STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	115	1

NHU-8-081(039)924

NOTES

DESIGN SPECIFICATIONS: AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, Sixth Edition 2013.*

100 SCOPE OF WORK: Work consists of the following:

Station	Type of Work
103+89 Centerline (Ex_WBEx)	Remove Existing Overhead Sign Structure - Truss
103+73 Centerline (Ex_WBEx)	Install Overhead Sign Structure – Truss
1314+93 LT (SCL_Univ)	Remove Existing Overhead Sign Structure – Truss
1315+23 LT (SCL_Univ)	Install Overhead Sign Structure – Cantilever

754 CLASS AE CONCRETE – SIGN FOUNDATION: The Class AE concrete that is used at Station 103+73 and 1315+23 will meet all requirements specified in Section 602.

754 STRUCTURAL STEEL: The following minimum requirements apply to the individual member types.

Member	F_y (ksi)	F_u (ksi)	ASTM Designation
HSS Round	42	58	A500 Grade B
Pipes	35	60	A53 Grade B
Angles	36	58	A36
WT Members	50	65	A992
Plates	42	58	A500 Grade B
Bolts			A325
U-bolts			A307
Anchor Bolts	55	75-95	F1554 Grade 55

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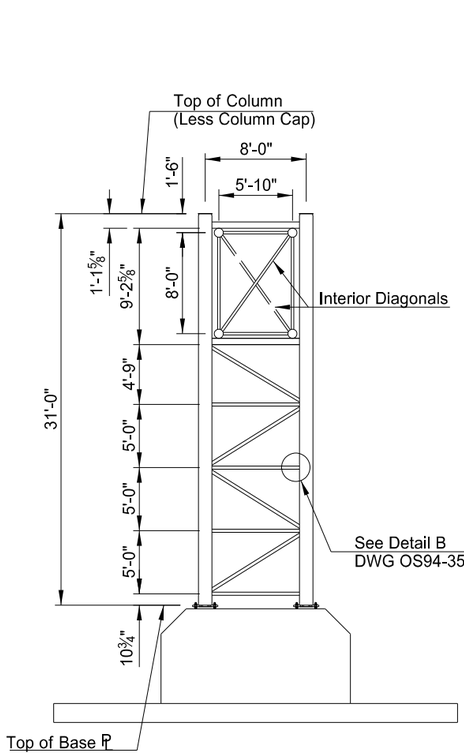
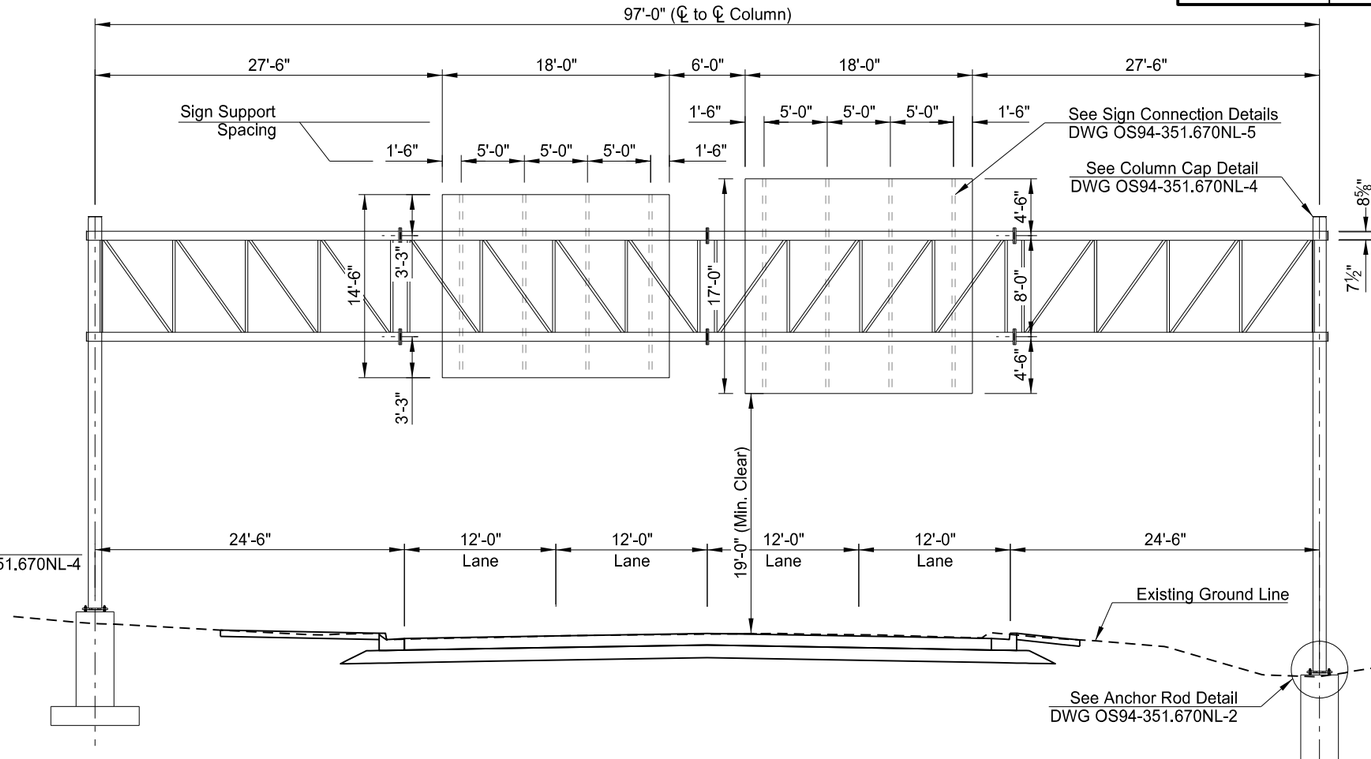
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	115	2

NHU-8-081(039)924



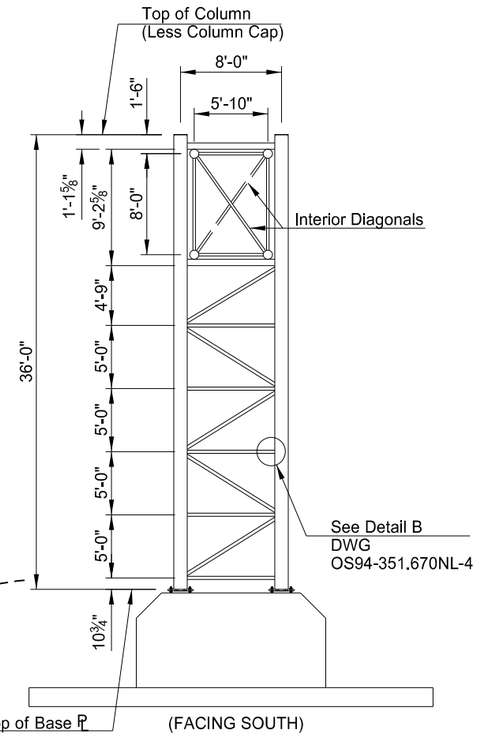
(FACING NORTH)

SOUTH END VIEW



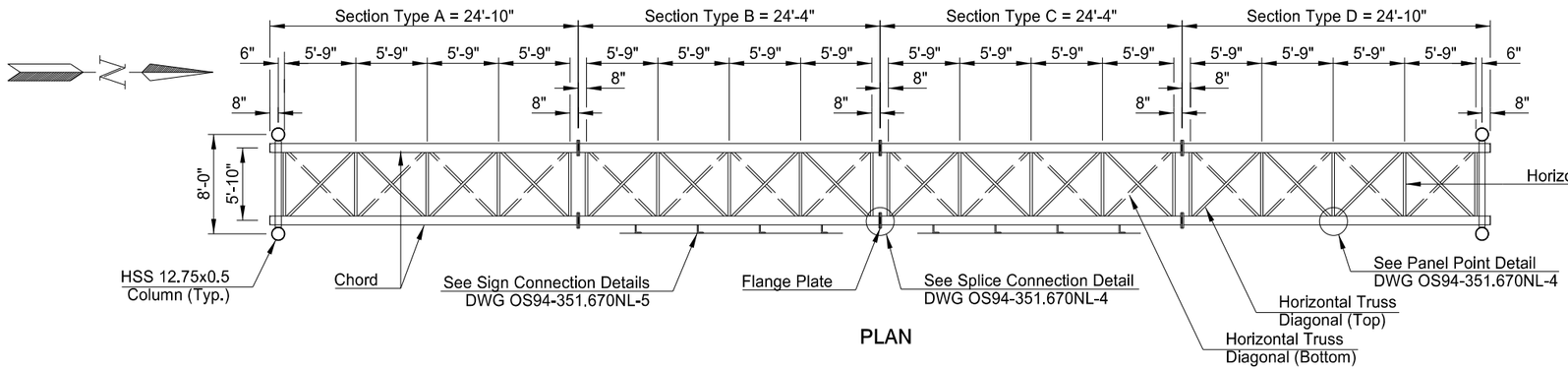
(FACING WEST)

ELEVATION



(FACING SOUTH)

NORTH END VIEW



PLAN

Base Plate Thickness: 1½"
Anchor Bolts: 6 ea @ 1¼" ø
Anchor Bolt Length: 5'-6"

Flange Plate Thickness: 1¼"
Flange Bolts: 8 ea/Flange @ ¾" ø
Camber: 0.476"

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QUANTITIES	
CLASS AE CONCRETE - SIGN FOUNDATION	57.3 CY
OH SIGN STR 97 FT TRUSS	1 EA
REMOVE OVERHEAD SIGN STRUCTURE-TRUSS	1 EA

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATION: 103+73 ℄ (EX_WBEx)

TRUSS OVERHEAD SIGN STRUCTURE
GENERAL LAYOUT

TRUSS SIGN STRUCTURE MEMBERS

		COLUMNS	COLUMN HORIZONTAL STRUTS	COLUMN DIAGONALS	CHORDS	VERTICAL STRUTS	VERTICAL DIAGONALS	HORIZONTAL STRUTS	HORIZONTAL DIAGONALS	INTERIOR DIAGONALS	CHORD SUPPORTS	SIGN SUPPORTS
STEEL	HSS Pipe	12.75 x 0.500	2.375x0.125	3x0.250	8.625x0.250	2.375x0.218	2.375x0.218	2.375x0.218	2.375x0.218	2.375x0.188		
	Other										WT 6x25	∠4x3x½"

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	115	3

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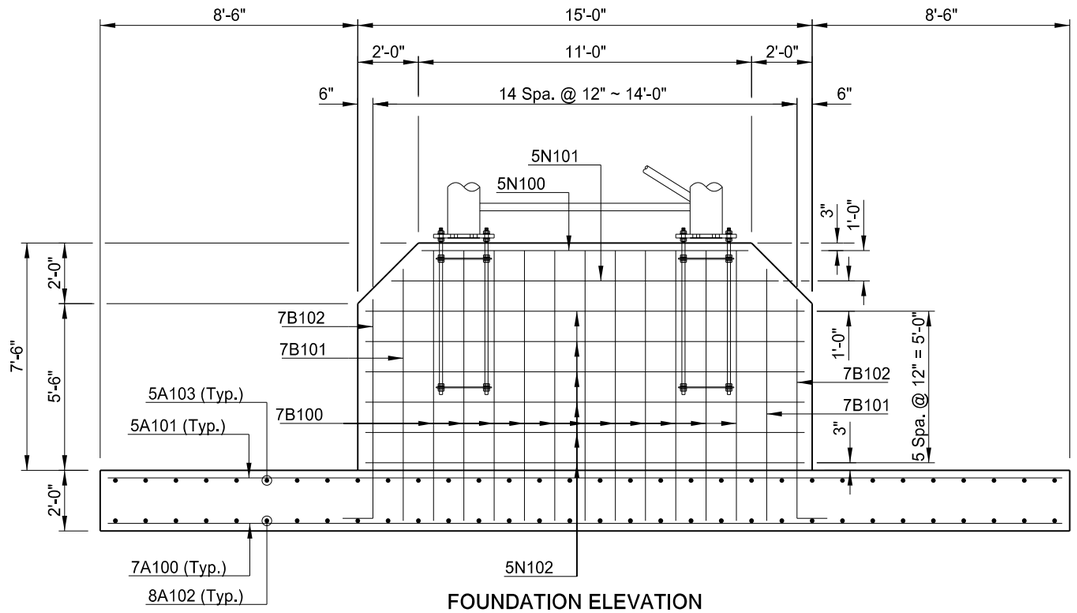
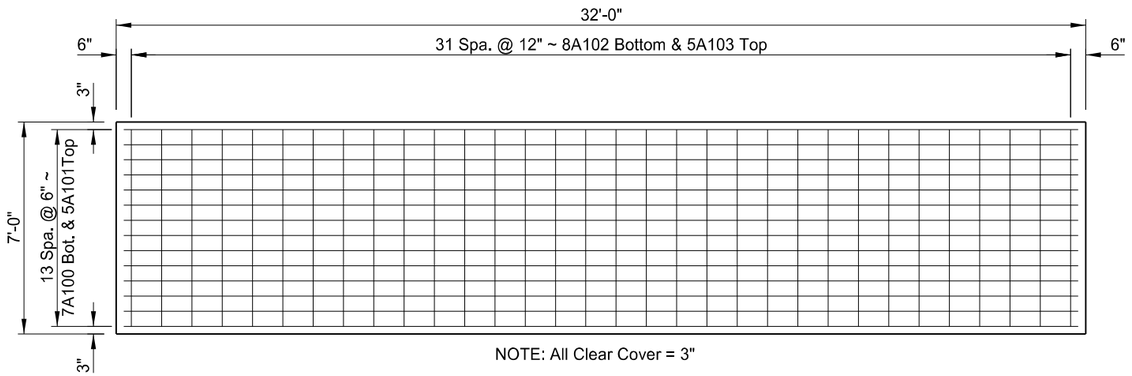
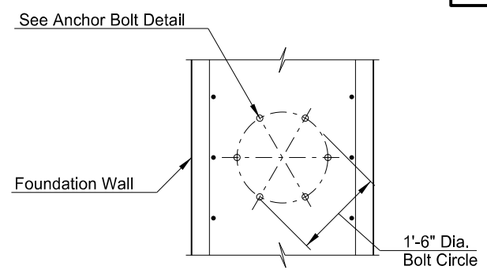


FOUNDATION ELEVATION

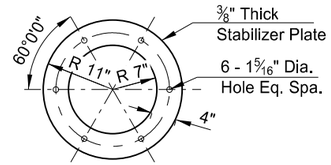


NOTE: All Clear Cover = 3"

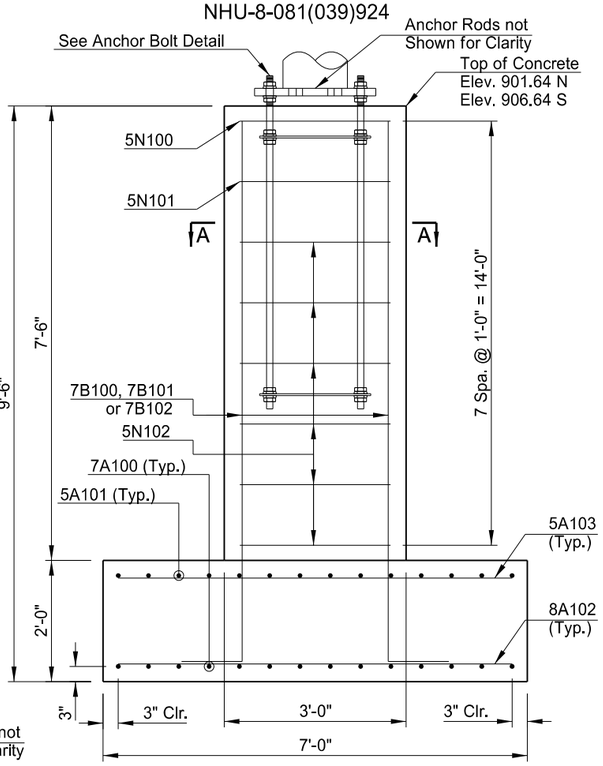
FOUNDATION PLAN



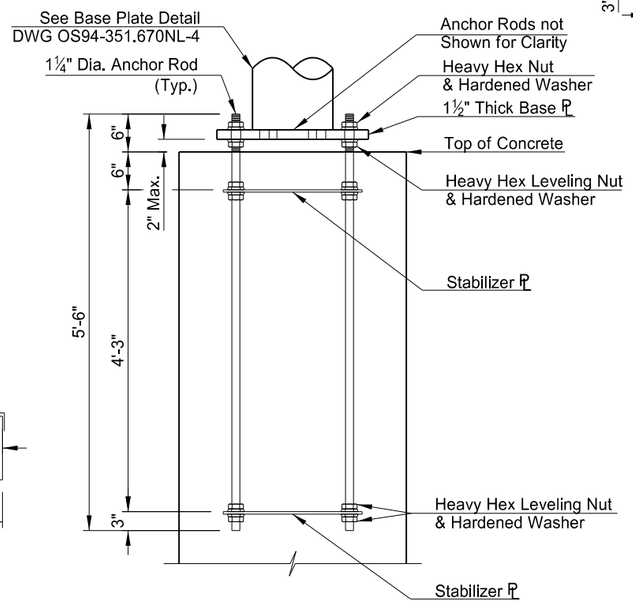
SECTION A-A



STABILIZER PLATE PLAN



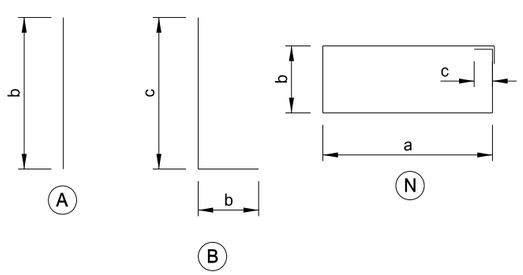
FOUNDATION END VIEW



ANCHOR ROD DETAIL

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS							
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS*		
					a	b	c
FOUNDATION**	7	A100	28	31'-6"		31'-6"	
	5	A101	28	31'-6"		31'-6"	
	8	A102	64	6'-6"		6'-6"	
	5	A103	64	6'-6"		6'-6"	
	7	B100	60	10'-1"		1'-2"	8'-11"
	7	B101	8	9'-6"		1'-2"	8'-4"
	7	B102	8	8'-6"		1'-2"	7'-4"
	5	N100	2	27'-6"	10'-9"	2'-6"	6"
	5	N101	2	31'-6"	12'-9"	2'-6"	6"
	5	N102	12	35'-0"	14'-6"	2'-6"	6"



*All dimensions are out-to-out of bars
**The reinforcing steel listed is common to both foundations. Therefore divide the indicated total by 2 to determine the requirement for each single foundation.

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BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATION: 103+73 ℄ (EX_WBEx)

TRUSS OVERHEAD SIGN STRUCTURE
STRUCTURAL DETAILS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	115	4

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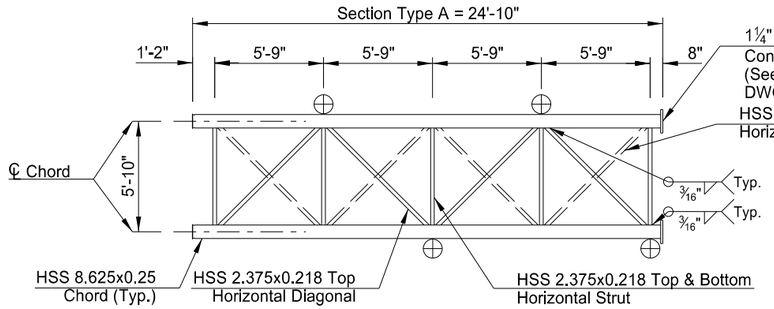
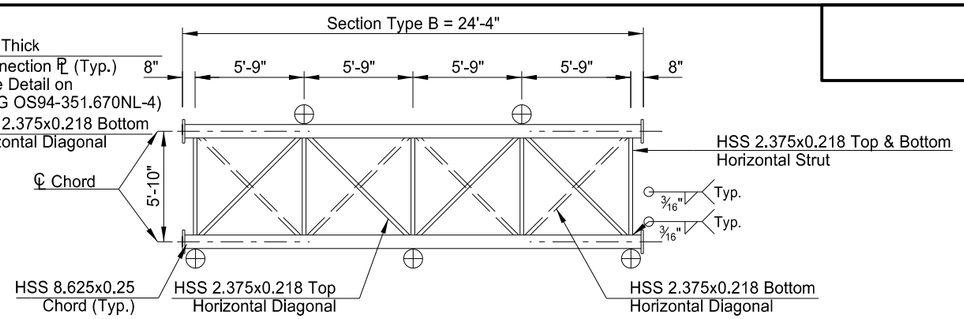
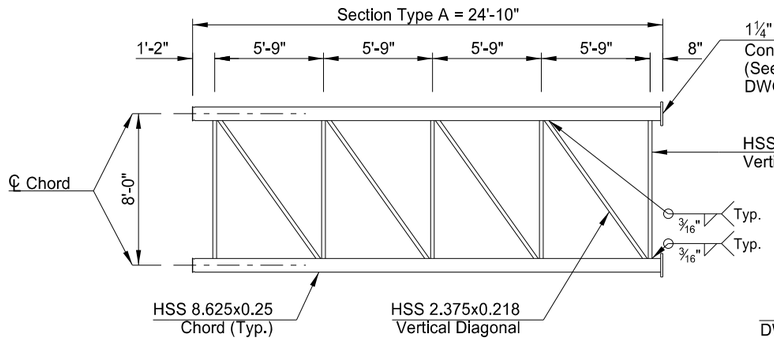


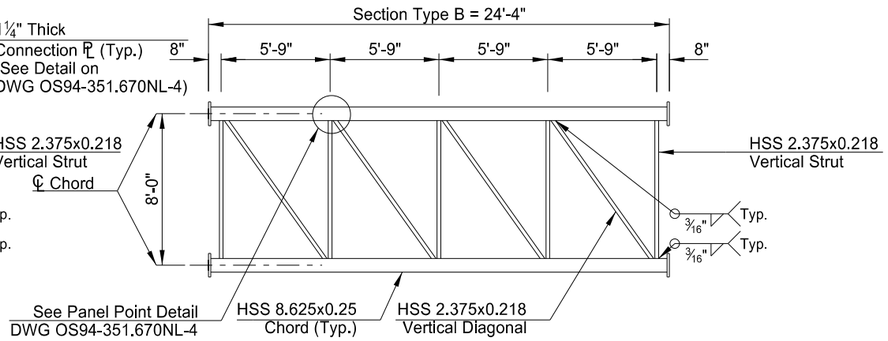
SECTION TYPE A PLAN



SECTION TYPE B PLAN



SECTION TYPE A ELEVATION



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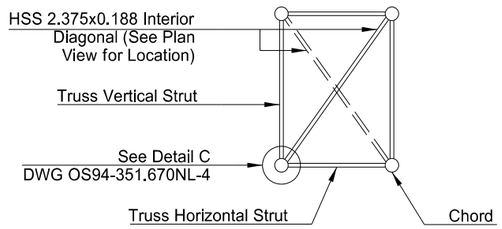
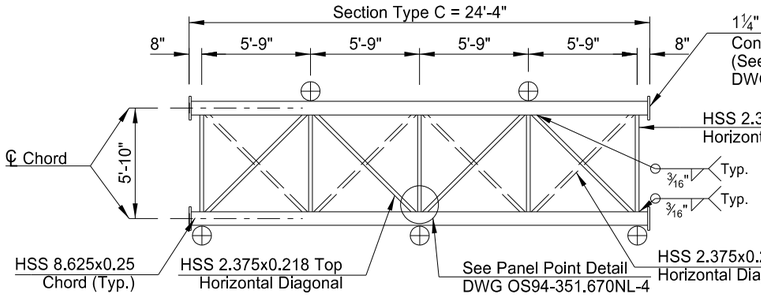
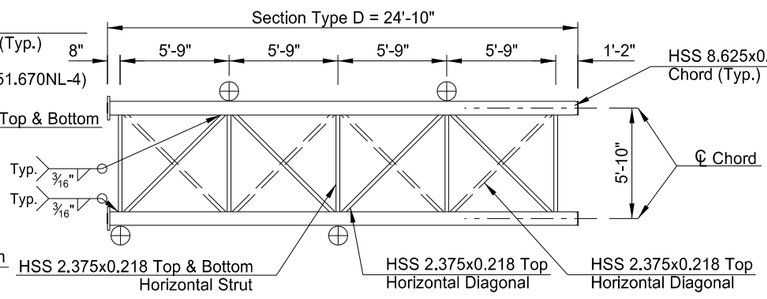


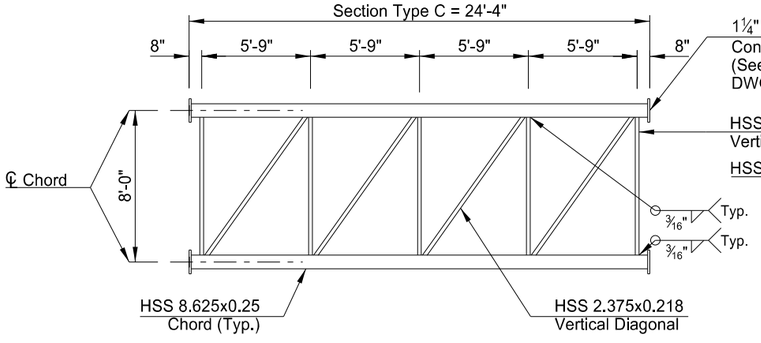
END VIEW



SECTION TYPE C PLAN



SECTION TYPE D PLAN



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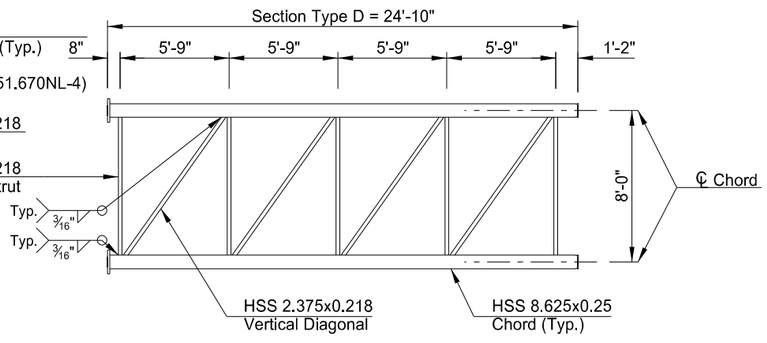

SECTION TYPE D ELEVATION

⊕ Denotes location of interior diagonal. The symbol is placed on the side of the truss where the diagonal attaches to the top chord.

