
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	2826+00

Mix and Specifications

Supplier:	Acme	**Specified Strength (psi):**	3000
Plant:	Ray	**Specified Air (%):**	5.0 - 8.0
Mix Design:	mainline	**Specified Slump:**	0.25 - 3.0
Admixtures:	None		

Field Measurements

Slump (in):	1 (ASTM C143)	**Load Volume (yd^3):**	10
Weather:	clear	**Air Content (%):**	5.0 (ASTM C231)
Air Temperature (F):	65	**Unit Weight:**	147.3 (ASTM C567)
Concrete Temp (F):	63 (ASTM C1064)		

Lab Test Results

Testing Lab: Williston, 5806 Baldwin Lane, Unit #5, Williston, ND, 58801

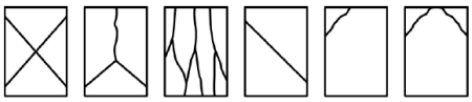
Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in^2)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
71-1	3	10/09/13	1 / 2	4.01	12.63	42,300	3,350	2	A1	N
71-2	3	10/09/13	1 / 2	4.01	12.60	41,260	3,280	2	A1	N
71-4	7	10/13/13	1 / 6	4.00	12.57	57,230	4,550	2	D2	N
71-3	7	10/13/13	1 / 6	4.00	12.57	55,360	4,400	2	D2	N
71-5	28	11/03/13	1 / 27	4.01	12.60	76,140	6,040	2	E1	N
71-6	28	11/03/13	1 / 27	4.02	12.66	75,210	5,940	2	E1	N

Break Remarks

A1: Result is reported per contractor request
D2: The 7 day test result meets or exceeds the 28 day specified strength.
E1: The average 28 day test result meets or exceeds the specified strength.

Capping Methods

N: ASTM C1231, Unbonded Caps



BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 11/6/2013
Sample: 18804

Client:	Project:
Allied Engineering, Inc. 120 S. Main Street, Lower Level Stanley, ND 58784	BM1302978 7-002(119)053 - Allied US 2 Ray, ND 58763

Sample Details

Set #:	103	**Cast By:**	Fitzgerald, Harvey
Pour Location:	Paving - Median	**Date Cast:**	10/30/13
Location Details:	Sta. 2807+00	**Time Batched:**	12:45 CDT
Specimens In Set:	6	**Time Sampled:**	13:04 CDT
Specimen Size:	4" X 8"	**Time Cast:**	13:15 CDT
Contractor:	ACME	**Time Truck Empty:**	13:05 CDT
Truck #:	916	**Total Placement Time (min):**	20
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Other
		Sample Location / Notes:	Median

Mix and Specifications

Supplier:	Acme	**Specified Strength (psi):**	3000
Plant:		**Specified Air (%):**	5.0 - 8.0
Mix Design:		**Specified Slump:**	Not Specified - 3.0
Admixtures:	None		

Field Measurements

Slump (in):	1.75 (ASTM C143)	**Load Volume (yd³):**	10
Weather:		**Air Content (%):**	7.6 (ASTM C231)
Air Temperature (F):		**Unit Weight:**	142.7 (ASTM C567)
Concrete Temp (F):	54 (ASTM C1064)		

Lab Test Results

Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in²)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
103-1	3	11/02/13	1 / 2	4.02	12.66	40,720	3,220	2	A1	N
103-2	3	11/02/13	1 / 2	4.03	12.72	44,420	3,490	2	A1	N

Break Remarks	Capping Methods
A1: Result is reported per contractor request	**N:** ASTM C1231, Unbonded Caps

TYPE 1 TYPE 2 TYPE 3 TYPE 4 TYPE 5 TYPE 6

Yoder, Carey
Nov 06 2013

BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 8/13/2013
Sample: 8247

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details

Set #:	16	**Cast By:**	Fitzgerald, Harvey
Pour Location:	Paving - Roadway	**Date Cast:**	08/02/13
Location Details:	2818+65 to 2811+00	**Time Batched:**	12:00 CDT
Specimens In Set:	5	**Time Sampled:**	12:15 CDT
Specimen Size:	4" X 8"	**Time Cast:**	12:25 CDT
Contractor:	acme paving	**Time Truck Empty:**	12:15 CDT
Truck #:		**Total Placement Time (min):**	15
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	St 2818+65