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BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATION: 103+73 ℄ (EX_WBEx)

TRUSS OVERHEAD SIGN STRUCTURE
STRUCTURAL DETAILS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
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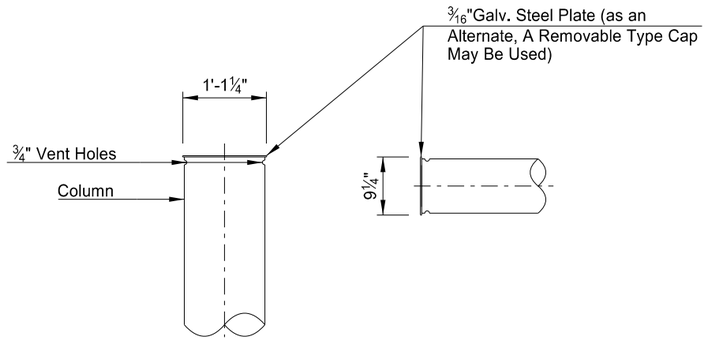
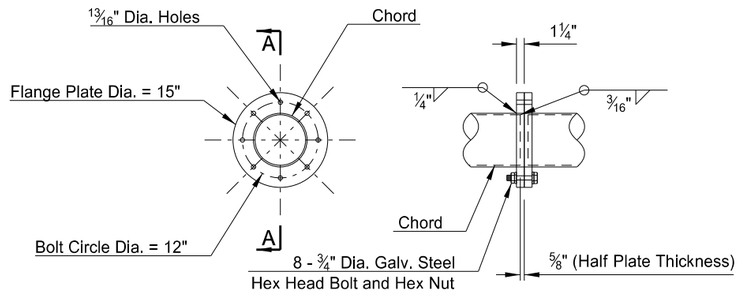


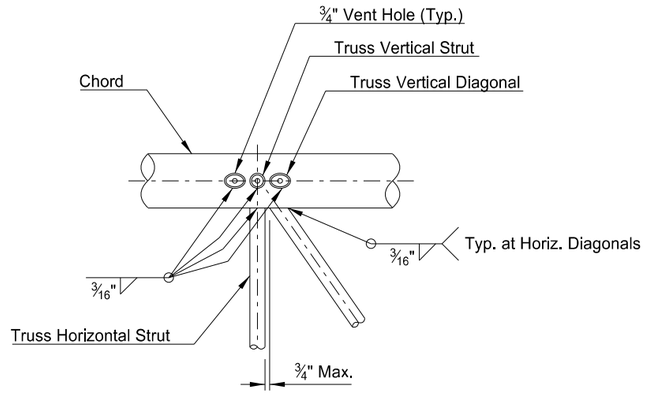
COLUMN CHORD

END CAP DETAILS

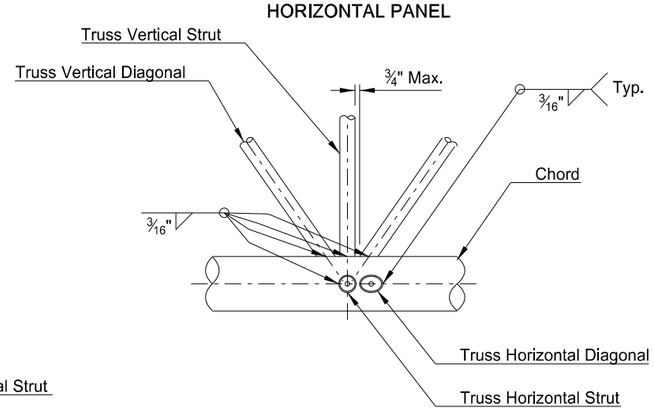


ELEVATION SECTION A-A

SPLICE CONNECTION DETAIL

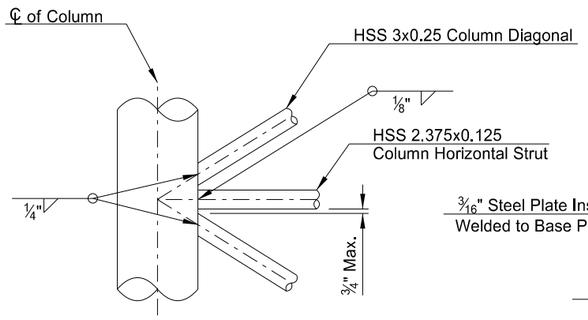


HORIZONTAL PANEL

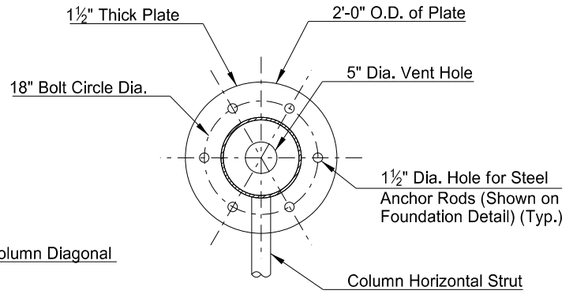


VERTICAL PANEL

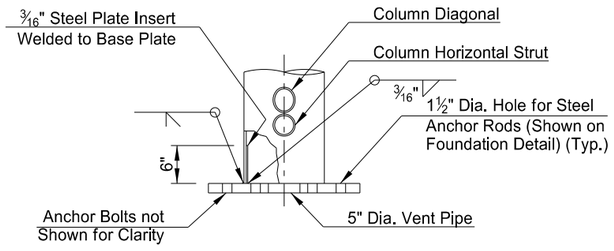
PANEL POINT DETAIL



DETAIL B

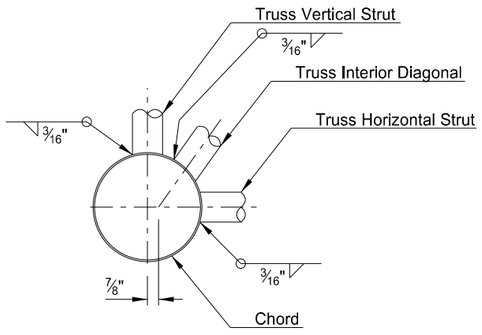


PLAN



ELEVATION

BASE PLATE DETAIL



DETAIL C

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BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATION: 103+73 ℄ (EX_WBEx)

TRUSS OVERHEAD SIGN STRUCTURE
STRUCTURAL DETAILS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	115	6

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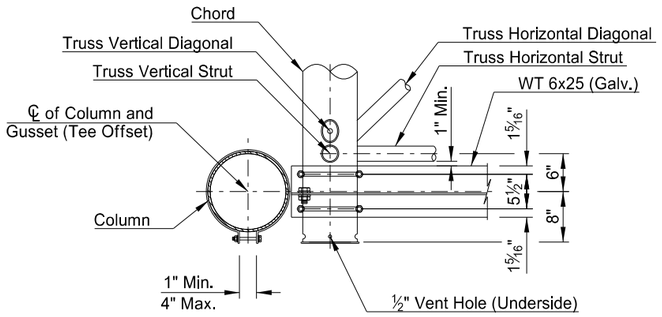
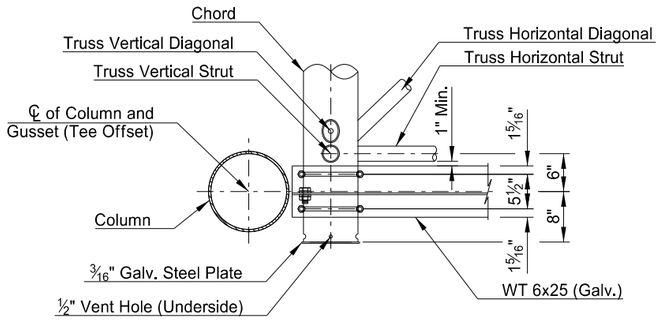


PLAN



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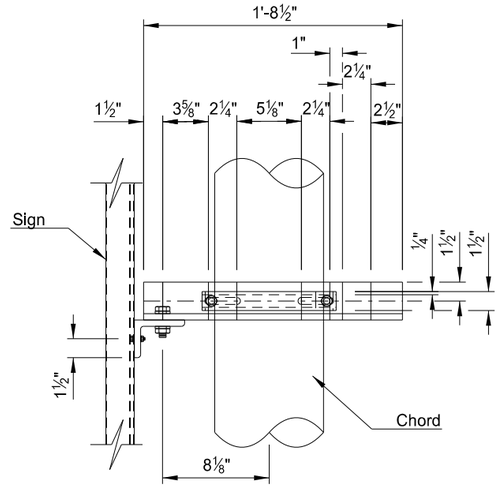
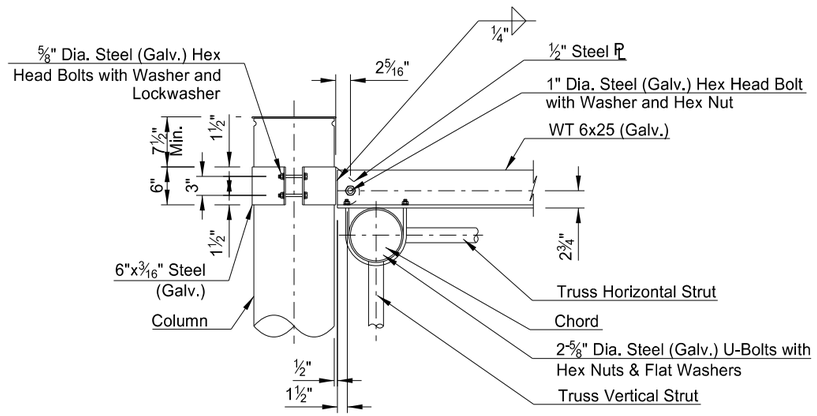
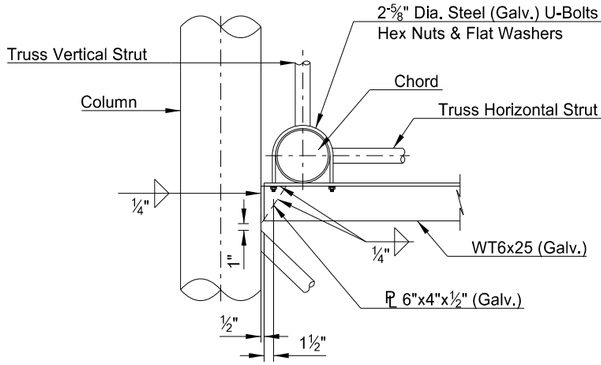


TOP VIEW



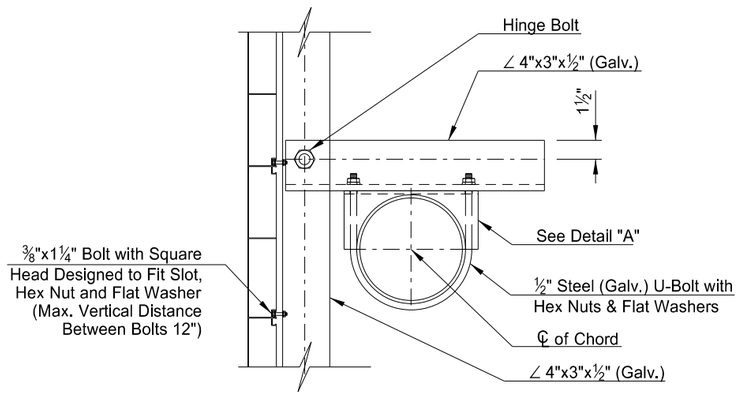
ELEVATION

UPPER END ATTACHMENT DETAIL



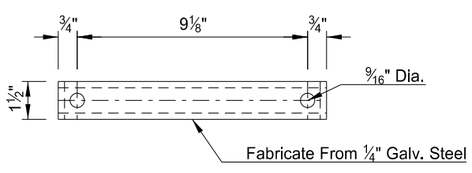
ELEVATION

LOWER END ATTACHMENT DETAIL

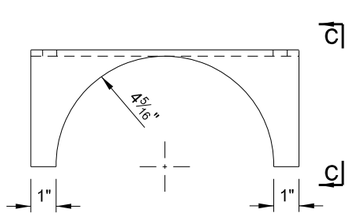


END VIEW

SIGN CONNECTION DETAILS



PLAN



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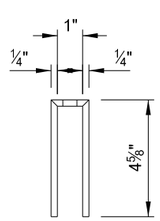

SECTION C-C

DETAIL "A"

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BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATION: 103+73 ℄ (EX_WBEx)

TRUSS OVERHEAD SIGN STRUCTURE
STRUCTURAL DETAILS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	115	7

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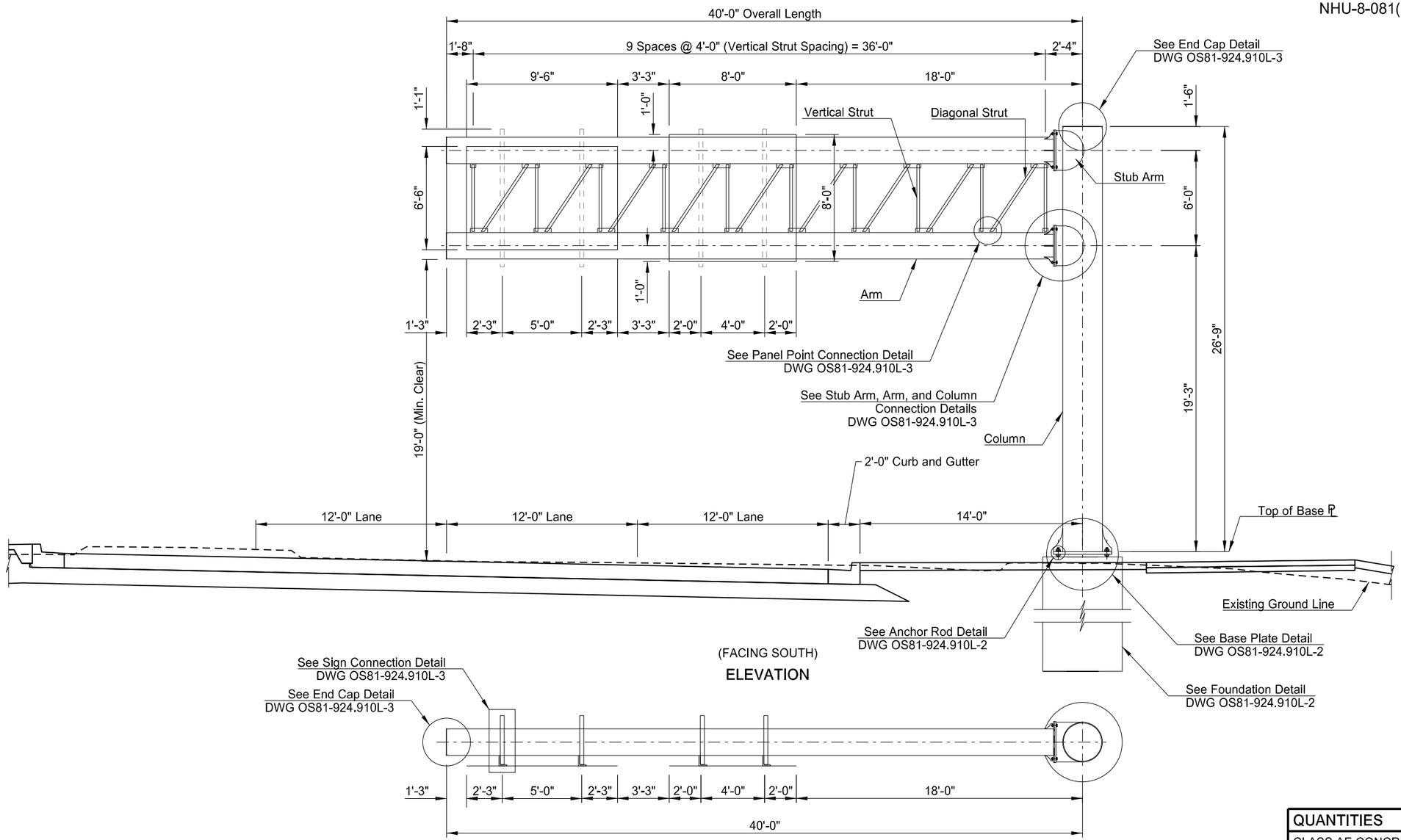

		CANTILEVER SIGN STRUCTURE MEMBERS				
		COLUMN	STUB ARMS	CANTILEVER ARMS	VERTICAL STRUTS	DIAGONAL STRUTS
STEEL	HSS Pipe	30 x 0.500	30 x 0.500	20 x 0.250		
	XS Pipe				2"	2"

Base Plate Thickness: 2"
Anchor Bolts: 12 ea @ 1¾" ø
Anchor Bolt Length: 5'-7"

Flange Plate Thickness: 1"
Flange Bolts: 12 ea/Flange @ 1⅛" ø
Camber: 1.538"

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QUANTITIES	
CLASS AE CONCRETE - SIGN FOUNDATION	24.0 CY
OH SIGN STR 40 FT CANTILEVER	1 EA
REMOVE OVERHEAD SIGN STRUCTURE-TRUSS	1 EA

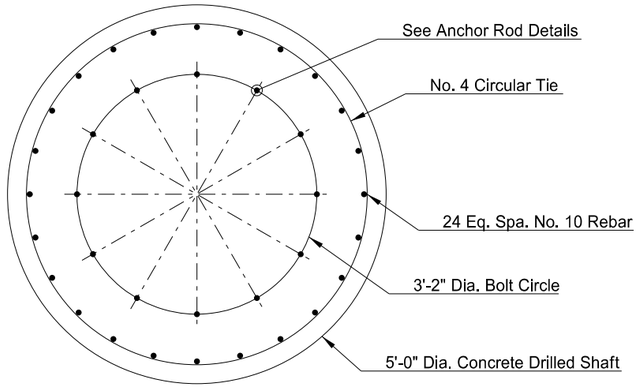
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATION: 1315+23 LT (SCL_Univ)