Mix and Specifications

Supplier:		**Specified Strength (psi):**	3000
Plant:		**Specified Air (%):**	5.0 - 7.0
Mix Design:		**Specified Slump:**	0.25 - 3.0
Admixtures:	None		

Field Measurements

Slump (in):	0.5 (ASTM C143)	**Load Volume (yd³):**	10
Weather:		**Air Content (%):**	5.1 (ASTM C231)
Air Temperature (F):		**Unit Weight:**	146.9 (ASTM C567)
Concrete Temp (F):	74.3 (ASTM C1064)		

Lab Test Results

Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in²)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
16-2	7	08/09/13	1 / 6	4.01	12.60	43,500	3,450	5	D2	N
16-3	7	08/09/13	1 / 6	4.01	12.63	40,280	3,190	2	D2	N

Break Remarks

D2: The 7 day test result meets or exceeds the 28 day specified strength.

Capping Methods

N: ASTM C1231, Unbonded Caps

TYPE 1 TYPE 2 TYPE 3 TYPE 4 TYPE 5 TYPE 6

Yoder, Carey
Aug 13 2013

BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 8/13/2013
Sample: 8193

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details

Set #:	15	**Cast By:**	Fitzgerald, Harvey
Pour Location:	Paving - Roadway	**Date Cast:**	08/02/13
Location Details:	St 2824+50 to St 2817+00	**Time Batched:**	07:20 CDT
Specimens In Set:	5	**Time Sampled:**	07:35 CDT
Specimen Size:	4" X 8"	**Time Cast:**	07:45 CDT
Contractor:	acme paving	**Time Truck Empty:**	07:35 CDT
Truck #:		**Total Placement Time (min):**	15
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	St 2824+60

Mix and Specifications

Supplier:		**Specified Strength (psi):**	3000
Plant:		**Specified Air (%):**	5.0 - 7.0
Mix Design:		**Specified Slump:**	0.25 - 3.0
Admixtures:	None		

Field Measurements

Slump (in):	1.25 (ASTM C143)	**Load Volume (yd³):**	10
Weather:		**Air Content (%):**	6.2 (ASTM C231)
Air Temperature (F):		**Unit Weight:**	144.8 (ASTM C567)
Concrete Temp (F):	70.5 (ASTM C1064)		

Lab Test Results

Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in²)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
15-2	7	08/09/13	1 / 6	4.01	12.63	50,580	4,010	2	D2	N
15-3	7	08/09/13	1 / 6	4.02	12.66	50,310	3,970	2	D2	N

Break Remarks

D2: The 7 day test result meets or exceeds the 28 day specified strength.

Capping Methods

N: ASTM C1231, Unbonded Caps

TYPE 1 TYPE 2 TYPE 3 TYPE 4 TYPE 5 TYPE 6

Yoder, Carey
Aug 13 2013

BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 11/2/2013
Sample: 17648

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details

Set #:	91	**Cast By:**	Pennala, Kip
Pour Location:	Paving - Roadway	**Date Cast:**	10/22/13
Location Details:	2826+10 eastbound, intersection	**Time Batched:**	14:40 CDT
Specimens In Set:	6	**Time Sampled:**	14:55 CDT
Specimen Size:	4" X 8"	**Time Cast:**	15:10 CDT
Contractor:	allied	**Time Truck Empty:**	15:15 CDT
Truck #:	3	**Total Placement Time (min):**	35
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	2826+10

Mix and Specifications

Supplier:	Acme	**Specified Strength (psi):**	3000
Plant:	Ray	**Specified Air (%):**	-
Mix Design:	mainline	**Specified Slump:**	-
Admixtures:	None		

Field Measurements

Slump (in):	2 (ASTM C143)	**Load Volume (yd³):**	10
Weather:	cloudy	**Air Content (%):**	6.5 (ASTM C231)
Air Temperature (F):	40	**Unit Weight:**	142.9 (ASTM C567)
Concrete Temp (F):	47.5 (ASTM C1064)		

Lab Test Results

Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in²)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
91-1	3	10/25/13	1 / 2	4.00	12.57	47,650	3,790	2	A1	N
91-2	3	10/25/13	1 / 2	4.00	12.57	46,070	3,670	2	A1	N
91-4	7	10/29/13	1 / 6	4.01	12.63	70,540	5,590	2	D1	N
91-3	7	10/29/13	1 / 6	4.01	12.60	70,090	5,560	2	D1	N

Break Remarks

A1: Result is reported per contractor request
D1: The result meets or exceeds the 28 day specified strength.

Capping Methods

N: ASTM C1231, Unbonded Caps

TYPE 1 TYPE 2 TYPE 3 TYPE 4 TYPE 5 TYPE 6

Yoder, Carey
Nov 02 2013

BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 11/2/2013
Sample: 17341

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details

Set #:	89	**Cast By:**	Pennala, Kip
Pour Location:	Paving - Roadway	**Date Cast:**	10/20/13
Location Details:	2843+00	**Time Batched:**	11:15 CDT
Specimens In Set:	6	**Time Sampled:**	11:35 CDT
Specimen Size:	4" X 8"	**Time Cast:**	11:55 CDT
Contractor:	allied	**Time Truck Empty:**	11:45 CDT
Truck #:	2	**Total Placement Time (min):**	30
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	2843+50

Mix and Specifications

Supplier:	Acme	**Specified Strength (psi):**	3000
Plant:	Ray	**Specified Air (%):**	-
Mix Design:	mainline	**Specified Slump:**	-
Admixtures:	None		

Field Measurements

Slump (in):	1.5 (ASTM C143)	**Load Volume (yd³):**	10
Weather:	cloudy	**Air Content (%):**	5.2 (ASTM C231)
Air Temperature (F):	37	**Unit Weight:**	145.8 (ASTM C567)
Concrete Temp (F):	47.3 (ASTM C1064)		

Lab Test Results

Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in²)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
89-4	7	10/27/13	1 / 6	3.99	12.47	76,440	6,130	2	D2	N
89-3	7	10/27/13	1 / 6	4.00	12.53	76,360	6,090	2	D2	N

Break Remarks

D2: The 7 day test result meets or exceeds the 28 day specified strength.

Capping Methods

N: ASTM C1231, Unbonded Caps

TYPE 1 TYPE 2 TYPE 3 TYPE 4 TYPE 5 TYPE 6

Yoder, Carey
Nov 02 2013

BRAUN INTERTEC

Compressive Strength of Concrete

Test Method: ASTM C39

Report Date: 11/6/2013
Sample: 15619

Client:
Allied Engineering, Inc.
120 S. Main Street, Lower Level
Stanley, ND 58784

Project:
BM1302978
7-002(119)053 - Allied
US 2
Ray, ND 58763

Sample Details			
Set #:	68	**Cast By:**	Pennala, Kip
Pour Location:	Paving - Roadway	**Date Cast:**	10/05/13
Location Details:	2815+00 eastbound	**Time Batched:**	17:40 CDT
Specimens In Set:	6	**Time Sampled:**	17:50 CDT
Specimen Size:	4" X 8"	**Time Cast:**	18:10 CDT
Contractor:	allied	**Time Truck Empty:**	18:05 CDT
Truck #:		**Total Placement Time (min):**	25
Ticket #:		**Method Of Placement:**	Conveyor
		Sampled From:	Conveyor
		Sample Location / Notes:	2815+00
Mix and Specifications			
Supplier:	Acme	**Specified Strength (psi):**	3000
Plant:	Ray	**Specified Air (%):**	5.0 - 8.0
Mix Design:	mainline	**Specified Slump:**	0.25 - 3.0
Admixtures:	None		
Field Measurements			
Slump (in):	1.5 (ASTM C143)	**Load Volume (yd^3):**	10
Weather:	clear	**Air Content (%):**	5.7 (ASTM C231)
Air Temperature (F):	48	**Unit Weight:**	145 (ASTM C567)
Concrete Temp (F):	59.9 (ASTM C1064)		

Lab Test Results

Specimen Number	Test Age Days	Test Date	Field / Lab Cure Days	Average Cylinder Diameter (in)	Cylinder Area (in^2)	Max Load (lbs)	Strength (psi)	Fracture Type	Break Remark	Capping Method
68-5	28	11/02/13	1 / 27	3.99	12.50	66,230	5,300	2	E1	N
68-6	28	11/02/13	1 / 27	4.00	12.53	69,910	5,580	2	E1	N

Break Remarks

E1: The average 28 day test result meets or exceeds the specified strength.

Capping Methods

N: ASTM C1231, Unbonded Caps

Yoder, Carey
Nov 06 2013