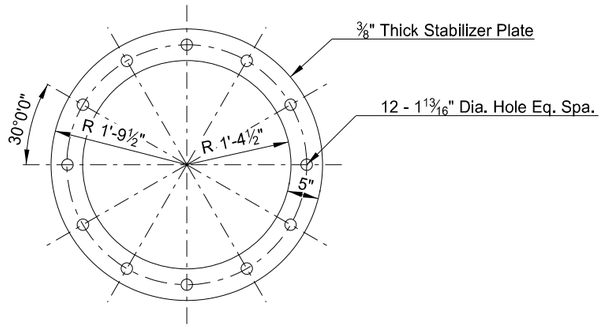
CANTILEVER OVERHEAD SIGN STRUCTURE
GENERAL LAYOUT

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	115	8

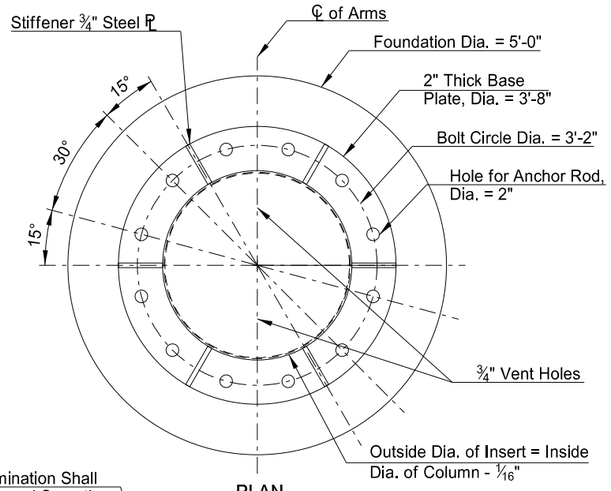
NHU-8-081(039)924



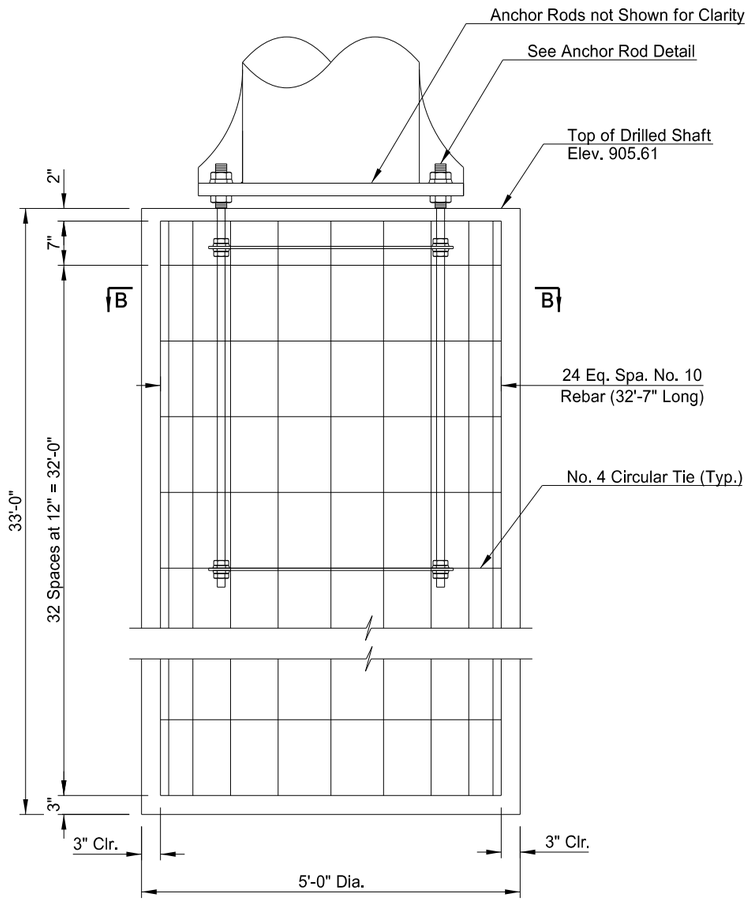
SECTION A-A



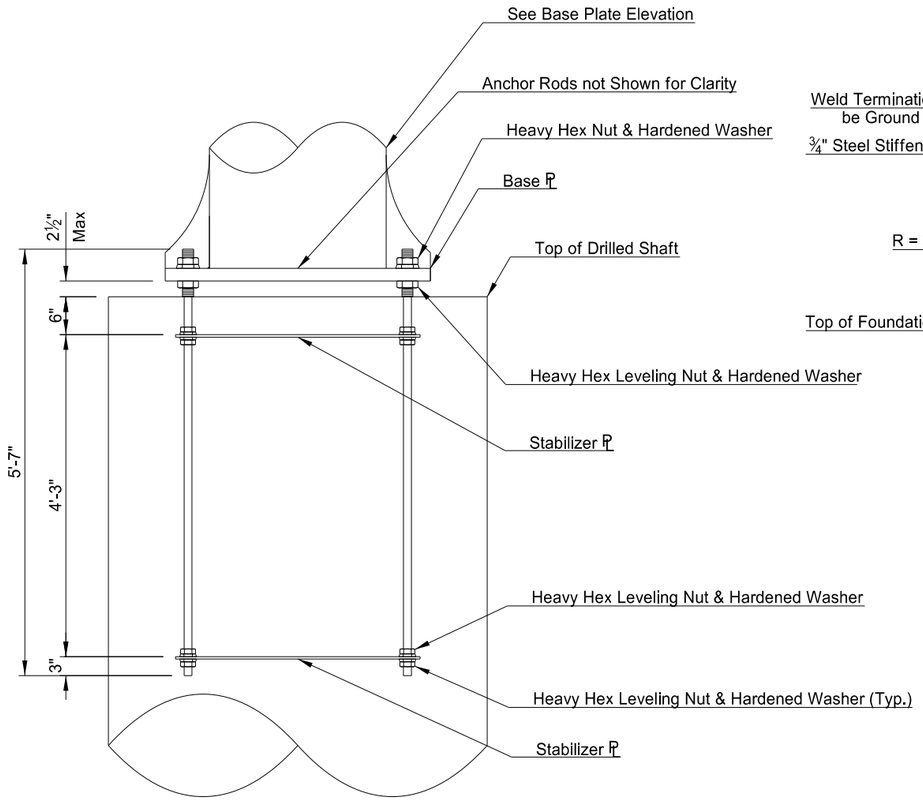
STABILIZER PLATE PLAN



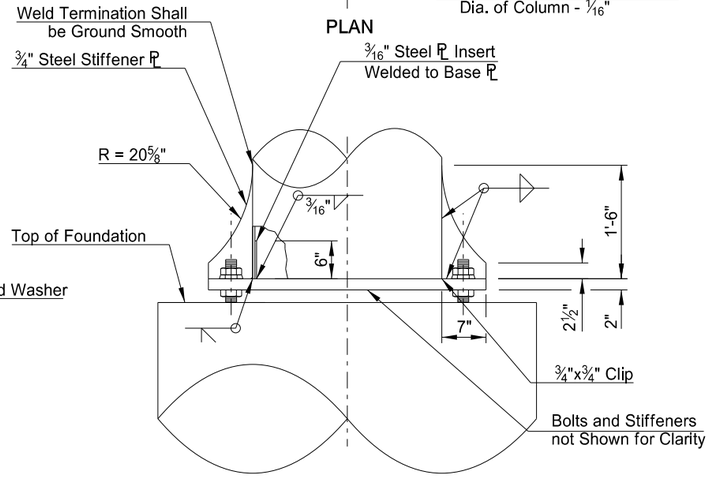
PLAN



FOUNDATION ELEVATION



ANCHOR ROD DETAIL



ELEVATION

BASE PLATE DETAIL

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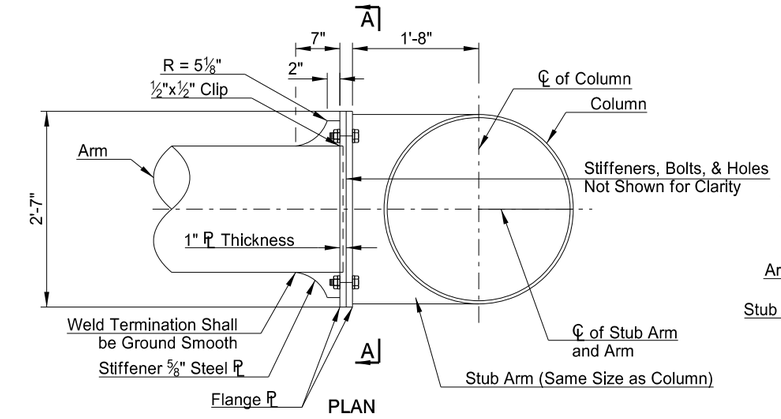
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATION: 1315+23 LT (SCL_Univ)

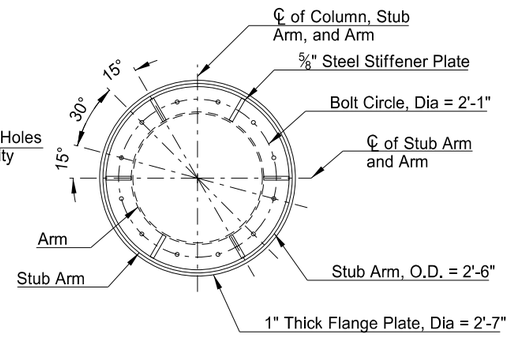
CANTILEVER OVERHEAD SIGN STRUCTURE
STRUCTURAL DETAILS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	115	9

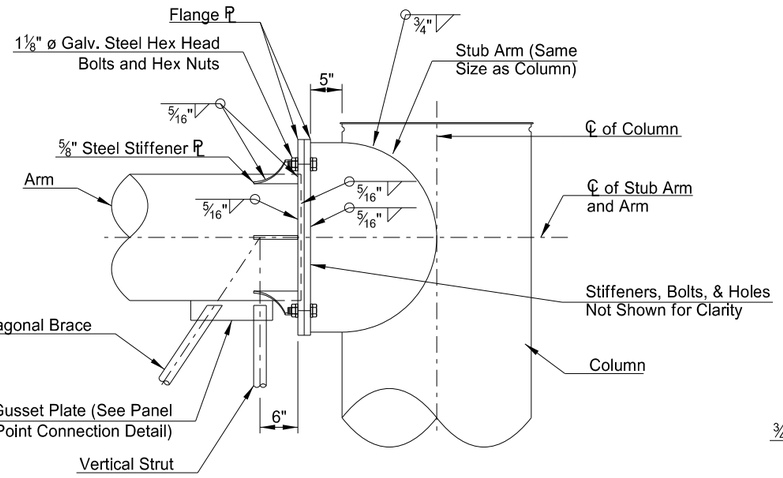
NHU-8-081(039)924



PLAN

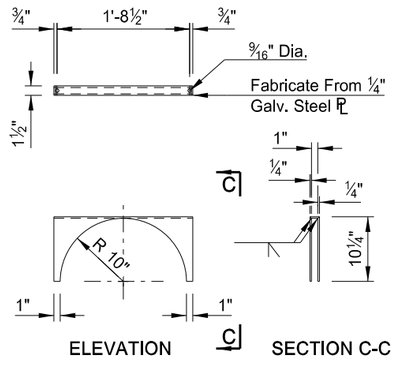


SECTION A-A



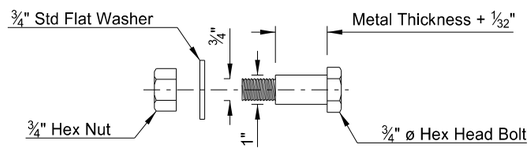
ELEVATION

STUB ARM, ARM, AND COLUMN CONNECTION DETAILS

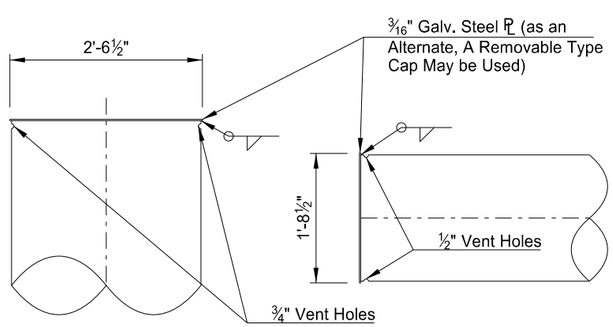


ELEVATION SECTION C-C

DETAILS "A"

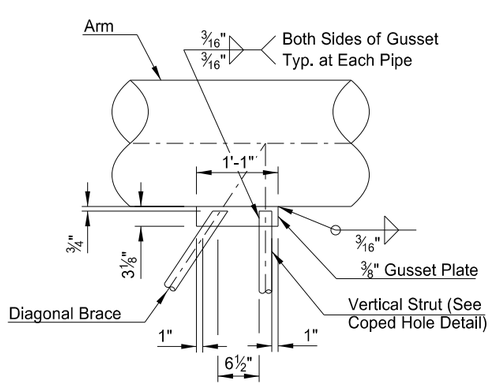


HINGE BOLT DETAIL

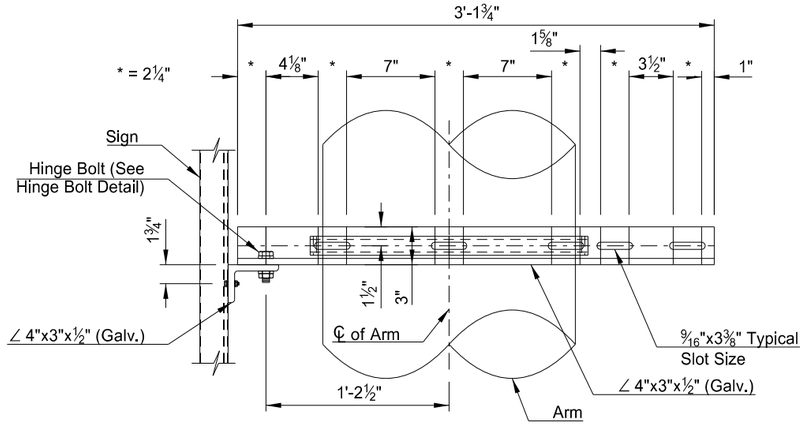


COLUMN ARM

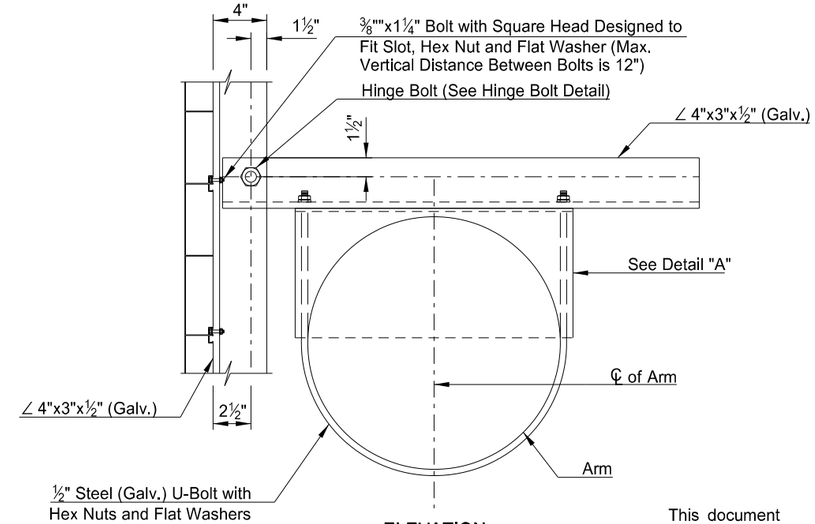
END CAP DETAIL



PANEL POINT CONNECTION DETAIL

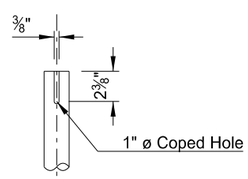


TOP VIEW



ELEVATION

SIGN CONNECTION DETAILS



COPED HOLE DETAIL

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BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATION: 1315+23 LT (SCL_Univ)

CANTILEVER OVERHEAD SIGN STRUCTURE STRUCTURAL DETAILS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	120	1

NHU-8-081(039)924

Spec	Code	Description			
762	0122	PREFORMED PATTERNED PVMT MK - MESSAGE (GROUVED)			
Sta 1302+90 Rt			White	16	SF
Sta 1303+58 Rt			White	16	SF
			Total	32	SF
762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED			
Sta 1301+80 Rt to Sta 1302+06 Rt			Yellow	6	LF
Sta 1302+43 Rt to Sta 1302+98 Rt			Yellow	35	LF
			Total	41	LF
762	1307	PREFORMED PATTERNED PVMT MK 6IN LINE-GROOVED			
Sta 1302+10 Rt to Sta 1302+20 Rt			White	48	LF
Sta 1302+28 Rt to Sta 1302+67 Rt			White	72	LF
Sta 1304+17 Rt to Sta 1304+25 Rt			White	213	LF
			Total	333	LF
762	1309	PREFORMED PATTERNED PVMT MK 8IN LINE-GROOVED			
Sta 1301+80 Rt to Sta 1302+15 Rt			White	35	LF
Sta 1302+90 Rt to Sta 1304+72 Rt			White	194	LF
			Total	229	LF
762	1325	PREFORMED PATTERNED PVMT MK 24IN LINE-GROOVED			
Sta 1302+06 Rt			White	12	LF
Sta 1302+43 Rt to Sta 1302+60 Rt			White	17	LF
Sta 1304+14 Rt			White	47	LF
			Total	76	LF

Note: Stationing based on Pr Univ

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Pavement Marking Layouts

Business US 81 (University Drive)
21st Ave S to 18th Ave S

Sta 1301+80 to Sta 1305+32

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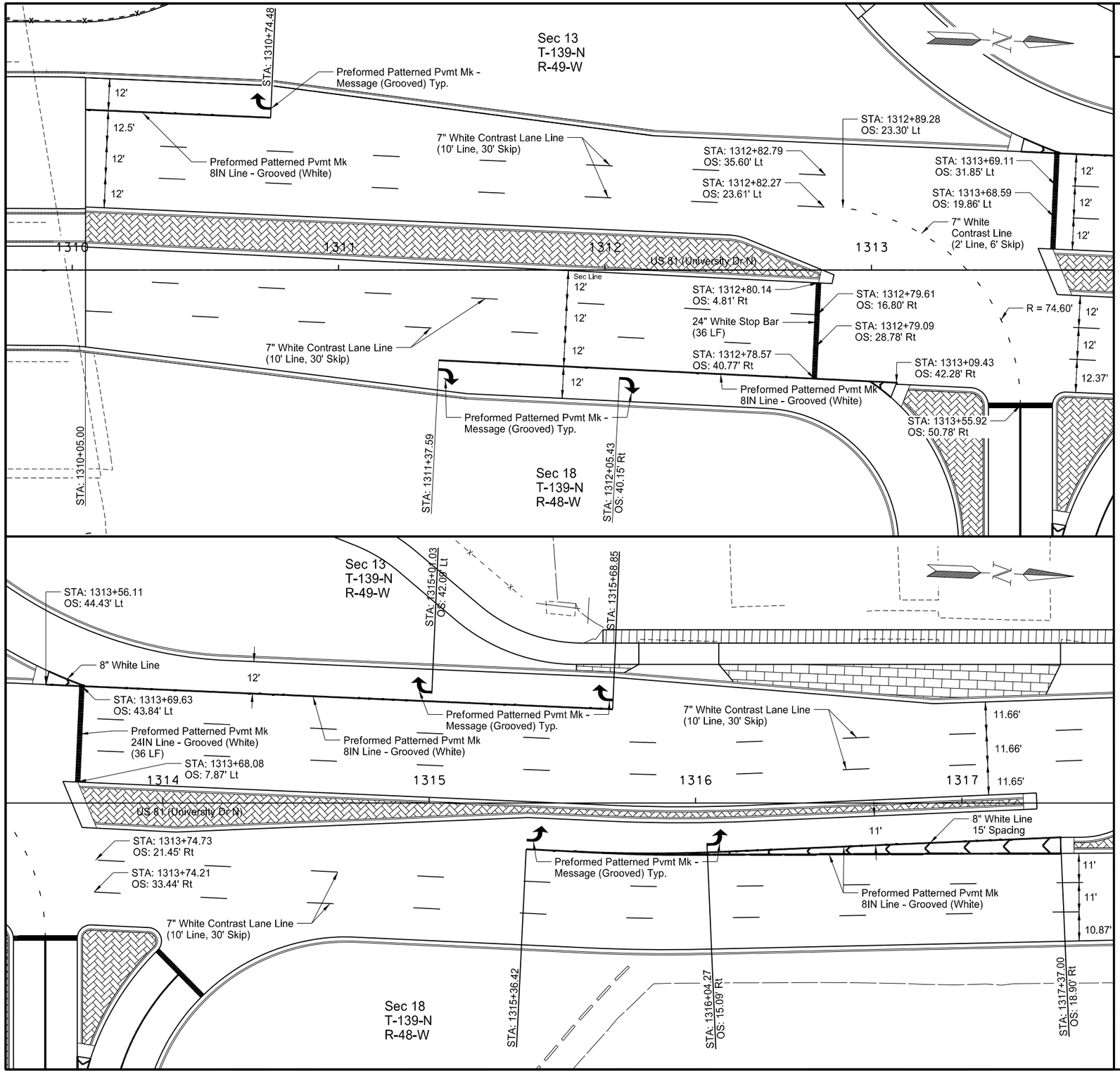

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	120	2

NHU-8-081(039)924

Spec	Code	Description		
762	0122	PREFORMED PATTERNED PVMT MK - MESSAGE (GROOVED)		
Sta 1310+74 Lt		White	16	SF
Sta 1311+38 Rt		White	16	SF
Sta 1312+05 Rt		White	16	SF
Sta 1315+01 Lt		White	16	SF
Sta 1315+36 Rt		White	16	SF
Sta 1315+69 Lt		White	16	SF
Sta 1316+04 Rt		White	16	SF
		Total	112	SF
762	1309	PREFORMED PATTERNED PVMT MK 8IN LINE-GROOVED		
Sta 1310+80 Lt to Sta 1310+74 Lt		White	70	LF
Sta 1311+38 Rt to Sta 1313+09 Rt		White	185	LF
Sta 1313+56 Lt to Sta 1315+69 Lt		White	231	LF
Sta 1315+36 Rt to Sta 1317+37 Rt		White	428	LF
		Total	914	LF
762	1325	PREFORMED PATTERNED PVMT MK 24IN LINE-GROOVED		
Sta 1313+68 Lt to 1313+70 Lt		White	36	LF
Sta 1312+79 Rt to 1312+80 Rt		White	36	LF
		Total	72	LF
762	1344	PREF PATT PVMT MK 7IN LINE CONTRAST-GROOVED		
Sta 1310+05 Lt to 1312+83 Lt		White	70	LF
Sta 1310+05 Lt to 1312+82 Lt		White	69	LF
Sta 1310+05 Rt to 1312+80 Rt		White	69	LF
Sta 1310+05 Rt to 1312+79 Rt		White	69	LF
Sta 1312+89 Lt to 1313+56 Rt		White	27	LF
Sta 1313+69 Lt to 1317+37 Lt		White	92	LF
Sta 1313+69 Lt to 1317+37 Lt		White	92	LF
Sta 1313+74 Rt to 1317+37 Rt		White	91	LF
Sta 1313+74 Rt to 1317+37 Rt		White	91	LF
		Total	670	LF

Note: Stationing based on Pr Univ

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Pavement Marking Layouts

Business US 81 (University Drive)
21st Ave S to 18th AveS

Sta 1310+05 to Sta 1317+37

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	120	3

NHU-8-081(039)924

Sec 13
T-139-N
R-49-W

Sec 18
T-139-N
R-48-W

Sec 18
T-139-N
R-48-W

STA: 1321+17
OS: 48.43' Lt

STA: 1321+11
OS: 46.19' Lt

Preformed Patterned Pvmt Mk 6IN Line - Grooved (White) (185 LF)

Preformed Patterned Pvmt Mk 4IN Line - Grooved (Yellow-Barrier)

STA: 1321+10
OS: 10.20' Lt

Pref Patt Pvmt Mk 7IN Line Contrast-Grooved (10' Line, 30' Skip)

Pref Patt Pvmt Mk 7IN Line Contrast-Grooved (10' Line, 30' Skip)

1318 1319 1320

US 81 (University Dr N)

Preformed Patterned Pvmt Mk - Message (Grooved) Typ.

Preformed Patterned Pvmt Mk 8IN Line - Grooved (White)

11' 11' 11' 11' 11' 11.26'

Preformed Patterned Pvmt Mk 24IN Line - Grooved (White) (50 LF)

STA: 1321+14
OS: 39.47' Rt

STA: 1321+18
OS: 42.04' Rt

STA: 1319+13.46

STA: 1319+81.29
OS: 4.48' Rt

STA: 1320+45.67

STA: 100+72.42
OS: 41.41' Lt

STA: 100+63.88
OS: 32.99' Lt

STA: 100+55.33
OS: 24.56' Lt

Preformed Patterned Pvmt Mk 24IN Line - Grooved (White) (24 LF)

1314 1313 100 101 102 103 104

Conc 24' C&G 2 CB CB Conc Trail Sig

STA: 102+05.36

Preformed Patterned Pvmt Mk - Message (Grooved) Typ.

STA: 100+95.09
OS: 5.54' Rt

Preformed Patterned Pvmt Mk 8IN Line - Grooved (White)

Preformed Patterned Pvmt Mk 24IN Line - Grooved (White) (24 LF)

12' 12' 12' 12'

STA: 103+37.83

STA: 103+52.93
OS: 6.46' Lt

STA: 103+72.55

STA: 100+50.78

US 81 (University Dr N)

Preformed Patterned Pvmt Mk - Message (Grooved) Typ.

N

Notes:
1. Stationing in top window based on Pr Univ
2. Stationing in bottom window based on Ex WBEx

Spec Code Description

762 0122 PREFORMED PATTERNED PVMT MK - MESSAGE (GROOVED)

Sta 1319+13 Rt	White	16 SF
Sta 1319+81 Rt	White	16 SF
Sta 102+05	White	63 SF
Sta 103+38	White	63 SF
	Total	158 SF

762 1305 PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED

Sta 1320+46 to Sta 1321+05	Yellow	237 LF

762 1307 PREFORMED PATTERNED PVMT MK 6IN LINE-GROOVED

Sta 1321+15	White	88 LF
Sta 1321+21	White	97 LF
	Total	185 LF

762 1309 PREFORMED PATTERNED PVMT MK 8IN LINE-GROOVED

Sta 1319+13 Rt to Sta 1321+05 Rt	White	192 LF
Sta 100+51 Rt to Sta 103+73 Rt	White	312 LF
Sta 100+95 Rt to Sta 103+73 Rt	White	314 LF
Sta 100+72 Lt to Sta 103+53 Lt	White	300 LF
	Total	1118 LF

762 1325 PREFORMED PATTERNED PVMT MK 24IN LINE-GROOVED

Sta 1321+12	White	50 LF
Sta 100+50.78 Rt	White	24 LF
Sta 100+55 Lt to 100+72 Lt	White	24 LF
	Total	98 LF

762 1344 PREF PATT PVMT MK 7IN LINE CONTRAST-GROOVED

Sta 1317+37 to 1321+05	White	368 LF

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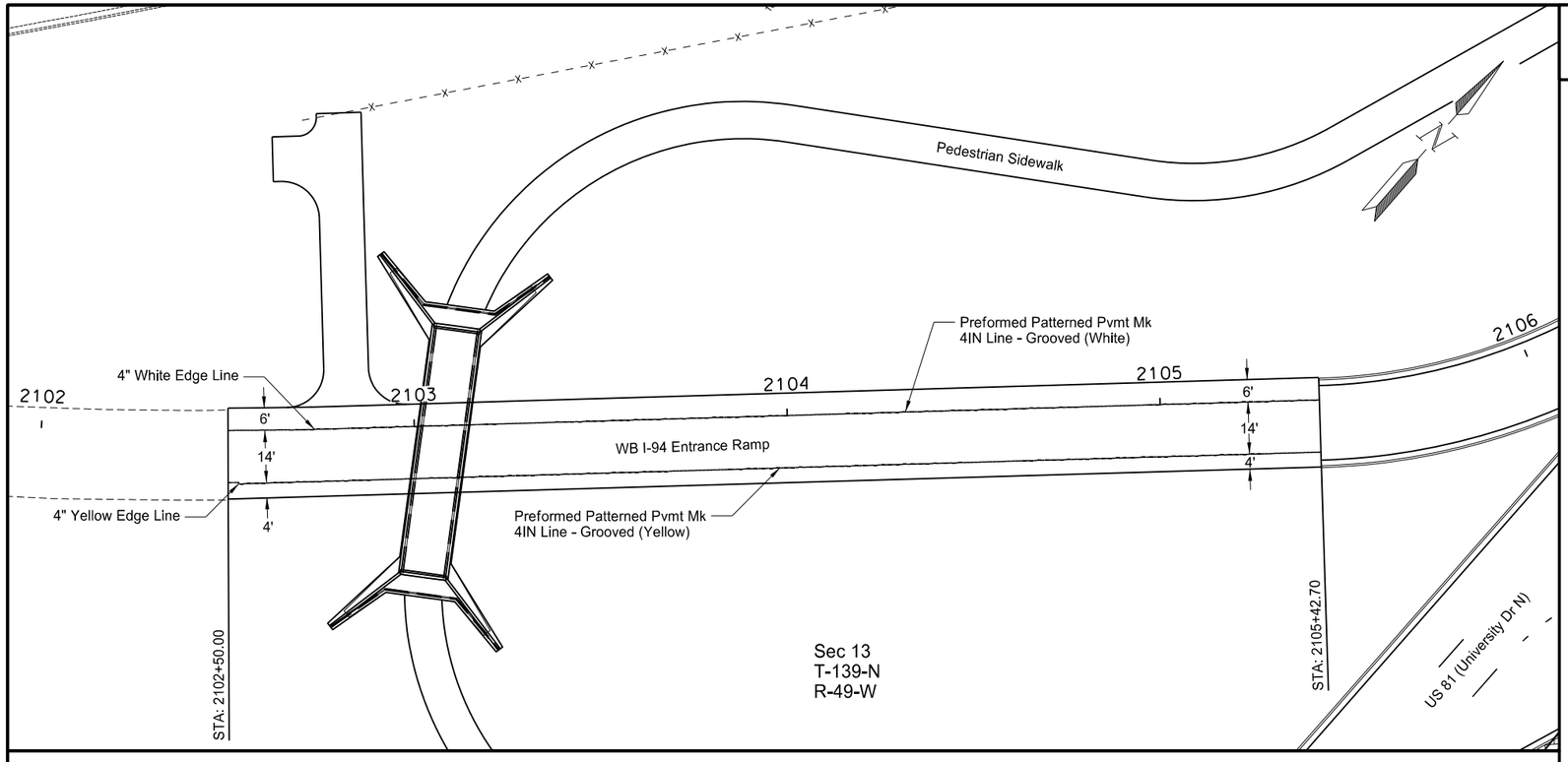
Pavement Marking Layouts

Business US 81 (University Drive)
21st Ave S to 18th Ave S
Sta 1317+37 to Sta 1321+05
Sta 100+51 to Sta 103+73



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	120	4

NHU-8-081(039)924

Spec	Code	Description		
762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED		
Sta 2102+50 Rt to Sta 2105+43 Rt		White	293	LF
Sta 2102+50 Rt to Sta 2105+43 Rt		Yellow	293	LF
		Total	586	LF

Note: Stationing is based on Pr WBEnt

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Pavement Marking Layouts

Business US 81 (University Drive)
21st Ave S to 18th Ave S

Sta 2102+50 to Sta 2105+43

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	140	1

NHU-8-081(039)924

0 20' 40'

EXISTING POLE MOUNTED FEED POINT (A) FOR CITY OF FARGO STREET LIGHTING TO BE REMOVED

SEE PEDESTRIAN LIGHTING LAYOUT SHEET FOR CONTINUATION

1" INNERDUCT/CONDUCTORS, 2-1/C #8 AND 1/C #8 GND

RIGHT OF WAY

PROPOSED PAD MOUNTED COMBINATION LIGHTING AND SIGNAL FEED POINT (A) TYPE IV CITY OF FARGO STREET LIGHTING (WITH 30A 2P BREAKER TO FEED PEDESTRIAN UNDERPASS LIGHTING CONSTANT 240V)

ELECTRIC SERVICE POLE

STREET LIGHT POLE A-1-2
STA. 1315+57, 61' LT

CIRCUIT A-1 (TYP)
(3) #6 RHW

STREET LIGHT POLE A-1-3
STA. 1317+27, 43' LT

RIGHT OF WAY

WB I-94 ON RAMP

STREET LIGHT POLE A-1-1
STA. 1314+17, 59' LT

UNIVERSITY DR

1313 1314 1315 1316 1317 1318

STREET LIGHT POLE A-2-1
STA. 1314+62, 55' RT

REMOVE EXISTING LIGHT STANDARD (TYP)

STREET LIGHT POLE A-2-2
STA. 1316+32, 59' RT

CIRCUIT A-2 (TYP)
(3) #6 RHW

RIGHT OF WAY

STREET LIGHT POLE A-2-3
STA. 1318+22, 53' RT

WB I-94 OFF RAMP

RIGHT OF WAY

LEGEND

- STREET LIGHT STANDARD AND LUM., 173W LED LUM. ON 40' MOUNTING HEIGH STD. W/ STLT NUMBER
- EXISTING STREET LIGHT
- 2" INNERDUCT/CONDUCTOR UNLESS NOTED OTHERWISE
- E — EXISTING INTERDUCT/CONDUCTOR
- PROPOSED FEED POINT
- EXISTING FEED POINT
- PULL BOX
- A-2-2 — POLE NUMBER, CIRCUIT NUMBER, FEED POINT

SHEET NOTES:

1. REMOVE BASE, STANDARD AND LUMINAIRE
2. REMOVE AND REPLACE LUMINAIRE ON EXISTING COMBINATION TRAFFIC SIGNAL STANDARD
3. INSTALL LIGHT STANDARD EXTENSION (40' FT. MOUNTING HEIGHT) AND LUMINAIRE (SEE TRAFFIC SIGNAL PLANS)

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LIGHTING PLANS
UNIVERSITY DR

BUSINESS US 81 (UNIVERSITY DRIVE)
WB I-94 RAMP TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	140	2

NHU-8-081(039)924

0 20' 40'

LEGEND

- STREET LIGHT STANDARD AND LUM., 173W LED LUM. ON 40' MOUNTING HEIGH STD. W/ STLT NUMBER
- EXISTING STREET LIGHT
- 2" INNERDUCT/CONDUCTOR UNLESS NOTED OTHERWISE
- E — EXISTING INTERDUCT/CONDUCTOR
- PROPOSED FEED POINT
- EXISTING FEED POINT
- PULL BOX
- A-2-2 — POLE NUMBER / CIRCUIT NUMBER / FEED POINT

STREET LIGHT POLE B-1-4
STA. 1321+26, 163' LT
INTERCEPT EXISTING CONDUIT/CONDUCTORS AND ROUTE INTO NEW POLE FOUNDATION

EXISTING COMBINATION POLE. REMOVE AND REPLACE LIGHT STANDARD EXTENSION (40 FT MOUNTING HEIGHT TENON TOP WITH 1' SPOKE ARM BRACKET) AND LUMINAIRE B-1-3 (SEE TRAFFIC SIGNAL PLANS)

CIRCUIT A-1 (TYP)
(3) #6 RHW

STREET LIGHT POLE A-1-4
STA. 1319+17, 49' LT

REMOVE EXISTING LIGHT STANDARD (TYP)

RIGHT OF WAY

EXISTING COMBINATION POLE. REMOVE AND REPLACE LIGHT STANDARD EXTENSION (40 FT MOUNTING HEIGHT TENON TOP WITH 1' SPOKE ARM BRACKET) AND LUMINAIRE B-1-2 (SEE TRAFFIC SIGNAL PLANS)

RIGHT OF WAY

UNIVERSITY DR

1319 1320 1321 1322 1323 1324

CIRCUIT A-2 (TYP)
(3) #6 RHW

STREET LIGHT POLE A-2-4
STA. 1320+12, 44' RT

RIGHT OF WAY

EXISTING TRAFFIC SIGNAL POLE. INSTALL LIGHT STANDARD EXTENSION (40 FT MOUNTING HEIGHT AND TENON TOP WITH 1' SPOKE ARM BRACKET) AND LUMINAIRE A-2-5 (SEE TRAFFIC SIGNAL PLANS)

EXISTING COMBINATION POLE. REMOVE AND REPLACE LIGHT STANDARD EXTENSION (40 FT MOUNTING HEIGHT TENON TOP WITH 1' SPOKE ARM BRACKET) AND LUMINAIRE B-1-1 (SEE TRAFFIC SIGNAL PLANS)

RIGHT OF WAY

EXISTING POLE MOUNTED FEED POINT
(B) FOR CITY OF FARGO STREET LIGHTING AND TRAFFIC SIGNALS

SHEET NOTES:

1. REMOVE BASE, STANDARD AND LUMINAIRE
2. REMOVE AND REPLACE LUMINAIRE ON EXISTING COMBINATION TRAFFIC SIGNAL STANDARD
3. INSTALL LIGHT STANDARD EXTENSION (40' FT. MOUNTING HEIGHT) AND LUMINAIRE (SEE TRAFFIC SIGNAL PLANS)

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LIGHTING PLANS
UNIVERSITY DR

BUSINESS US 81 (UNIVERSITY DRIVE)
WB I-94 RAMP TO 18TH AVE S

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	140	3

NHU-8-081(039)924

0 20' 40'

PULL BOX STA 2102+84, 41' LT
INTERCEPT EXISTING CONDUIT AND SPLICE PROPOSED CONDUCTORS TO EXISTING CONDUCTORS

2" INNERDUCT/CONDUCTORS DIRECTIONAL BORED 15' BELOW EXISTING GRADE PRIOR TO EXCAVATION FOR PATHWAY AND UNDERPASS

PULL BOX STA 2007+28, 13' LT

PULL BOX STA 2103+64, 47' LT
INTERCEPT EXISTING CONDUIT AND SPLICE PROPOSED CONDUCTORS TO EXISTING CONDUCTORS

1" DIA. RGS CONDUIT WITH 2-1/C #8 AND 1/C #8 GND

PEDESTRIAN UNDERPASS 4' LINEAR LED LUMINAIRES, CONTINUOUS ROW, (2) END LUMINAIRES AND (14) MIDDLE LUMINAIRES, CEILING MOUNTED (SEE DETAIL SHEET)

1" INNERDUCT/CONDUCTORS, 2-1/C #8 AND 1/C #8 GND

EXIST NDDOT LIGHTING CIRCUITS

EXIST ELECTRIC SERVICE TO BE REMOVED (FOR CITY OF FARGO ONLY)

EXIST NDDOT FEED POINT (C)

EXISTING POLE MOUNTED FEED POINT (A) FOR CITY OF FARGO STREET LIGHTING TO BE REMOVED

SEE LIGHTING PLANS FOR CONTINUATION

EXIST NDDOT HIGH MAST LIGHT TOWER

RIGHT OF WAY

WB I-94 ON-RAMP

UNIVERSITY DR

2102 2103 2104 2105 2106 2107 2005 2006 2007 2008 2009 2010 1310 1311 1312 1313 1314

LEGEND

- STREET LIGHT STANDARD AND LUM., 173W LED LUM. ON 40' MOUNTING HEIGH STD. W/ STLT NUMBER
- EXISTING STREET LIGHT
- 2" INNERDUCT/CONDUCTOR UNLESS NOTED OTHERWISE
- EXISTING INTERDUCT/CONDUCTOR
- PROPOSED FEED POINT
- EXISTING FEED POINT
- PULL BOX
- EXISTING NDDOT HIGH MAST LIGHT TOWER

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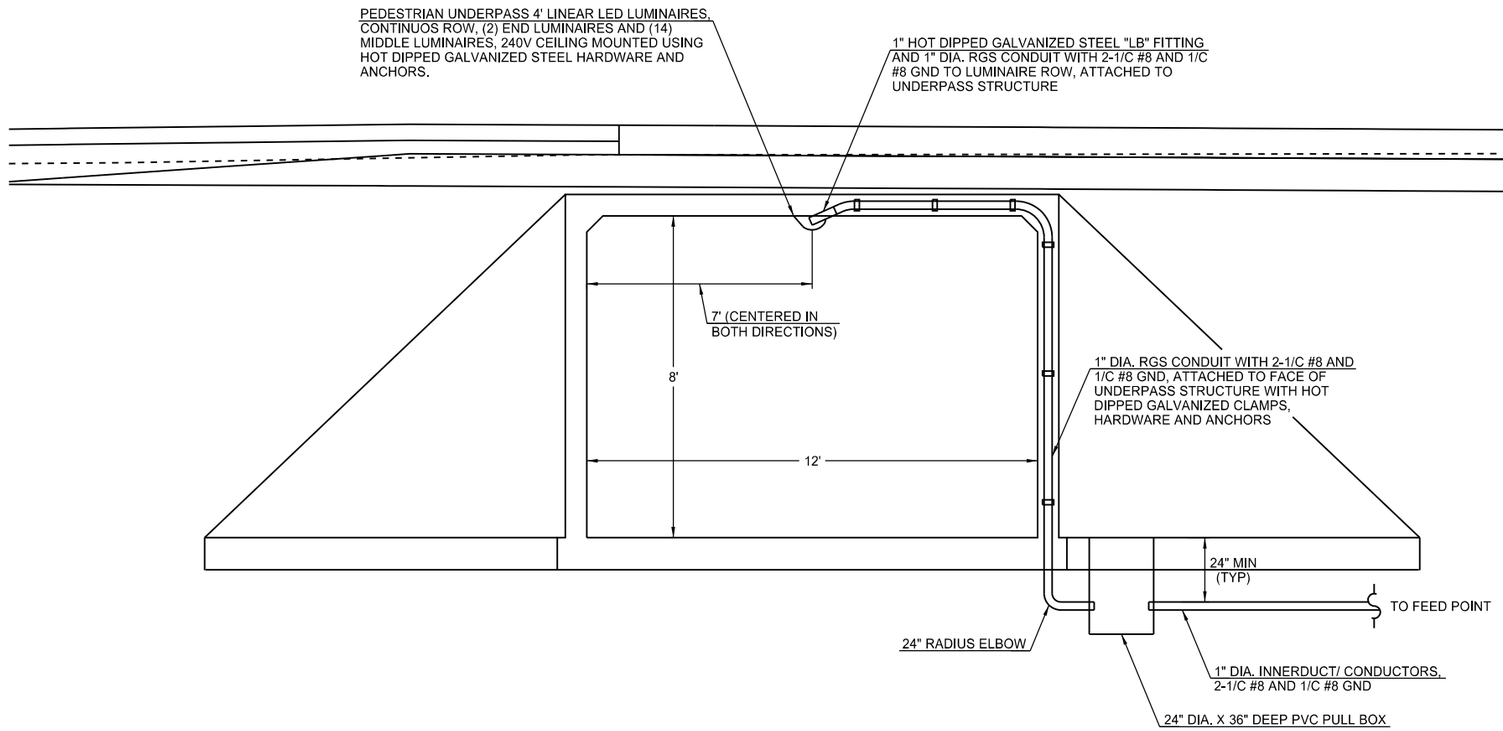
LIGHTING PLANS
UNIVERSITY DR
PEDESTRIAN LIGHTING LAYOUT

BUSINESS US 81 (UNIVERSITY DRIVE)
WB I-94 RAMP TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	140	4

NHU-8-081(039)924



LUMINAIRE MANUFACTURER	MODEL NUMBER	NOTES
KENALL	MLHA5S-B48-14/M48-E48-SP-MW-PP-1-45L40K-DCC-1-DV-CDF-MFAD20	WITH MANUAL FIELD-ADJUSTABLE DEVICE IN FIXTURES DIMMED TO 20%
NEW STAR LIGHTING	VIC4N-L1-40-1-RWC-UN-WH-TM-SD3-DE-TH	SET STEP DIM MODULES TO 25%. PROVIDE (2) END LUMINAIRES AND (14) MIDDLE LUMINAIRES.

NOTES
1. LUMINAIRES AS NOTED OR APPROVED EQUAL.

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LIGHTING PLANS
PEDESTRIAN LIGHTING DETAILS

BUSINESS US 81 (UNIVERSITY DRIVE)
WB I-94 RAMP TO 18TH AVE S

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	140	5

NHU-8-081(039)924

LIGHTING SUMMARY - SYSTEM A - CITY OF FARGO		
ITEM DESCRIPTION	UNIT	QUANTITY
CONCRETE FOUNDATION-HIGHWAY LIGHTING	EACH	8
2 INCH DIAMETER RIGID CONDUIT (INNERDUCT)	LF	1525
UNDERGROUND CONDUCTOR-NO. 6-TYPE RHW	LF	4841
COMBINATION FEED POINT-TYPE IV- PAD MOUNTED	EACH	1
LED LUMINAIRE-173 WATT	EACH	9
LIGHT STANDARD 40 FT MT HT, TENON TOP WITH 1' SPOKE ARM BRACKET	EACH	8

LIGHTING SUMMARY - SYSTEM B - CITY OF FARGO		
ITEM DESCRIPTION	UNIT	QUANTITY
CONCRETE FOUNDATION-HIGHWAY LIGHTING	EACH	1
LED LUMINAIRE-173 WATT	EACH	4
LIGHT STANDARD 40 FT MT HT, TENON TOP WITH 1' SPOKE ARM BRACKET	EACH	1

LIGHTING SUMMARY - SYSTEM C - NDDOT		
ITEM DESCRIPTION	UNIT	QUANTITY
2 INCH DIAMETER RIGID CONDUIT (INNERDUCT)	LF	100
UNDERGROUND CONDUCTOR-NO. 2-TYPE RHW	LF	216
UNDERGROUND CONDUCTOR-NO. 4-TYPE RHW	LF	108
PULL BOX	EACH	2

LIGHTING SYSTEM - CITY OF FARGO #		
ITEM DESCRIPTION	UNIT	QUANTITY
1 INCH DIAMETER RIGID CONDUIT (INNERDUCT)	LF	400
1 INCH DIAMETER RIGID CONDUIT	LF	30
UNDERGROUND CONDUCTOR-NO. 8-TYPE RHW	LF	1320
4 FT LINEAR LED LUMINAIRE	EACH	16
PULL BOX	EACH	1
# PEDESTRIAN UNDERPASS LIGHTING		

LIGHTING REMOVAL SUMMARY		
ITEM DESCRIPTION	UNIT	QUANTITY
REMOVE LIGHT STANDARD	EACH	13
REMOVE LUMINAIRE MTD. ON SIGNAL POLE	EACH	3
REMOVE FEED POINT	EACH	1

STREET LIGHT SCHEDULE (SYSTEM A - CITY OF FARGO)								
SYSTEM	NO.	STATION	OFFSET	WATT	POLE HT.	CIRCUIT NO.	FOUNDATION DEPTH/DIA.	MISCELLANEOUS
A	A-1-1	1314+17	59' LT	173	40	1	7' DEPTH/24" DIA.	
A	A-1-2	1315+57	61' LT	173	40	1	7' DEPTH/24" DIA.	
A	A-1-3	1317+27	43' LT	173	40	1	7' DEPTH/24" DIA.	
A	A-1-4	1319+17	49' LT	173	40	1	7' DEPTH/24" DIA.	
A	A-2-1	1314+62	55' RT	173	40	2	7' DEPTH/24" DIA.	
A	A-2-2	1316+32	59' RT	173	40	2	7' DEPTH/24" DIA.	
A	A-2-3	1318+22	53' RT	173	40	2	7' DEPTH/24" DIA.	
A	A-2-4	1320+12	44' RT	173	40	2	7' DEPTH/24" DIA.	
A	A-2-5	-	-	173	40	2	-	LUMINAIRE MTD. ON SIGNAL POLE

STREET LIGHT SCHEDULE (SYSTEM B - CITY OF FARGO)								
SYSTEM	NO.	STATION	OFFSET	WATT	POLE HT.	CIRCUIT NO.	FOUNDATION DEPTH/DIA.	MISCELLANEOUS
B	B-1-1	-	-	173	40	1	-	LUMINAIRE MTD. ON SIGNAL POLE
B	B-1-2	-	-	173	40	1	-	LUMINAIRE MTD. ON SIGNAL POLE
B	B-1-3	-	-	173	40	1	-	LUMINAIRE MTD. ON SIGNAL POLE
B	B-1-4	1321+26	163' LT	173	40	1	7' DEPTH/24" DIA.	

NOTE:
1. QUANTITIES FOR INFORMATION ONLY.

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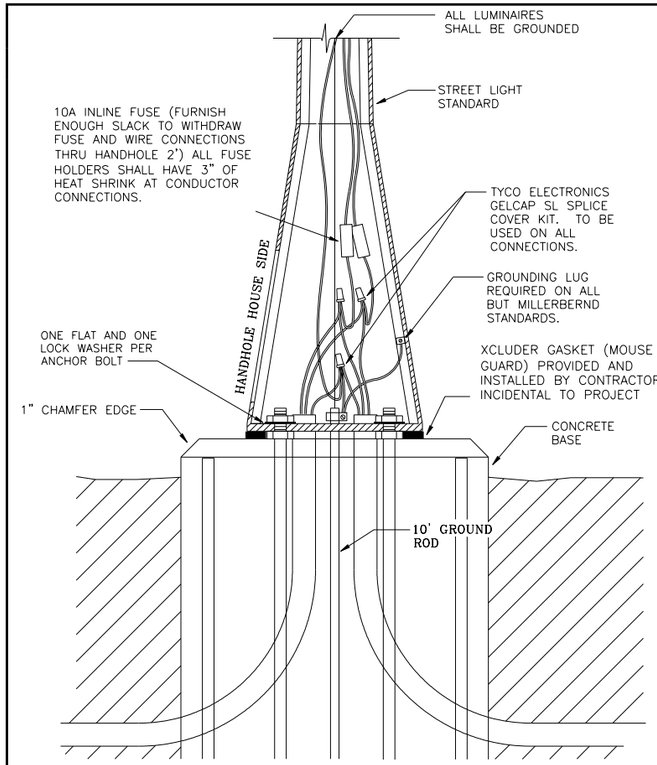
LIGHTING PLANS
SCHEDULE OF QUANTITIES

BUSINESS US 81 (UNIVERSITY DRIVE)
WB I-94 RAMP TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	140	6

NHU-8-081(039)924



NOTE:
1. ALL CONDUIT LOCATED IN STREET LIGHT BASES, FEED POINT FOUNDATIONS AND PULL BOXES SHALL HAVE BELL ENDS.

2. ALL STANDARDS SHALL HAVE INDIVIDUAL CONDUCTOR RUNS AND FUSES FOR EACH LUMINAIRE.

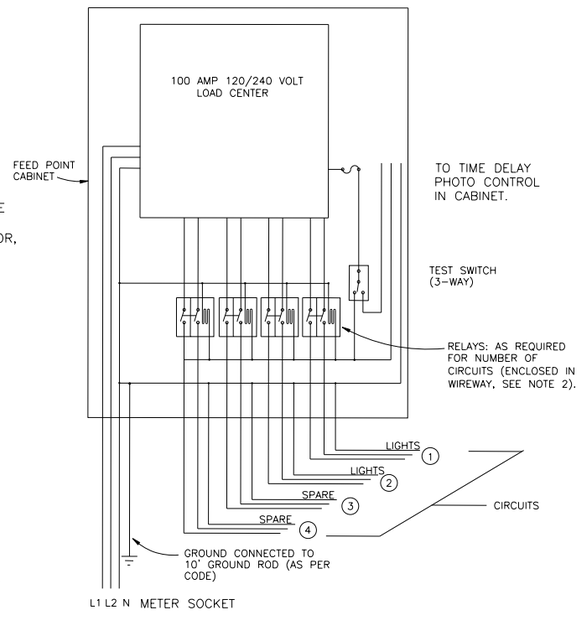
STANDARD FOUNDATION DETAIL

NO SCALE

NOTES:

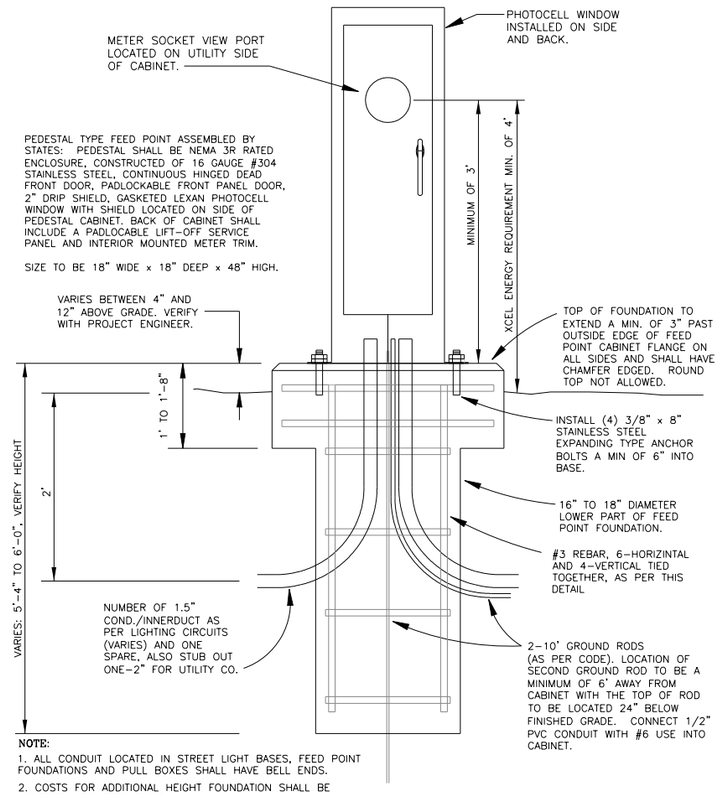
1. CIRCUIT BREAKERS TO BE 60A., 2-POLE. TEST SWITCH CIRCUIT TO BE 15A 1-POLE. ALL BREAKERS ARE TO BE RATED AT 22,000 AIC.

2. CONTACTORS TO BE NORMAL OPEN TYPE ELECTRICALLY HELD, 60A, 2-POLE, NEMA OPEN STYLE, 240V TO GROUND. QUANTITY OF RELAYS AS REQUIRED FOR NUMBER OF CIRCUITS.



WIRING SCHEMATIC: FOUR CIRCUIT FEED POINT

NO SCALE

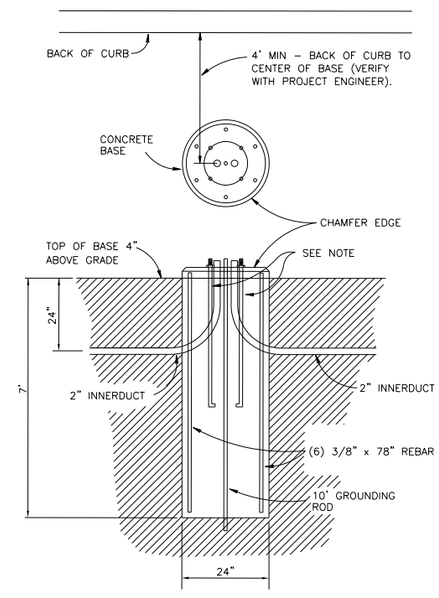


NOTE:
1. ALL CONDUIT LOCATED IN STREET LIGHT BASES, FEED POINT FOUNDATIONS AND PULL BOXES SHALL HAVE BELL ENDS.

2. COSTS FOR ADDITIONAL HEIGHT FOUNDATION SHALL BE INCIDENTAL TO FEED POINT.

FEED POINT ELEVATION

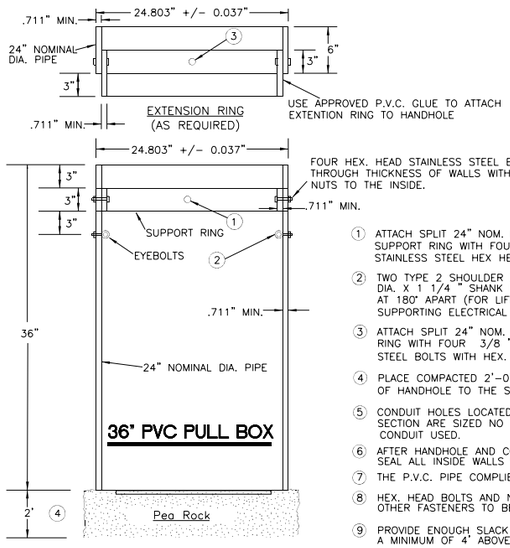
NO SCALE



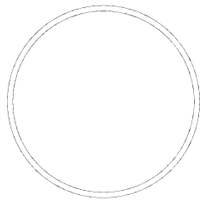
NOTES:
1. 1"x 40" ANCHOR BOLTS, 15" BOLT CIRCLE WITH 4" BOLT PROJECTION.
2. BASES LOCATED AT THE END OF CIRCUIT SHALL HAVE SPARE CONDUIT, CAP END.
3. ALL CONDUIT LOCATED IN STREET LIGHT BASES, FEED POINT FOUNDATIONS AND PULL BOXES SHALL HAVE BELL ENDS.

7' CONCRETE BASE DETAIL

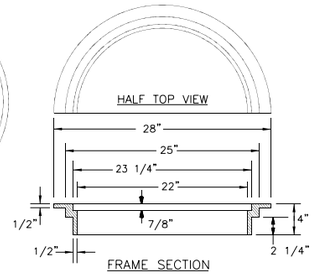
NO SCALE



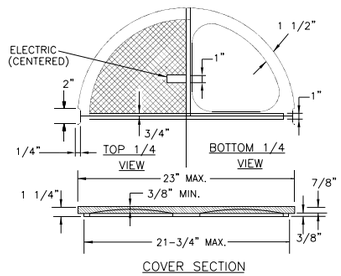
1. ATTACH SPLIT 24" NOM. DIA. P.V.C. COVER SUPPORT RING WITH FOUR 3/8 " DIA. X 2" LONG STAINLESS STEEL HEX HEAD BOLTS WITH HEX NUTS AT 90° APART.
2. TWO TYPE 2 SHOULDER EYEBOLTS, 3/8 " DIA. X 1 1/4 " SHANK LENGTH, WITH HEX. NUTS AT 180° APART (FOR LIFTING HANDHOLES AND SUPPORTING ELECTRICAL CABLES)
3. ATTACH SPLIT 24" NOM. DIA. P.V.C. COVER SUPPORT EXTENSION RING WITH FOUR 3/8 " DIA. X 2" LONG HEX. HEAD STAINLESS STEEL BOLTS WITH HEX. NUTS AT 90° APART. BOLT ASSEMBLY TOGETHER.
4. PLACE COMPACTED 2'-0" AGGRETGATE DRAIN BED BELOW BOTTOM OF HANDHOLE TO THE SATISFACTION OF THE ENGINEER.
5. CONDUIT HOLES LOCATED IN THE BARREL SECTION ARE SIZED NO MORE THAN 1" LARGER THAN THE CONDUIT USED.
6. AFTER HANDHOLE AND CONDUIT INSTALLATION, SEAL ALL INSIDE WALLS WATER TIGHT TO THE SATISFACTION OF THE ENGINEER.
7. THE P.V.C. PIPE COMPLIES WITH ASTM F679T-1.
8. HEX. HEAD BOLTS AND NUTS ARE TO BE STAINLESS STEEL. OTHER FASTENERS TO BE GALVANIZED AS PER AASHTO M-232
9. PROVIDE ENOUGH SLACK TO PULL CONDUCTOR AND SPLICES A MINIMUM OF 4' ABOVE FINISHED ELEVATION.



BOTTOM VIEW



FRAME SECTION



COVER SECTION

FRAME AND COVER CASTING

NOTE:
ALL CASTINGS ARE GRAY IRON AS PER SPEC. 3321 CLASS 35B

PULL BOX, METAL FRAME AND COVER DETAIL

NO SCALE

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LIGHTING PLANS
LIGHTING DETAILS

BUSINESS US 81 (UNIVERSITY DRIVE)
WB I-94 RAMP TO 18TH AVE S

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	150	1

NHU-8-081(039)924

0 20' 40'

VIDEO CAMERA

NAME	APPROACH	LOCATION
CAMERA 1	EB TO SB	STA 1303+40, 83' LT
CAMERA 2	SOUTHBOUND	STA 1304+25, 82' LT
CAMERA 3	NORTHBOUND	STA 1305+25, 38' RT
CAMERA 4	EB TO NB	STA 1304+96, 54' RT

PEDESTRIAN PUSHBUTTON & SIGN

STATION	SIGN NO.	PUSHBUTTON SIGN FACES	ARROW & DIRECTION	QUANTITY
STA 1304+25, 82' LT	R10-3i	EAST	N/A	1
STA 1304+25, 11' LT	R10-3e	SOUTH	WEST/EAST - DUAL	1
STA 1304+25, 58' RT	R10-3e	SOUTH	WEST - LEFT	1

EMERGENCY VEHICLE PRE-EMPTION SYSTEM

UNIVERSITY DR AND I-94 WB RAMP SHALL INCLUDE THE FOLLOWING:		1 EA
EV DETECTOR POLE 5	STA 1305+25, 38' RT	1 EA
CONFIRMATION LIGHT POLE 5	STA 1305+25, 38' RT	1 EA

EXISTING FEED POINT

21ST AVE S

EB I-94 OFF RAMP

REPLACE EXISTING CONTROLLER. INSTALL BATTERY BACKUP AND ETHERNET SWITCH.

PAINT EXISTING SIGNAL

PAINT EXISTING SIGNAL POLE AND MAST ARM

POLE 6

VIDEO DETECTION CAMERA (TYP)

UNIVERSITY DR

POLE 1 STA 1304+25, 82' LT
PAINT EXISTING SIGNAL POLE AND MAST ARM

PAINT EXISTING SIGNAL

PAINT EXISTING PUSHBUTTON

PAINT EXISTING PUSHBUTTON

EB I-94 ON RAMP

PULL BOX 1

POLE 2 STA 1304+25, 11' LT
TYPE II SIGNAL STANDARD

1302 1303 1304 1305 1306 1307

2500

2400

2602

2501

2402

PULL BOX 2 OVER EXISTING RIGID CONDUITS

POLE 3 STA 1304+25, 58' RT
TYPE VI SIGNAL STANDARD

REMOVE EXISTING PULL BOX

EVP DETECTOR/LIGHT (TYP)

PULL BOX 5 OVER EXISTING RIGID CONDUITS

REMOVE EXISTING TYPE IV SIGNAL STANDARD WITH 30' MAST ARM

POLE 5 STA 1305+25, 38' RT
TYPE IV SIGNAL STANDARD WITH 30' MAST ARM

PTZ CAMERA

POLE 4 STA 1304+96, 54' RT
COMBINATION SIGNAL AND LIGHT STANDARD 40 FT MOUNTING HEIGHT LUMINAIRE EXTENSION, TENON TOP WITH 1' SPOKE ARM BRACKET

REMOVE EXISTING TYPE IV SIGNAL STANDARD WITH 24' MAST ARM

NOTES:

1. CONTRACTOR SHALL RECONNECT REPLACEMENT CONTROLLER TO EXISTING ELECTRIC FEED AND FIBER OPTIC INTERCONNECT SYSTEM.
2. CONTRACTOR SHALL STOCKPILE AND DELIVER SIGNAL STANDARDS AND SIGNAL EQUIPMENT TO NDDOT FARGO DISTRICT YARD.

LEGEND

- 3 SIGNAL HEAD NUMBER
- P2 PEDESTRIAN HEAD NUMBER
- 3 CONDUIT RUN NUMBER
- ⊗ PULL BOX

REMOVAL QUANTITIES				
REMOVE TRAFFIC SIGNAL SYSTEM	REMOVE PULL BOX	REMOVE 1-WAY, 3 SECTION HEAD	REMOVE SIGNAL STANDARDS	REMOVE TRAFFIC SIGNAL CONTROLLER
EACH	EACH	EACH	EACH	EACH
1	1	6	2	1

* REMOVAL QUANTITIES FOR INFORMATION ONLY

* REMOVAL OF TRAFFIC SIGNAL EQUIPMENT SHALL BE PAID FOR AS REMOVE TRAFFIC SIGNAL SYSTEM

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SIGNAL PLANS
EB I-94 RAMP & UNIVERSITY DR
TRAFFIC SIGNAL LAYOUT

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	150	2

NHU-8-081(039)924

0 20' 40'

21ST AVE S

EB I-94 OFF RAMP

EB I-94 ON RAMP

UNIVERSITY DR

PRESENCE / COUNTING DETECTION ZONES

PRESENCE / COUNTING DETECTION ZONES

QUEUE / COUNTING DETECTION ZONES

PASSAGE DETECTION ZONES

PASSAGE DETECTION ZONES

QUEUE / COUNTING DETECTION ZONES

1302 1303 1304 1305 1306 1307

2500 2400 2602 2501 2401 2402

21ST AVE S

EB I-94 ON RAMP

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SIGNAL PLANS
EB I-94 RAMP & UNIVERSITY DR
VIDEO DETECTION ZONE LAYOUT

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	3

NHU-8-081(039)924

EB I-94 RAMP & UNIVERSITY DR.

RUN	SIGNAL EQUIP NO.		CONDUIT RUNS		CABLE RUNS	
	FROM	TO	LF	DIA.	LF	TYPE
1	CONTLR	EX PB	42	EX 2" & 3"	62	CABLE 1
					62	CABLE 2
					62	CABLE 3
					62	CABLE 4
					62	CABLE 5
					62	(3) NO. 16 AWG 2 (A)
					62	(1) NO. 12 AWG 2 (B)
					62	(1) EVD CABLE (C)
					62	(3) COAXIAL CABLE (D)
					62	(3) #16 AWG 3 (E)
					62	(3) #10 RHW CABLE (F)
					62	CAT 6 CABLE (G)
					62	(1) #16 AWG 3 (H)
2	EX PB	POLE 1	63	EX 2"	68	CABLE 1
					76	(1) NO. 16 AWG 2 (A)
					111	(1) COAXIAL CABLE (D)
					111	(1) #16 AWG 3 (E)
3	EX PB	PB1	102	4"	112	CABLE 2
					112	CABLE 3
					112	(2) NO. 16 AWG 2 (A)
4	PB1	POLE 2	52	2"	77	CABLE 2
					65	(1) NO. 16 AWG 2 (A)
5	PB1	PB2	77	4"	87	CABLE 3
					87	(1) NO. 16 AWG 2 (A)
6	PB2	POLE 3	50	2"	55	CABLE 3
					63	(1) NO. 16 AWG 2 (A)
7	POLE 6	EX PB	61	EX 2"	109	(1) COAXIAL CABLE (D)
					109	(1) #16 AWG 3 (E)
8	PB5	POLE 4	21	3"	26	CABLE 4
					73	(1) COAXIAL CABLE (D)
					73	(1) #16 AWG 3 (E)
					69	(3) #10 RHW CABLE (F)
					64	CAT 6 CABLE (G)
					64	(1) #16 AWG 3 (H)
9	PB5	POLE 5	42	EX 1.5"	47	CABLE 5
					100	(1) NO. 12 AWG 2 (B)
					100	(1) EVD CABLE (C)
					100	(1) COAXIAL CABLE (D)
					100	(1) #16 AWG 3 (E)
10	EX PB	PB5	128	EX 2.5"	138	CABLE 4
					138	CABLE 5
					138	(1) NO. 12 AWG 2 (B)
					138	(1) EVD CABLE (C)
					138	(2) COAXIAL CABLE (D)
					138	(2) #16 AWG 3 (E)
					138	(3) #10 RHW CABLE (F)
					138	CAT 6 CABLE (G)
					138	(1) #16 AWG 3 (H)
11	EX PB	EX PB	110	EX 3"	120	CABLE 4
					120	CABLE 5
					120	(1) NO. 12 AWG 2 (B)
					120	(1) EVD CABLE (C)
					120	(2) COAXIAL CABLE (D)
					120	(2) #16 AWG 3 (E)
					120	(3) #10 RHW CABLE (F)
					120	CAT 6 CABLE (G)
					120	(1) #16 AWG 3 (H)
12	EX PB	CONTLR	21	EX 2"	41	(1) COAXIAL CABLE (D)
					41	(1) #16 AWG 3 (E)

	A	PEDESTRIAN PUSH BUTTON CONDUCTOR
	B	INDICATOR LIGHT CABLE
	C	EMERGENCY VEHICLE DETECTOR CABLE
	D	VIDEO DETECTION - (AS REQUIRED BY MANUFACTURER)
	E	VIDEO DETECTION POWER CABLE - (AS REQUIRED BY MANUFACTURER)
	F	LUMINAIRE CABLE
	G	PTZ CAMERA DATA CABLE
	H	PTZ CAMERA POWER CABLE

TRAFFIC SIGNAL QUANTITIES

	CONCRETE FOUNDATION - TRAFFIC SIGNALS	PULL BOX	2" DIA. RIGID CONDUIT	3" DIA. RIGID CONDUIT	4" DIA. RIGID CONDUIT	TRAFFIC SIGNAL CONTROLLER	NO. 16 AWG 2 CONDUCTOR CABLE	NO. 14 AWG 3 CONDUCTOR CABLE	NO. 14 AWG 5 CONDUCTOR CABLE	NO. 14 AWG 7 CONDUCTOR CABLE	NO. 14 AWG 12 CONDUCTOR CABLE	EMERGENCY VEHICLE DETECTION CABLE	EMERGENCY VEHICLE INDICATOR CABLE (#12 AWG 2C)	COAXIAL CABLE	NO. 16 AWG 3 VIDEO DETECTION POWER	UNDERGROUND CONDUCTOR CABLE NO. 10 TYPE RHW	LED LUMINAIRE	1-WAY 3 SECTION HEAD W/12" LENS - MA MTD.	1-WAY 3 SECTION HEAD W/12" LENS - POST MTD.	1-WAY 5 SECTION HEAD W/12" LENS - POST MTD.	PEDESTRIAN COUNTDOWN SIGNAL HEAD - POST MTD.	PEDESTRIAN COUNTDOWN SIGNAL HEAD - PEDESTAL MTD.	PEDESTRIAN PUSHBUTTON AND SIGN	TYPE IV SIGNAL STANDARD - 30' MA	TYPE VI SIGNAL STANDARD	COMBINATION 40' MH SIGNAL AND LIGHT STANDARD - 24' MA	TYPE II PEDESTRIAN POLE	PAINT SIGNAL STANDARD AND MAST ARM	PAINT SIGNAL STANDARD	PAINT PUSH BUTTON POST	EMERGENCY VEHICLE DETECTOR SYSTEM	VEHICLE DETECTION SYSTEM	BATTERY BACKUP SYSTEM	PTZ CAMERA	OUTDOOR ETHERNET RANGE EXTENDER	CAT 6 CABLE	NO. 16 AWG 3 - PTZ CAMERA POWER	ETHERNET SWITCH	TRAFFIC SIGNAL SYSTEM	REMOVE TRAFFIC SIGNAL SYSTEM
	EA	EA	LF	LF	LF	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA
POLE 1																					1		1				1												
POLE 2	1																				2	1			1													
POLE 3	1																		1	1		1		1														
POLE 4	1															1	2	1						1									1	1					
POLE 5	1																2		1				1															
POLE 6																										1												
CONTROLLER						1																								1	1		1			1		
VARIOUS LOCATIONS		3	102	73	179		701	60	435	34	1159	420	420	1136	1136	1152											2	2	1					384	384		1	1
TOTAL	4	3	102	73	179	1	701	60	435	34	1159	420	420	1136	1136	1152	1	4	1	2	2	2	3	1	1	1	1	2	2	2	1	1	1	1	2	384	384	1	1	1

* TRAFFIC SIGNAL QUANTITIES FOR INFORMATION ONLY

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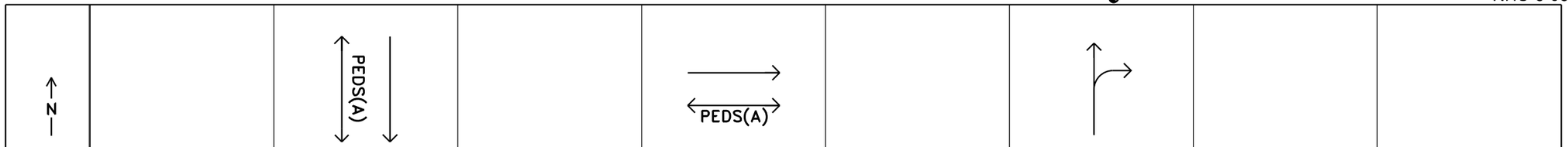
SIGNAL PLANS
EB I-94 RAMP & UNIVERSITY DR
CONDUIT & CABLE RUNS AND SUMMARY OF QUANTITIES

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

EB I-94 OFF RAMP & University Dr.

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	150	4

NHU-8-081(039)924



HEAD NUMBER	Phase 1								Phase 2								Phase 3								Phase 4							
	R/W	Clear to ø							R/W	Clear to ø							R/W	Clear to ø							R/W	Clear to ø						
	W	2	3	4	5	6	7	8	W	3	4	5	6	7	8	1	W	4	5	6	7	8	1	2	W	5	6	7	8	1	2	3
1																																
2																									~~G~~		~~Y~~				~~Y~~	
3																									~~G~~		~~Y~~				~~Y~~	
4																									~~G~~		~~Y~~				~~Y~~	
5																																
6																																
7																																
8									G		Y		*																			
9									G		Y		*																			
10									G		Y		*																			
11																									G		Y				Y	
12																									G		Y				Y	
13																									G		Y				Y	
14																									G		Y				Y	

HEAD NUMBER	Phase 5								Phase 6								Phase 7								Phase 8							
	R/W	Clear to ø							R/W	Clear to ø							R/W	Clear to ø							R/W	Clear to ø						
	W	6	7	8	1	2	3	4	W	7	8	1	2	3	4	5	W	8	1	2	3	4	5	6	W	1	2	3	4	5	6	7
1									G				*		Y																	
2									~~G~~						~~Y~~																	
3																																
4																																
5									G				*		Y																	
6									G				*		Y																	
7									G				*		Y																	
8																																
9																																
10																																
11																																
12																																
13																																
14																																

CHART "A"

On Phase	Non–Conflicting Phase Allowed to Time Concurrently
1	
2	6
3	
4	NONE
5	
6	2
7	
8	

Blank Squares Denote a Red Indication.

(*) When one phase is on alone, any nonconflicting phase may start timing concurrently without a clearance interval. (See Chart "A")

(A) Only upon pedestrian actuation.

THE CONTRACTOR WILL PROGRAM THE SIGNAL TIMING INTO THE CONTROLLER PRIOR TO START UP.

TRAFFIC CONTROL SYSTEM
Controller Phasing

SIGNAL PLANS
EB I-94 RAMP & UNIVERSITY DR
CONTROLLER PHASING

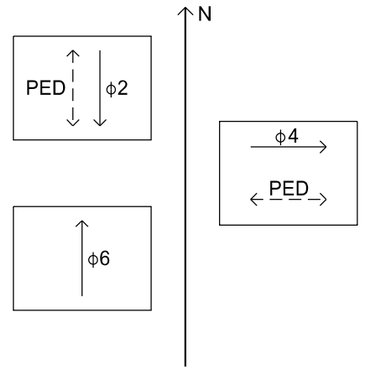
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	5

NHU-8-081(039)924

		ϕ1	ϕ2	ϕ3	ϕ4	ϕ5	ϕ6	ϕ7	ϕ8
BASIC INTERVALS (OR FUNCTIONS)									
MINIMUM GREEN/INITIAL			12		6		12		
VEHICLE EXTENSTION/PASSAGE TIME			6		3		6		
MAXIMUM GREEN			61		49		61		
YELLOW CHANGE			3.6		3.6		3.6		
RED CLEARANCE			2.3		2.9		2.3		
WALK			7		7				
PEDESTRIAN CLEARANCE			11		14				
VOLUME DENSITY TIMING FUNCTIONS									
ADDED INITIAL PER ACTUATION									
MAXIMUM INITIAL			26				26		
TIME WAITING GAP TIMING FUNCTIONS									
TIME BEFORE REDUCTION			35				35		
TIME TO REDUCE MINIMUM GAP			20				20		
MINIMUM GAP			2.0				2.0		
LOCKING MEMORY			X		X		X		
NON-LOCKING MEMORY									
FLASHING-NORMAL & CONFLICT MONITOR			Y		R		Y		
START UP PHASING			G		R		G		
TYPE OF DETECTOR	PRESENCE				X				
	CALLING *		X				X		
	PASSAGE		X				X		
	COUNTING		X		X		X		
EMERGENCY VEHICLE PRE-EMPTION			X				X		

* CALLING LOOPS SHALL PLACE ONE CALL INTO THE CONTROLLER ON THE YELLOW OR RED INTERVAL. CALLING LOOPS SHALL BE DISCONTINUED DURING THE GREEN INTERVAL.



SIGNAL PHASING

NOTE:
1. THE CITY OF FARGO WILL VERIFY SIGNAL TIMINGS AND PROVIDE COORDINATION PLAN.

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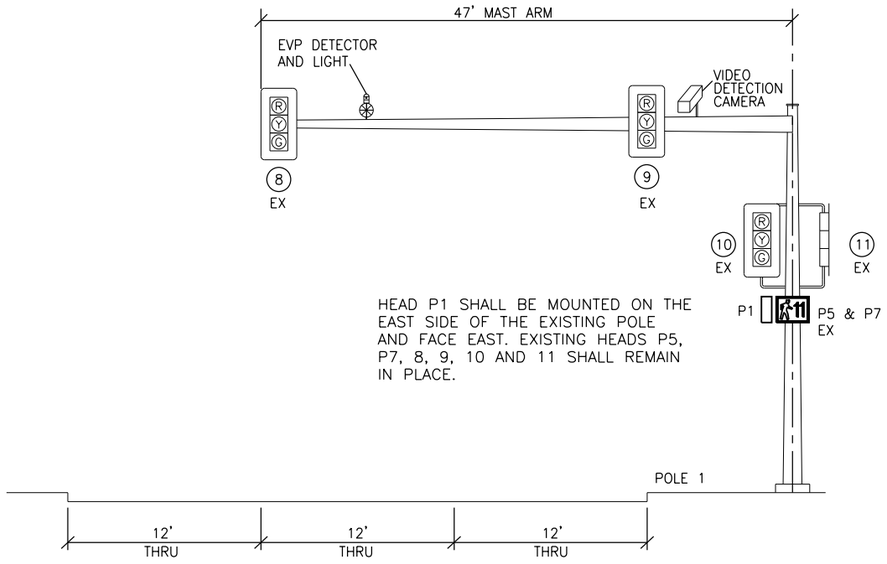
SIGNAL PLANS
EB I-94 RAMP & UNIVERSITY DR
CONTROLLER SETTINGS

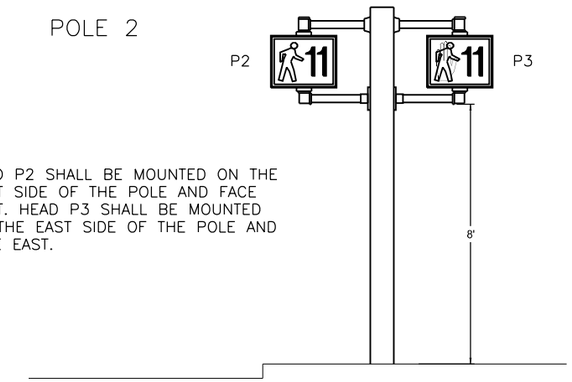
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	6

NHU-8-081(039)924



EXISTING 47' MAST ARM
STA 1304+25, 82' LT



TYPE II SIGNAL STANDARD

POLE 1

CONDUCTORS			CABLE 1 (NO 14 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	BLACK		P5/7 EX	ø2 WALK
2	WHITE			NEUTRAL
3	RED		EX	ø2 RED
4	GREEN			GROUND
5	ORANGE		EX	ø2 YELLOW
6	BLUE		EX	ø2 GREEN
7	WHITE	BLACK	P5/7 EX	ø2 DT.WALK
8	RED	BLACK	P1	ø4 WALK
9	GREEN	BLACK		GROUND
10	ORANGE	BLACK	P1	ø4 DT.WALK
11	BLUE	BLACK		SPARE
12	BLACK	WHITE		SPARE

POLE 2

CONDUCTORS			CABLE 2 (NO 14 AWG 5)	
BASE		TRACER	HEAD	INDICATION
1	BLACK		P2, P3	ø4 WALK
2	WHITE			NEUTRAL
3	RED		P2, P3	ø4 DT.WALK
4	GREEN			GROUND
5	ORANGE			SPARE

POLE 3

CONDUCTORS			CABLE 3 (NO 14 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	BLACK		P4	ø4 WALK
2	WHITE			NEUTRAL
3	RED		1	ø6 RED
4	GREEN			GROUND
5	ORANGE		1	ø6 YELLOW
6	BLUE		1	ø6 GREEN
7	WHITE	BLACK	P4	ø4 DT.WALK
8	RED	BLACK		SPARE
9	GREEN	BLACK		GROUND
10	ORANGE	BLACK		SPARE
11	BLUE	BLACK		SPARE
12	BLACK	WHITE		SPARE

POLE 4

CONDUCTORS			CABLE 4 (NO 14 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	BLACK			SPARE
2	WHITE			NEUTRAL
3	RED		2, 3, 4	ø4 RED
4	GREEN			GROUND
5	ORANGE		2, 3, 4	ø4 YELLOW
6	BLUE		2, 3, 4	ø4 GREEN
7	WHITE	BLACK		SPARE
8	RED	BLACK		SPARE
9	GREEN	BLACK		GROUND
10	ORANGE	BLACK		SPARE
11	BLUE	BLACK		SPARE
12	BLACK	WHITE		SPARE

POLE 5

CONDUCTORS			CABLE 5 (NO 14 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	BLACK			SPARE
2	WHITE			NEUTRAL
3	RED		5, 6, 7	ø6 RED
4	GREEN			GROUND
5	ORANGE		5, 6, 7	ø6 YELLOW
6	BLUE		5, 6, 7	ø6 GREEN
7	WHITE	BLACK		SPARE
8	RED	BLACK		SPARE
9	GREEN	BLACK		GROUND
10	ORANGE	BLACK		SPARE
11	BLUE	BLACK		SPARE
12	BLACK	WHITE		SPARE

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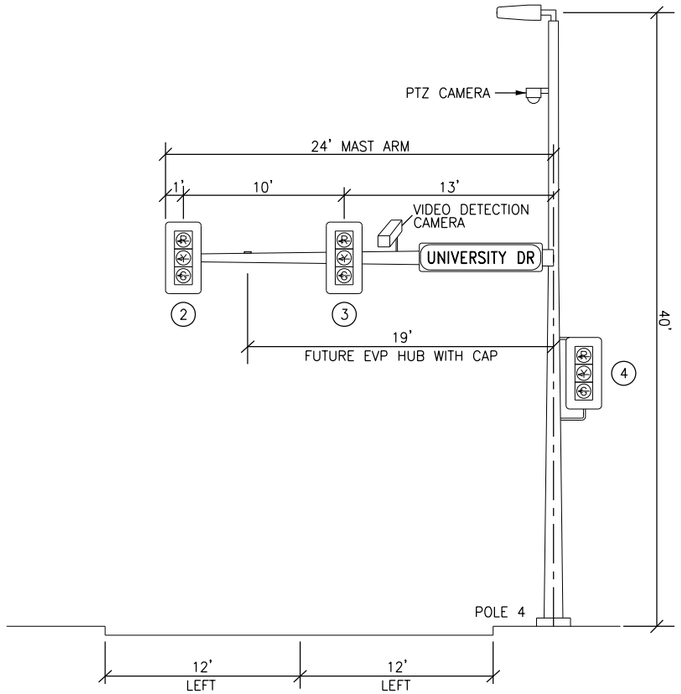
SIGNAL PLANS
EB I-94 RAMP & UNIVERSITY DR
SIGNAL HEADS & CONDUCTORS

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

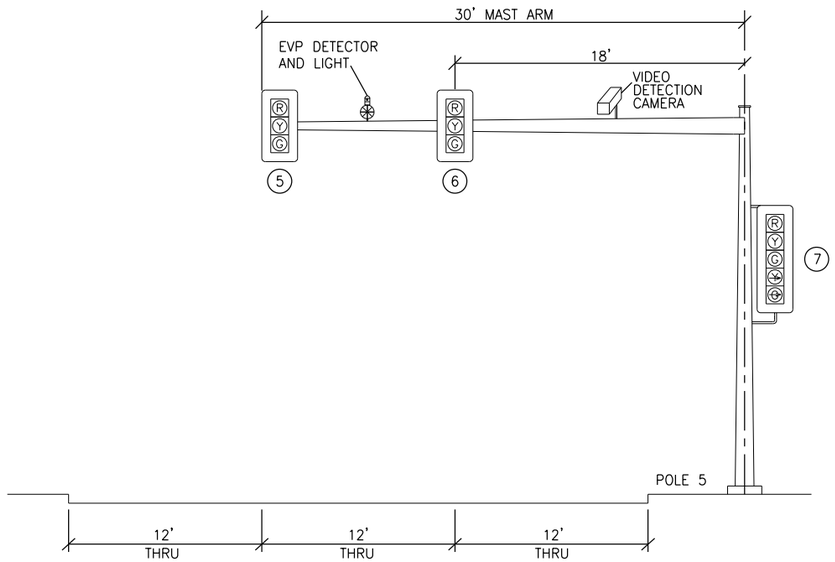
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	7

NHU-8-081(039)924



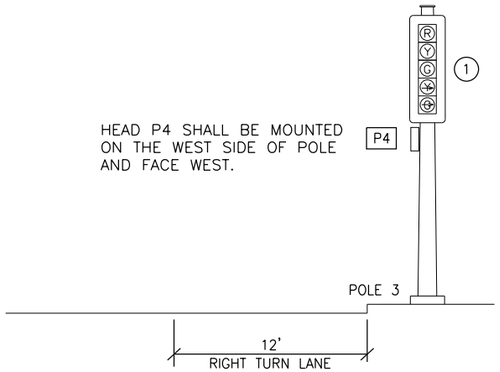
S.W. RAMP

24' MAST ARM
STA 1304+96, 54' RT
(SEE PLAN FOR LUMINAIRE ARM ORIENTATION)



NORTHBOUND

30' MAST ARM
STA 1305+51, 38' RT



NORTHBOUND

STA 1304+25, 58' RT

* SIGNAL STANDARDS SHALL BE PAINTED BLACK

MASTARMS AND STANDARDS:
ALL MASTARMS AND STANDARDS SHALL BE DESIGNED FOR A WINDLOAD FACTOR THAT ACCOUNTS FOR THE REPLACING OF THE END MASTARM VEHICLE HEAD WITH A 5-SECTION CLUSTER HEAD AND THE ADDITION OF 10 SQUARE FEET OF SIGN AREA TO THE MASTARM, WITH ALL OTHER EXISTING HEADS AND SIGNS SHOWN ON THE "MASTARM DETAIL SHEET".

EACH VEHICLE/PEDESTRIAN HEAD CABLE SHALL BE LABELED WITH THE HEAD #. EACH CABLE SHALL HAVE A SEPARATE TERMINAL BLOCK INSIDE THE T-BASE FOR TERMINATIONS.

LUMINAIRES TO BE AS NOTED IN GENERAL NOTE 770-P06, EXCEPT WITH LONG LIFE PHOTOCELL INSTEAD OF A SHORTING CAP.

TRAFFIC STANDARD EXTENSION: LUMINAIRE EXTENSION TO BE MILLERBERND (OR APPROVED EQUAL), STAINLESS STEEL, FROST FINISH, TENON TOP WITH 1' SPOKE ARM BRACKET. LUMINAIRE MOUNTING HEIGHT SHALL BE 40', (VERIFY WITH MANUFACTURER OF TRAFFIC SIGNAL STANDARDS TO DETERMINE EXTENSION HEIGHT NEEDED). SEE TRAFFIC SIGNAL PLANS FOR DETAILS. LUMINAIRE EXTENSION AND FIXTURE SHALL BE INCLUDED IN THE COST BID FOR COMBO STANDARD.

ALL TRAFFIC SIGNAL EQUIPMENT SHALL BE BLACK IN COLOR.

NOTES:
1. FOR LUMINAIRE INFORMATION, SEE NDDOT STANDARD D-772-3.

2. SEE NNDOT STANDARD D-772-4 FOR SIGNAL HEAD PLACEMENT.

3. SEE NNDOT STANDARD D-772-4 FOR EMERGENCY VEHICLE DETECTOR AND CONFIRMATION LIGHT.

HEAD CONDUCTOR ASSIGNMENT

CONDUCTORS			No.14 Awg 3 Ped. Heads	No.14 Awg 5 Veh. Heads	No.14 Awg 7 5-Section Veh. Heads
	BASE	TRACER	INDICATION	INDICATION	INDICATION
1	BLACK		WALK	GREEN	GREEN BALL
2	WHITE		NEUTRAL	NEUTRAL	NEUTRAL
3	RED		DT.WALK	RED	RED
4	GREEN			GROUND	GROUND
5	ORANGE			YELLOW	YELLOW BALL
6	BLUE				GREEN ARROW
7	WHITE	BLACK			YELLOW ARROW

NOTE: ALL SIGNAL HEADS SHALL BE SIG POLYCARBONATE. ALL BACK PLATES SHALL BE LOUVERED .063" THICK ALUMINUM.

ALL NEW P1-P4
16" X 18" FILLED OVERLAY
L.E.D. PEDESTRIAN HEAD WITH PEDESTRIAN COUNT DOWN TIMER AND "TUNNEL" STYLE VISOR

ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS 1,7
ALL ARROW L.E.D. SIGNAL HEADS

ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS
5,6

ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS
2,3,4

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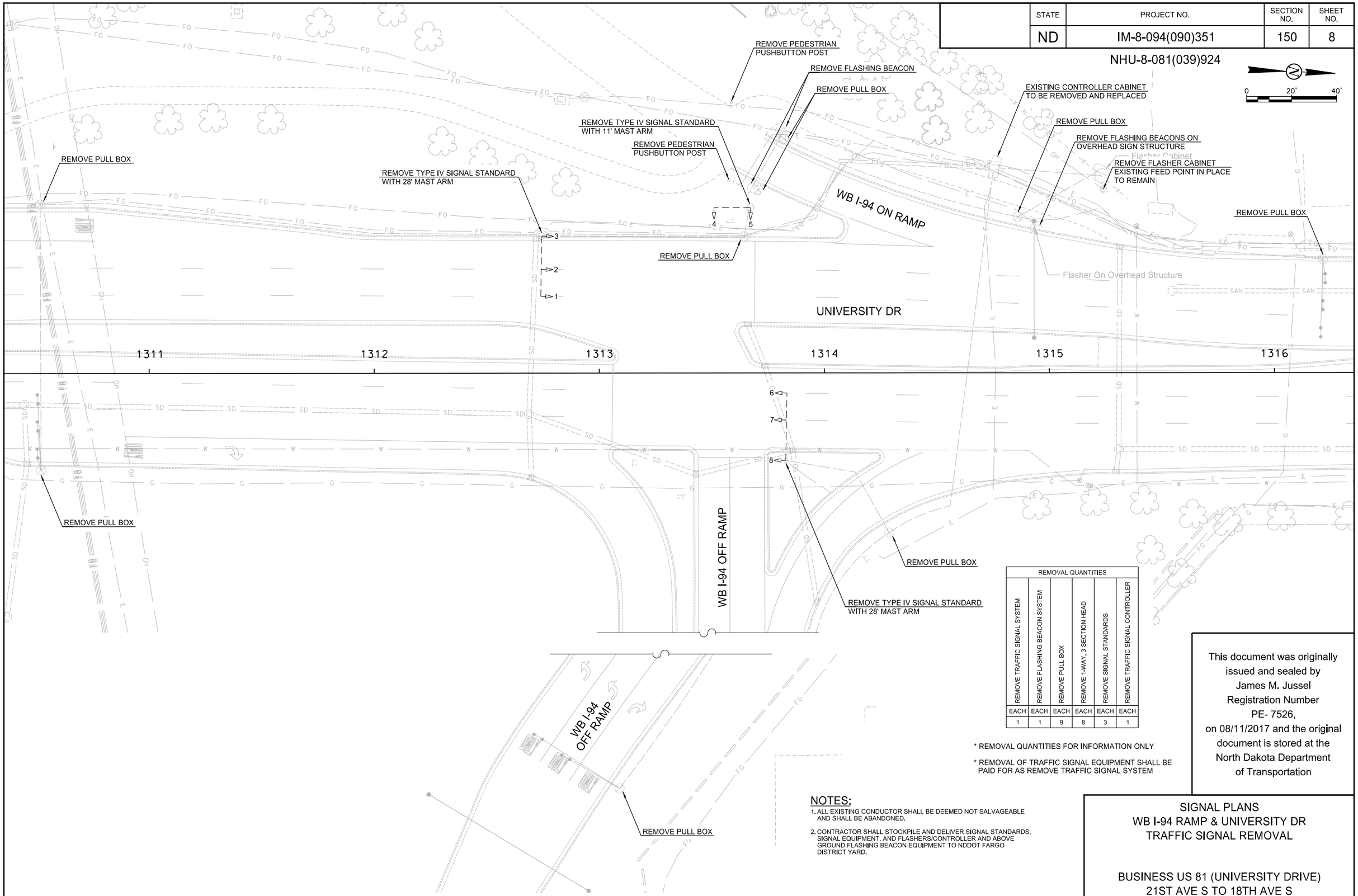
SIGNAL PLANS
EB I-94 RAMP & UNIVERSITY DR
SIGNAL STANDARD & HEAD LOCATIONS

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	150	8

NHU-8-081(039)924



REMOVAL QUANTITIES					
REMOVE TRAFFIC SIGNAL SYSTEM	REMOVE FLASHING BEACON SYSTEM	REMOVE PULL BOX	REMOVE 1-WAY, 3 SECTION HEAD	REMOVE SIGNAL STANDARDS	REMOVE TRAFFIC SIGNAL CONTROLLER
EACH	EACH	EACH	EACH	EACH	EACH
1	1	9	8	3	1

* REMOVAL QUANTITIES FOR INFORMATION ONLY

* REMOVAL OF TRAFFIC SIGNAL EQUIPMENT SHALL BE PAID FOR AS REMOVE TRAFFIC SIGNAL SYSTEM

NOTES:

1. ALL EXISTING CONDUCTOR SHALL BE DEEMED NOT SALVAGEABLE AND SHALL BE ABANDONED.
2. CONTRACTOR SHALL STOCKPILE AND DELIVER SIGNAL STANDARDS, SIGNAL EQUIPMENT, AND FLASHERS/CONTROLLER AND ABOVE GROUND FLASHING BEACON EQUIPMENT TO NDDOT FARGO DISTRICT YARD.

SIGNAL PLANS
WB I-94 RAMP & UNIVERSITY DR
TRAFFIC SIGNAL REMOVAL

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	9

NHU-8-081(039)924

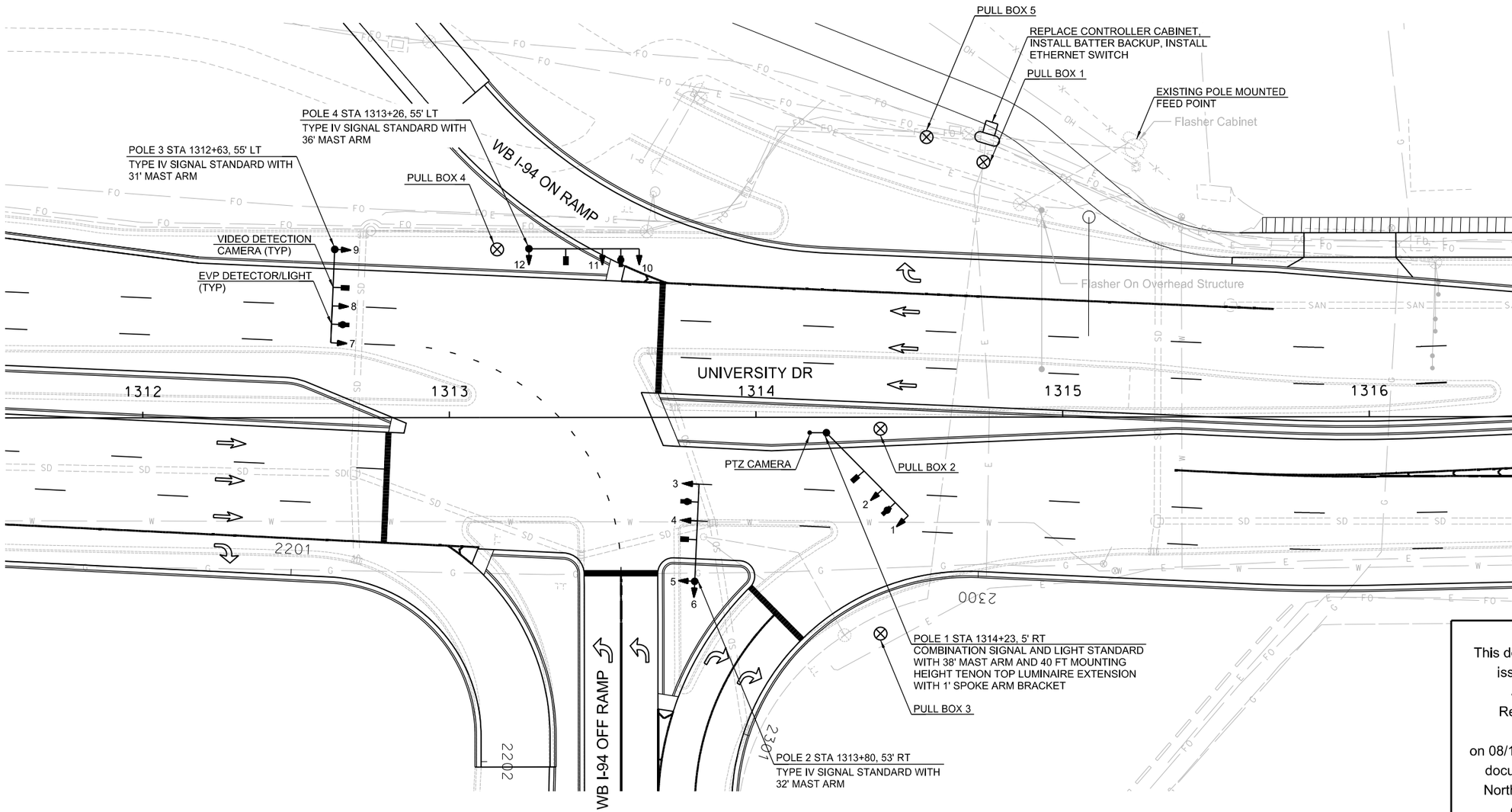
0 20' 40'

VIDEO CAMERA

NAME	APPROACH	LOCATION
CAMERA 1	WB TO NB	STA 1314+20, 5' RT
CAMERA 2	NORTHBOUND	STA 1313+80, 53' RT
CAMERA 3	SOUTHBOUND	STA 1312+63, 55' LT
CAMERA 4	WB TO SB	STA 1313+20, 55' LT

EMERGENCY VEHICLE PRE-EMPTION SYSTEM

UNIVERSITY DR AND I-94 WB RAMP SHALL INCLUDE THE FOLLOWING:		1 EA
EV DETECTOR POLE 2	STA 1313+80, 53' RT	1 EA
EV DETECTOR POLE 3	STA 1312+63, 55' LT	1 EA
CONFIRMATION LIGHT POLE 1	STA 1314+23, 5'RT	1 EA
CONFIRMATION LIGHT POLE 2	STA 1313+80, 53' RT	1 EA
CONFIRMATION LIGHT POLE 3	STA 1312+63, 55' LT	1 EA
CONFIRMATION LIGHT POLE 4	STA 1313+26, 55' LT	1 EA



NOTE:
1. CONTRACTOR SHALL RECONNECT REPLACEMENT CONTROLLER CABINET TO EXISTING POWER FEED AND FIBER OPTIC INTERCONNECT SYSTEM.

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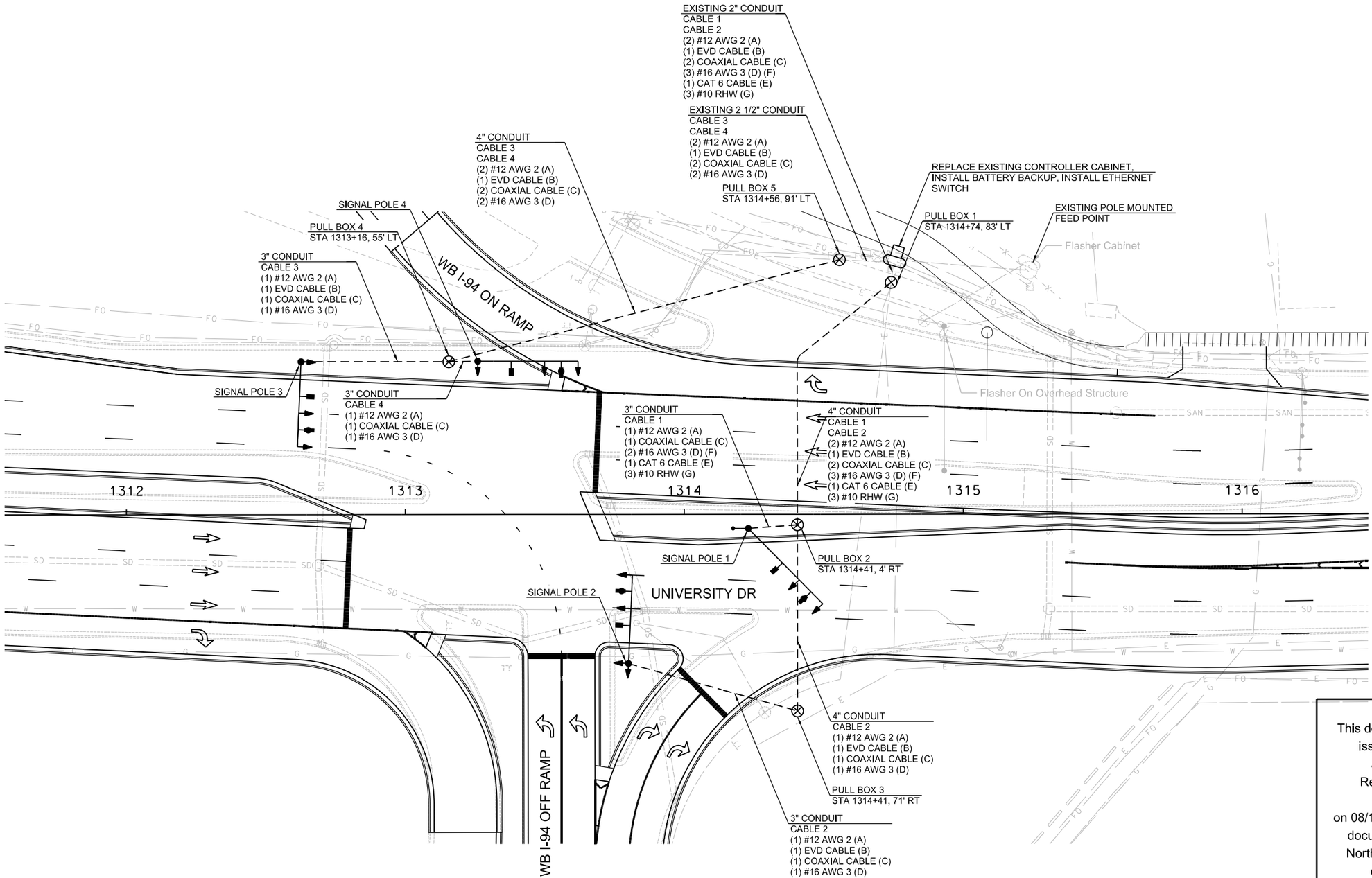
SIGNAL PLANS
WB I-94 RAMP TO UNIVERSITY DR
TRAFFIC SIGNAL LAYOUT

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	10

NHU-8-081(039)924

0 20' 40'



NOTES:

(A) INDICATOR LIGHT CABLE
(B) EMERGENCY VEHICLE DETECTOR CABLE
(C) VIDEO DETECTION (AS REQUIRED BY MANUFACTURER)
(D) VIDEO DETECTION POWER CABLE (AS REQUIRED BY MANUFACTURER)
(E) PTZ CAMERA CABLE
(F) PTZ CAMERA POWER
(G) LUMINAIRE CABLE

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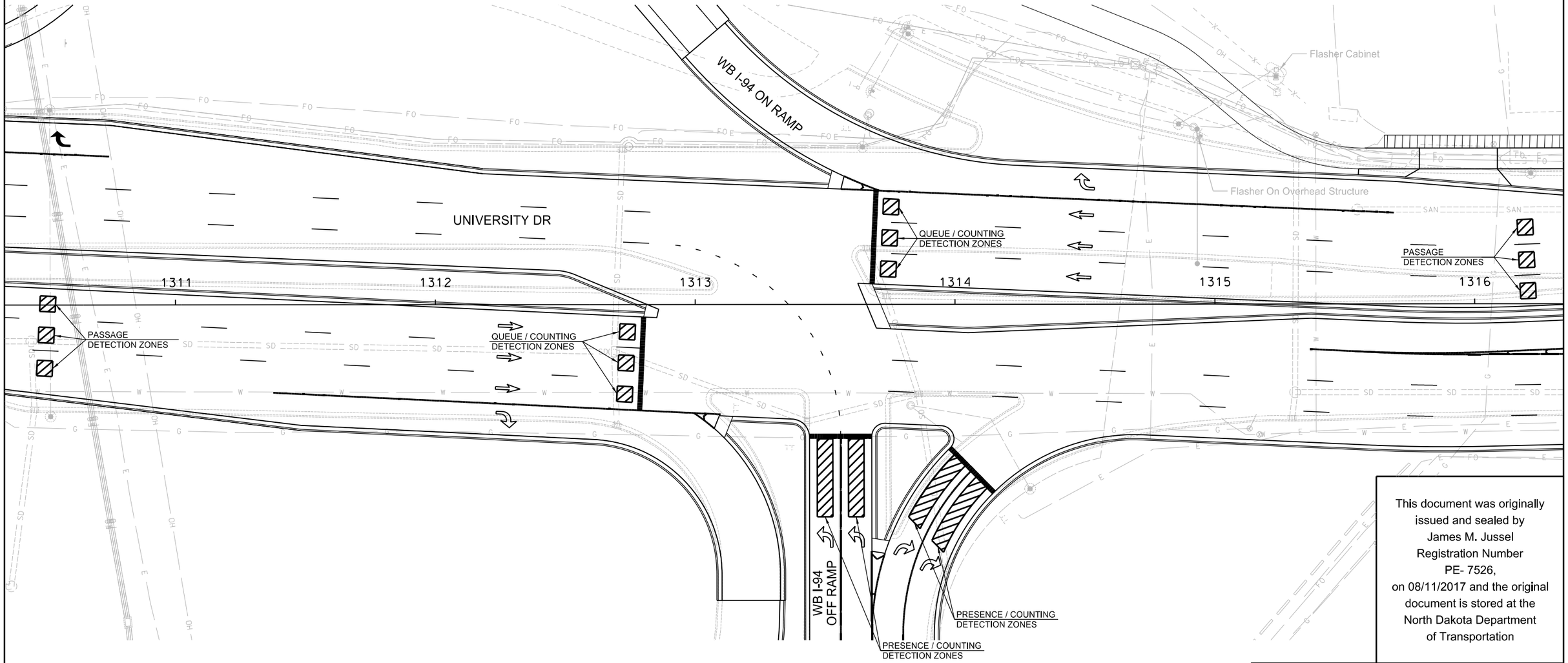
SIGNAL PLANS
WB I-94 RAMP & UNIVERSITY DR
CONDUIT AND CONDUCTOR LAYOUT

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	11

NHU-8-081(039)924

0 20' 40'



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SIGNAL PLANS
WB I-94 RAMP & UNIVERSITY DR
VIDEO DETECTION ZONE LAYOUT

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	12

NHU-8-081(039)924

WB I-94 RAMP & UNIVERSITY DR.

SIGNAL EQUIP NO.		CONDUIT RUNS		CABLE RUNS	
FROM	TO	LF	DIA.	LF	TYPE
CONTLR	PB1	8	EX 2"	28	CABLE 1
				28	CABLE 2
				28	(2) NO. 12 AWG 2 (A)
				28	(1) EVD CABLE (B)
				28	(2) COAXIAL CABLE (C)
				28	(3) #16 AWG 3 (D)(F)
				28	(1) CAT 6 CABLE (E)
				28	(3) #10 RHW (G)
PB1	PB2	103	4"	113	CABLE 1
				113	CABLE 2
				113	(2) NO. 12 AWG 2 (A)
				113	(1) EVD CABLE (B)
				113	(2) COAXIAL CABLE (C)
				113	(3) #16 AWG 3 (D)(F)
				113	(1) CAT 6 CABLE (E)
				113	(3) #10 RHW (G)
PB2	POLE 1	18	3"	23	CABLE 1
				84	(1) NO. 12 AWG 2 (A)
				84	(1) COAXIAL CABLE (C)
				84	(2) #16 AWG 3 (D)(F)
				84	(1) CAT 6 CABLE (E)
				84	(3) #10 RHW (G)
PB2	PB3	67	4"	77	CABLE 2
				77	(1) NO. 12 AWG 2 (A)
				77	(1) EVD CABLE (B)
				77	(1) COAXIAL CABLE (C)
				77	(1) #16 AWG 3 (D)
PB3	POLE 2	65	3"	70	CABLE 2
				125	(1) NO. 12 AWG 2 (A)
				125	(1) EVD CABLE (B)
				125	(1) COAXIAL CABLE (C)
				125	(1) #16 AWG 3 (D)
CONTLR	PB5	20	EX 2.5"	40	CABLE 3
				40	CABLE 4
				40	(2) NO. 12 AWG 2 (A)
				40	(1) EVD CABLE (B)
				40	(2) COAXIAL CABLE (C)
				40	(2) #16 AWG 3 (D)
PB5	PB4	151	4"	161	CABLE 3
				161	CABLE 4
				161	(2) NO. 12 AWG 2 (A)
				161	(1) EVD CABLE (B)
				161	(2) COAXIAL CABLE (C)
				161	(2) #16 AWG 3 (D)
PB4	POLE 4	12	3"	17	CABLE 4
				76	(1) NO. 12 AWG 2 (A)
				76	(1) COAXIAL CABLE (C)
				76	(1) #16 AWG 3 (D)
PB4	POLE 3	53	3"	58	CABLE 3
				112	(1) NO. 12 AWG 2 (A)
				112	(1) EVD CABLE (B)
				112	(1) COAXIAL CABLE (C)
				112	(1) #16 AWG 3 (D)

A	INDICATOR LIGHT CABLE
B	EMERGENCY VEHICLE DETECTOR CABLE
C	VIDEO DETECTION - (AS REQUIRED BY MANUFACTURER)
D	VIDEO DETECTION POWER CABLE - (AS REQUIRED BY MANUFACTURER)
E	PTZ CAMERA DATA CABLE
F	PTZ CAMERA POWER CABLE
G	LUMINAIRE CABLE

TRAFFIC SIGNAL QUANTITIES

	CONCRETE FOUNDATION - TRAFFIC SIGNALS	PULL BOX	3" DIA. RIGID CONDUIT	4" DIA. RIGID CONDUIT	TRAFFIC SIGNAL CONTROLLER	NO. 14 AWG 5 CONDUCTOR CABLE	NO. 14 AWG 12 CONDUCTOR CABLE	EMERGENCY VEHICLE DETECTION CABLE	EMERGENCY VEHICLE INDICATOR CABLE (#12 AWG 2C)	COAXIAL CABLE	NO. 16 AWG 3 VIDEO DETECTION POWER	UNDERGROUND CONDUCTOR CABLE NO. 10 TYPE RHW	LED LUMINAIRE	1-WAY 3 SECTION HEAD W/12" LENS - MA MTD.	1-WAY 3 SECTION HEAD W/12" LENS - POST MTD.	TYPE IV SIGNAL STANDARD - 31' MA	TYPE IV SIGNAL STANDARD - 32' MA	TYPE IV SIGNAL STANDARD - 36' MA	COMBINATION 40' MH SIGNAL AND LIGHT STANDARD - 38' MA	EMERGENCY VEHICLE DETECTION SYSTEM	VEHICLE DETECTION SYSTEM	BATTERY BACKUP SYSTEM	PTZ CAMERA	CAT 6 CABLE	NO. 16 AWG 3 - PTZ CAMERA POWER	ETHERNET SWITCH	TRAFFIC SIGNAL SYSTEM	REMOVE TRAFFIC SIGNAL SYSTEM
	EA	EA	LF	LF	EA	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA
POLE 1	1												1	2					1				1					
POLE 2	1													2	2		1											
POLE 3	1													2	1	1												
POLE 4	1													2	1			1										
CONTROLLER					1																1	1				1		
VARIOUS LOCATIONS		5	148	321		465	929	656	1158	1158	1158	675							1				225	225		1	1
TOTAL	4	5	148	321	1	465	929	656	1158	1158	1158	675	1	8	4	1	1	1	1	1	1	1	1	225	225	1	1	1

* TRAFFIC SIGNAL QUANTITIES FOR INFORMATION ONLY

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SIGNAL PLANS
WB I-94 RAMP & UNIVERSITY DR
CONDUIT & CABLE RUNS AND SUMMARY OF QUANTITIES

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

WB I-94 OFF RAMP & University Dr.

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	13

NHU-8-081(039)924

N

HEAD NUMBER	Phase 1								Phase 2								Phase 3							
	R/W	Clear to ø							R/W	Clear to ø							R/W	Clear to ø						
	W	2	3	4	5	6	7	8	W	3	4	5	6	7	8	1	W	4	5	6	7	8	1	2
1																								
2																								
3																								
4																								
5																								
6																								
7									G				*		Y									
8									G				*		Y									
9									G				*		Y									
10																								
11																								
12																								

HEAD NUMBER	Phase 4								Phase 5								Phase 6							
	R/W	Clear to ø							R/W	Clear to ø							R/W	Clear to ø						
	W	5	6	7	8	1	2	3	W	6	7	8	1	2	3	4	W	7	8	1	2	3	4	5
1																								
2																								
3																	G		Y		*			
4																	G		Y		*			
5																	G		Y		*			
6																								
7																								
8																								
9																								
10																								
11																								
12																								

HEAD NUMBER	Phase 7								Phase 8							
	R/W	Clear to ø							R/W	Clear to ø						
	W	8	1	2	3	4	5	6	W	1	2	3	4	5	6	7
1									G		Y				Y	
2									G		Y				Y	
3																
4																
5																
6									~~G~~		~~Y~~				~~Y~~	
7																
8																
9																
10									~~G~~		~~Y~~				~~Y~~	
11									~~G~~		~~Y~~				~~Y~~	
12									~~G~~		~~Y~~				~~Y~~	

CHART "A"

On Phase	Non-Conflicting Phase Allowed to Time Concurrently
1	
2	6
3	
4	
5	
6	2
7	
8	NONE

Blank Squares Denote a Red Indication.

(*) When one phase is on alone, any nonconflicting phase may start timing concurrently without a clearance interval. (See Chart "A")

THE CONTRACTOR WILL PROGRAM THE SIGNAL TIMING INTO THE CONTROLLER PRIOR TO START UP.

TRAFFIC CONTROL SYSTEM
Controller Phasing

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SIGNAL PLANS
WB I-94 RAMP & UNIVERSITY DR
CONTROLLER PHASING

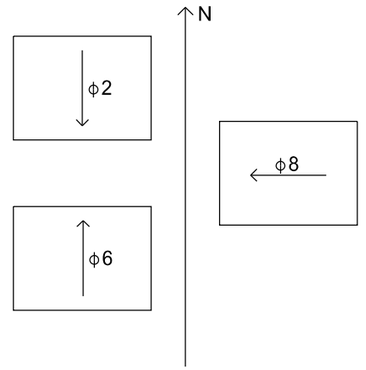
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	14

NHU-8-081(039)924

		ϕ1	ϕ2	ϕ3	ϕ4	ϕ5	ϕ6	ϕ7	ϕ8
BASIC INTERVALS (OR FUNCTIONS)									
MINIMUM GREEN/INITIAL			12				12		11.6
VEHICLE EXTENSTION/PASSAGE TIME			3				3		3
MAXIMUM GREEN			63				63		47
YELLOW CHANGE			3.6				3.6		4
RED CLEARANCE			2.1				2.1		2.5
WALK									
PEDESTRIAN CLEARANCE									
VOLUME DENSITY TIMING FUNCTIONS									
ADDED INITIAL PER ACTUATION									
MAXIMUM INITIAL			26				26		
TIME WAITING GAP TIMING FUNCTIONS									
TIME BEFORE REDUCTION			35				35		
TIME TO REDUCE MINIMUM GAP			20				20		
MINIMUM GAP			2				2		
LOCKING MEMORY			X				X		X
NON-LOCKING MEMORY									
FLASHING-NORMAL & CONFLICT MONITOR			Y				Y		R
START UP PHASING			G				G		R
TYPE OF DETECTOR	PRESENCE								X
	CALLING *		X				X		
	PASSAGE		X				X		
	COUNTING		X				X		X
EMERGENCY VEHICLE PRE-EMPTION			X				X		

* CALLING LOOPS SHALL PLACE ONE CALL INTO THE CONTROLLER ON THE YELLOW OR RED INTERVAL. CALLING LOOPS SHALL BE DISCONTINUED DURING THE GREEN INTERVAL.



SIGNAL PHASING

NOTE:
1. THE CITY OF FARGO WILL VERIFY SIGNAL TIMINGS AND PROVIDE COORDINATION PLAN.

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SIGNAL PLANS
WB I-94 RAMP & UNIVERSITY DR
CONTROLLER SETTINGS

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	15

NHU-8-081(039)924

POLE 1

CONDUCTORS			CABLE 1 (NO 14 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	BLACK			SPARE
2	WHITE			NEUTRAL
3	RED		1, 2	ø8 RED
4	GREEN			GROUND
5	ORANGE		1, 2	ø8 YELLOW
6	BLUE		1, 2	ø8 GREEN
7	WHITE	BLACK		SPARE
8	RED	BLACK		SPARE
9	GREEN	BLACK		GROUND
10	ORANGE	BLACK		SPARE
11	BLUE	BLACK		SPARE
12	BLACK	WHITE		SPARE

POLE 2

CONDUCTORS			CABLE 2 (NO 14 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	BLACK			SPARE
2	WHITE			NEUTRAL
3	RED		3, 4, 5	ø6 RED
4	GREEN			GROUND
5	ORANGE		3, 4, 5	ø6 YELLOW
6	BLUE		3, 4, 5	ø6 GREEN
7	WHITE	BLACK		SPARE
8	RED	BLACK	6	ø8 RED
9	GREEN	BLACK		GROUND
10	ORANGE	BLACK	6	ø8 YELLOW
11	BLUE	BLACK	6	ø8 GREEN
12	BLACK	WHITE		SPARE

POLE 3

CONDUCTORS			CABLE 3 (NO 14 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	BLACK			SPARE
2	WHITE			NEUTRAL
3	RED		7, 8, 9	ø2 RED
4	GREEN			GROUND
5	ORANGE		7, 8, 9	ø2 YELLOW
6	BLUE		7, 8, 9	ø2 GREEN
7	WHITE	BLACK		SPARE
8	RED	BLACK		SPARE
9	GREEN	BLACK		GROUND
10	ORANGE	BLACK		SPARE
11	BLUE	BLACK		SPARE
12	BLACK	WHITE		SPARE

POLE 4

CONDUCTORS			CABLE 4 (NO 14 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	BLACK			SPARE
2	WHITE			NEUTRAL
3	RED		10, 11, 12	ø8 RED
4	GREEN			GROUND
5	ORANGE		10, 11, 12	ø8 YELLOW
6	BLUE		10, 11, 12	ø8 GREEN
7	WHITE	BLACK		SPARE
8	RED	BLACK		SPARE
9	GREEN	BLACK		GROUND
10	ORANGE	BLACK		SPARE
11	BLUE	BLACK		SPARE
12	BLACK	WHITE		SPARE

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SIGNAL PLANS
WB I-94 RAMP & UNIVERSITY DR
SIGNAL HEADS & CONDUCTORS

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	16

NHU-8-081(039)924

HEAD CONDUCTOR ASSIGNMENT

CONDUCTORS			No.14 Awg 3 Ped. Heads	No.14 Awg 5 Veh. Heads	No.14 Awg 7 5-Section Veh. Heads
	BASE	TRACER	INDICATION	INDICATION	INDICATION
1	BLACK		WALK	GREEN	GREEN BALL
2	WHITE		NEUTRAL	NEUTRAL	NEUTRAL
3	RED		DT.WALK	RED	RED
4	GREEN			GROUND	GROUND
5	ORANGE			YELLOW	YELLOW BALL
6	BLUE				GREEN ARROW
7	WHITE	BLACK			YELLOW ARROW

MASTARMS AND STANDARDS:
ALL MASTARMS AND STANDARDS SHALL BE DESIGNED FOR A WINDLOAD FACTOR THAT ACCOUNTS FOR THE REPLACING OF THE END MASTARM VEHICLE HEAD WITH A 5-SECTION CLUSTER HEAD AND THE ADDITION OF 10 SQUARE FEET OF SIGN AREA TO THE MASTARM, WITH ALL OTHER EXISTING HEADS AND SIGNS SHOWN ON THE "MASTARM DETAIL SHEET".

EACH VEHICLE/PEDESTRIAN HEAD CABLE SHALL BE LABELED WITH THE HEAD #. EACH CABLE SHALL HAVE A SEPARATE TERMINAL BLOCK INSIDE THE T-BASE FOR TERMINATIONS.

LUMINAIRES TO BE AS NOTED IN GENERAL NOTE 770-P06, EXCEPT WITH LONG LIFE PHOTOCELL INSTEAD OF A SHORTING CAP.

TRAFFIC STANDARD EXTENSION: LUMINAIRE EXTENSION TO BE MILLERBERND (OR APPROVED EQUAL), STAINLESS STEEL, FROST FINISH, TENON TOP WITH 1' SPOKE ARM BRACKET. LUMINAIRE MOUNTING HEIGHT SHALL BE 40', (VERIFY WITH MANUFACTURER OF TRAFFIC SIGNAL STANDARDS TO DETERMINE EXTENSION HEIGHT NEEDED). SEE TRAFFIC SIGNAL PLANS FOR DETAILS. LUMINAIRE EXTENSION AND FIXTURE SHALL BE INCLUDED IN THE COST BID FOR COMBO STANDARD.

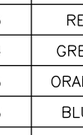
ALL TRAFFIC SIGNAL EQUIPMENT SHALL BE BLACK IN COLOR.

NOTES:
1. FOR LUMINAIRE INFORMATION, SEE NDDOT STANDARD D-772-3.

2. SEE NNDOT STANDARD D-772-4 FOR SIGNAL HEAD PLACEMENT.

3. SEE NNDOT STANDARD D-772-4 FOR EMERGENCY VEHICLE DETECTOR AND CONFIRMATION LIGHT.

NOTE: ALL SIGNAL HEADS SHALL BE SIG POLYCARBONATE. ALL BACK PLATES SHALL BE LOUVERED .063" THICK ALUMINUM.



ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS 6,10,11,12
ALL ARROW L.E.D. SIGNAL HEADS

ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS
1,2,3,4,5,7,8,9

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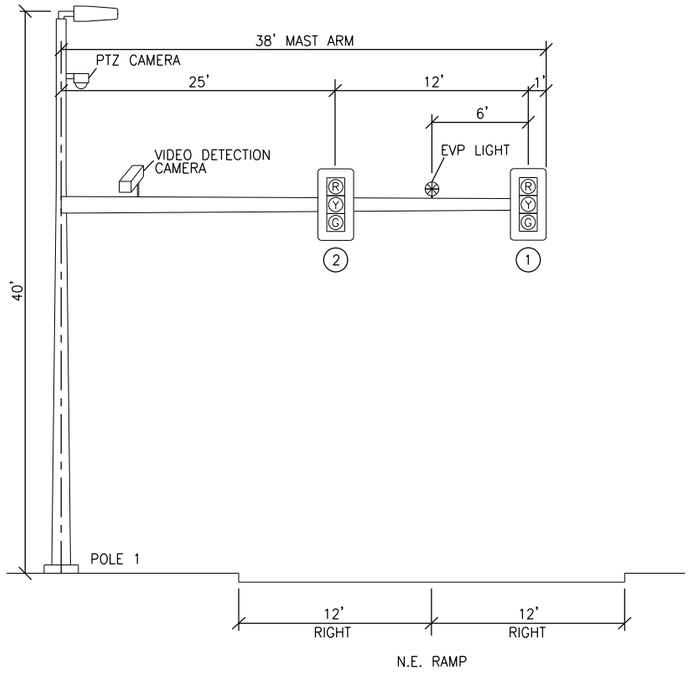
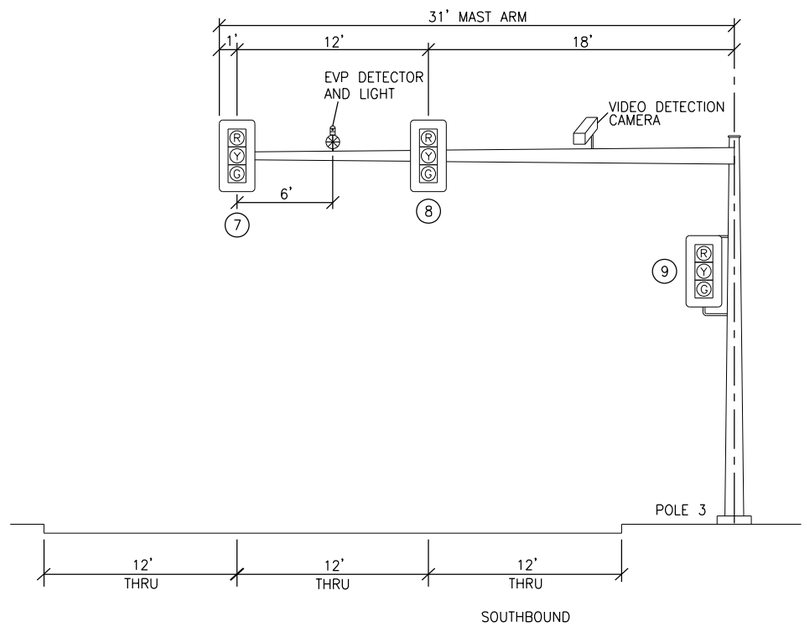
SIGNAL PLANS
WB I-94 RAMP & UNIVERSITY DR
SIGNAL STANDARD & HEAD LOCATIONS

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

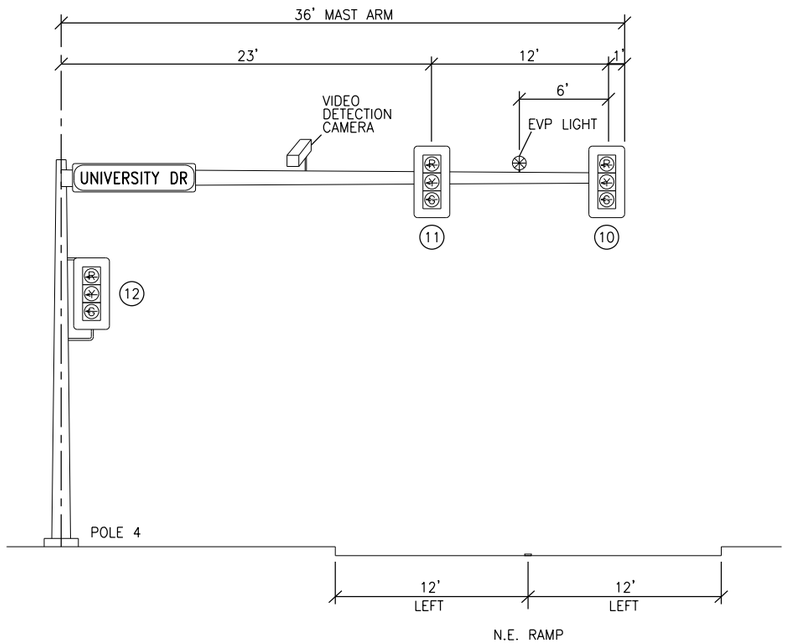


38' MAST ARM
STA 1314+23, 5' RT

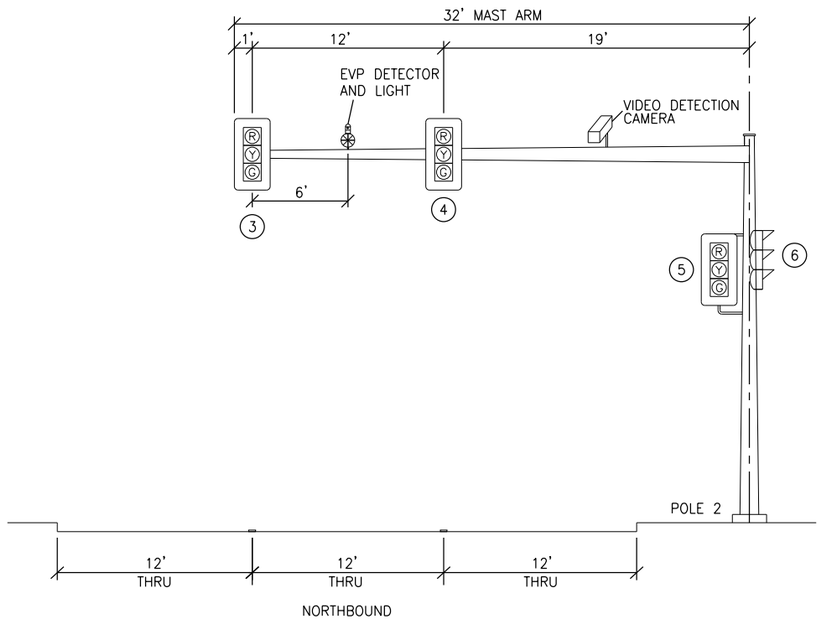
* SIGNAL STANDARDS SHALL BE PAINTED BLACK



31' MAST ARM
STA 1312+63, 55' LT



36' MAST ARM
STA 1313+26, 55' LT



32' MAST ARM
STA 1313+80, 53' RT

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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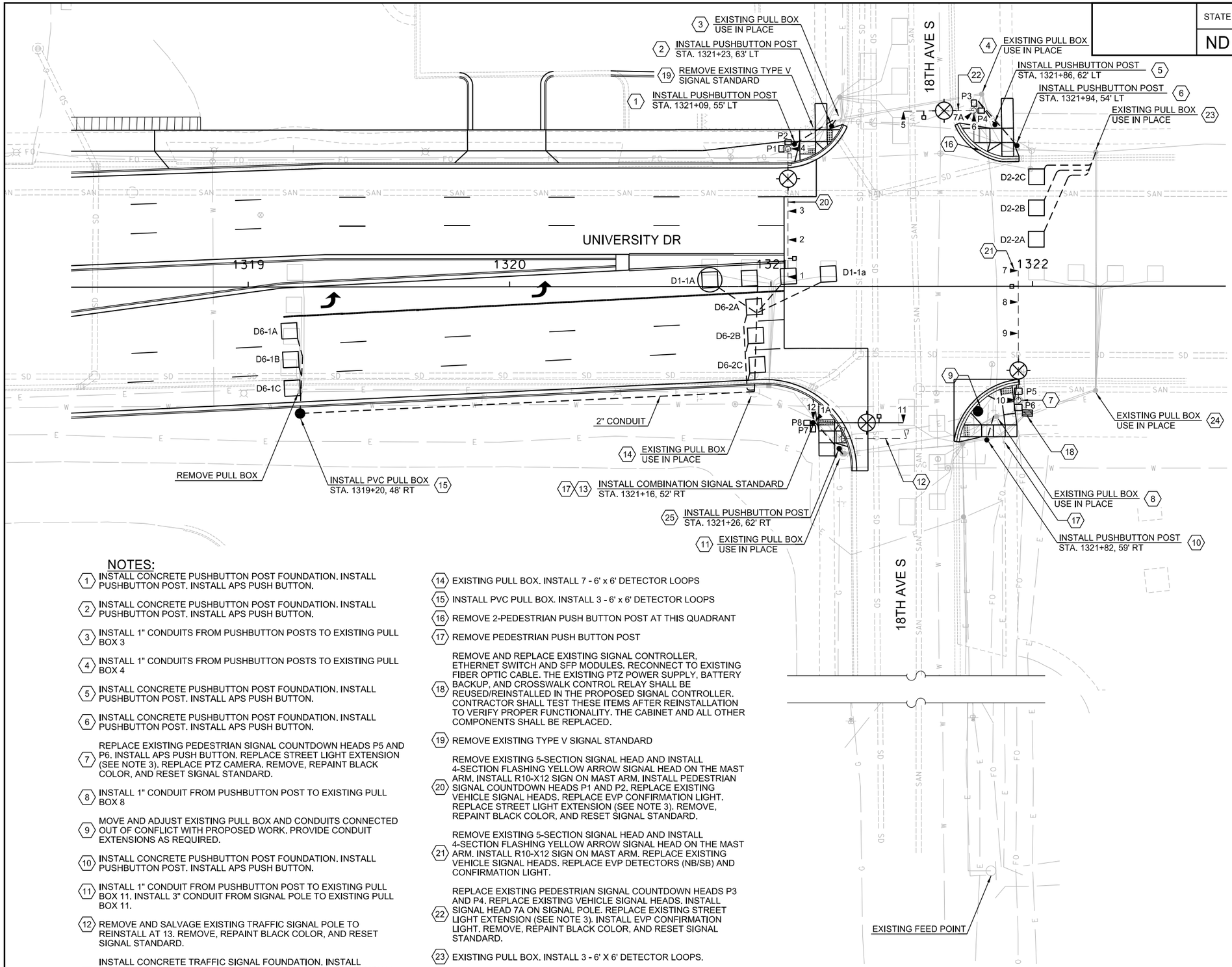

0 20' 40'

NOTES:

1. CONTRACTOR SHALL SPLICE LOOP DETECTOR WIRE FOR STOP BAR DETECTORS WITH NEW LOOP LEADIN WIRE. CONTRACTOR SHALL SPLICE LOOP DETECTOR WIRE FOR LEFT TURN LANE PRESENCE DETECTORS WITH NEW LOOP LEADIN WIRES. CONTRACTOR SHALL SPLICE LOOP DETECTOR WIRE FOR FAR BACK DETECTORS WITH NEW LOOP LEADIN WIRE. LOOP LEADIN WIRE WILL RUN FROM THE NEW PULL BOX TO THE TRAFFIC SIGNAL CONTROLLER.
2. EXISTING UNDERGROUND AND OVERHEAD UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION. THEREFORE, THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. IT IS THE RESPONSIBILITY OF THE INDIVIDUAL CONTRACTOR TO EXACTLY LOCATE EACH UTILITY BEFORE ACTUAL CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH PROJECT ENGINEER FOR NEWLY CONSTRUCTED UTILITIES LOCATIONS.
3. NEW AND REPLACEMENT STREET LIGHT EXTENSIONS SHALL BE 40' M.H., TENON TOP, STAINLESS STEEL, FROST FINISH WITH 1' SPOKE ARM BRACKET. SEE SIGNAL STANDARD DETAIL SHEET FOR MORE INFO.

TRAFFIC SIGNAL REMOVAL QUANTITIES		
PVC PULL BOX	1	EA
PEDESTRIAN PUSHBUTTON POST	4	EA
PEDESTRIAN SIGNAL POST	1	EA
STREET LIGHT EXTENSION	3	EA
SIGNAL CONTROLLER	1	EA

* REMOVAL QUANTITIES FOR INFORMATION ONLY

NOTES:

1. INSTALL CONCRETE PUSHBUTTON POST FOUNDATION. INSTALL PUSHBUTTON POST. INSTALL APS PUSH BUTTON.
2. INSTALL CONCRETE PUSHBUTTON POST FOUNDATION. INSTALL PUSHBUTTON POST. INSTALL APS PUSH BUTTON.
3. INSTALL 1" CONDUITS FROM PUSHBUTTON POSTS TO EXISTING PULL BOX 3
4. INSTALL 1" CONDUITS FROM PUSHBUTTON POSTS TO EXISTING PULL BOX 4
5. INSTALL CONCRETE PUSHBUTTON POST FOUNDATION. INSTALL PUSHBUTTON POST. INSTALL APS PUSH BUTTON.
6. INSTALL CONCRETE PUSHBUTTON POST FOUNDATION. INSTALL PUSHBUTTON POST. INSTALL APS PUSH BUTTON.
7. REPLACE EXISTING PEDESTRIAN SIGNAL COUNTDOWN HEADS P5 AND P6. INSTALL APS PUSH BUTTON. REPLACE STREET LIGHT EXTENSION (SEE NOTE 3). REPLACE PTZ CAMERA. REMOVE, REPAINT BLACK COLOR, AND RESET SIGNAL STANDARD.
8. INSTALL 1" CONDUIT FROM PUSHBUTTON POST TO EXISTING PULL BOX 8
9. MOVE AND ADJUST EXISTING PULL BOX AND CONDUITS CONNECTED OUT OF CONFLICT WITH PROPOSED WORK. PROVIDE CONDUIT EXTENSIONS AS REQUIRED.
10. INSTALL CONCRETE PUSHBUTTON POST FOUNDATION. INSTALL PUSHBUTTON POST. INSTALL APS PUSH BUTTON.
11. INSTALL 1" CONDUIT FROM PUSHBUTTON POST TO EXISTING PULL BOX 11. INSTALL 3" CONDUIT FROM SIGNAL POLE TO EXISTING PULL BOX 11.
12. REMOVE AND SALVAGE EXISTING TRAFFIC SIGNAL POLE TO REINSTALL AT 13. REMOVE, REPAINT BLACK COLOR, AND RESET SIGNAL STANDARD.
13. INSTALL CONCRETE TRAFFIC SIGNAL FOUNDATION. INSTALL SALVAGED POLE FROM 12. REPLACE EXISTING PEDESTRIAN SIGNAL COUNTDOWN HEADS P7 AND P8. INSTALL APS PUSH BUTTON. REPLACE EXISTING VEHICLE SIGNAL HEADS. INSTALL SIGNAL HEAD 1A ON SIGNAL POLE. INSTALL STREET LIGHT EXTENSION (SEE NOTE 3). INSTALL EVP DETECTORS (EB/WB) AND CONFIRMATION LIGHT.
14. EXISTING PULL BOX. INSTALL 7 - 6' x 6' DETECTOR LOOPS
15. INSTALL PVC PULL BOX. INSTALL 3 - 6' x 6' DETECTOR LOOPS
16. REMOVE 2-PEDESTRIAN PUSH BUTTON POST AT THIS QUADRANT
17. REMOVE PEDESTRIAN PUSH BUTTON POST
18. REMOVE AND REPLACE EXISTING SIGNAL CONTROLLER, ETHERNET SWITCH AND SFP MODULES. RECONNECT TO EXISTING FIBER OPTIC CABLE. THE EXISTING PTZ POWER SUPPLY, BATTERY BACKUP, AND CROSSWALK CONTROL RELAY SHALL BE REUSED/REINSTALLED IN THE PROPOSED SIGNAL CONTROLLER. CONTRACTOR SHALL TEST THESE ITEMS AFTER REINSTALLATION TO VERIFY PROPER FUNCTIONALITY. THE CABINET AND ALL OTHER COMPONENTS SHALL BE REPLACED.
19. REMOVE EXISTING TYPE V SIGNAL STANDARD
20. REMOVE EXISTING 5-SECTION SIGNAL HEAD AND INSTALL 4-SECTION FLASHING YELLOW ARROW SIGNAL HEAD ON THE MAST ARM. INSTALL R10-X12 SIGN ON MAST ARM. INSTALL PEDESTRIAN SIGNAL COUNTDOWN HEADS P1 AND P2. REPLACE EXISTING VEHICLE SIGNAL HEADS. REPLACE EVP CONFIRMATION LIGHT. REPLACE STREET LIGHT EXTENSION (SEE NOTE 3). REMOVE, REPAINT BLACK COLOR, AND RESET SIGNAL STANDARD.
21. REMOVE EXISTING 5-SECTION SIGNAL HEAD AND INSTALL 4-SECTION FLASHING YELLOW ARROW SIGNAL HEAD ON THE MAST ARM. INSTALL R10-X12 SIGN ON MAST ARM. REPLACE EXISTING VEHICLE SIGNAL HEADS. REPLACE EVP DETECTORS (NB/SB) AND CONFIRMATION LIGHT.
22. REPLACE EXISTING PEDESTRIAN SIGNAL COUNTDOWN HEADS P3 AND P4. REPLACE EXISTING VEHICLE SIGNAL HEADS. INSTALL SIGNAL HEAD 7A ON SIGNAL POLE. REPLACE EXISTING STREET LIGHT EXTENSION (SEE NOTE 3). INSTALL EVP CONFIRMATION LIGHT. REMOVE, REPAINT BLACK COLOR, AND RESET SIGNAL STANDARD.
23. EXISTING PULL BOX. INSTALL 3 - 6' X 6' DETECTOR LOOPS.
24. EXISTING PULL BOX
25. INSTALL CONCRETE PUSHBUTTON POST FOUNDATION. INSTALL PUSHBUTTON POST. INSTALL APS PUSH BUTTON.

SIGNAL PLANS
18TH AVE S & UNIVERSITY DR
TRAFFIC SIGNAL LAYOUT

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	18

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TRAFFIC SIGNAL QUANTITIES

	CONCRETE FOUNDATION - TRAFFIC SIGNALS	MOVE AND ADJUST PVC PULL BOX	PVC PULL BOX	TRAFFIC SIGNAL CONTROLLER	1" DIA. RIGID CONDUIT	2" DIA. RIGID CONDUIT	3" DIA. RIGID CONDUIT	NO. 14 AWG 2 CONDUCTOR CABLE	NO. 14 AWG 3 CONDUCTOR CABLE	NO. 14 AWG 5 CONDUCTOR CABLE	NO. 14 AWG 7 CONDUCTOR CABLE	NO. 14 AWG 20 CONDUCTOR CABLE	LOOP LEAD-IN WIRE	LOOP WIRE	SAW SLOT	EMERGENCY VEHICLE DETECTION CABLE	1-WAY 3 SECTION HEAD W/12" LENS - MA MTD.	1-WAY 3 SECTION HEAD W/12" LENS - POST MTD.	1-WAY 4 SECTION HEAD W/12" LENS - MA MTD.	1-WAY 4 SECTION HEAD W/12" LENS - POST MTD.	1-WAY 5 SECTION HEAD W/12" LENS - MA MTD.	LED BLANK OUT SIGN	APS PEDESTRIAN PUSHBUTTON WITH SIGN	R10-X12 SIGN	PEDESTRIAN COUNTDOWN SIGNAL HEAD - POST MTD.	COMBINATION 40' MH SIGNAL AND LIGHT STANDARD EXTENSION	PEDESTRIAN PUSH BUTTON POST AND FOUNDATION	PAINT SIGNAL STANDARD AND MAST ARM	EMERGENCY VEHICLE DETECTOR SYSTEM	PTZ CAMERA	CAT 6 CABLE	NO. 16 AWG 3 - PTZ CAMERA POWER	ETHERNET SWITCH	TRAFFIC SIGNAL SYSTEM	REMOVE TRAFFIC SIGNAL SYSTEM
	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA
POLE 7/21																	2	1	1				1	1	2	1		1		1				
POLE 13	1																1	1		1			1		2	1		1						
POLE 20																	2	1	1			1		1	2	1		1						
POLE 22																		1		1	1				2	1		1						
PEDESTRIAN PUSH BUTTON POSTS																							6				6							
CONTROLLER				1																												1		
VARIOUS LOCATIONS		1	1		68	175	15	1130	144	445	247	539	2010	1439	611	264												1		60	60		1	1
TOTAL	1	1	1	1	68	175	15	1130	144	445	247	539	2010	1439	611	264	5	4	2	2	1	1	8	2	8	4	6	4	1	1	60	60	1	1	1

* TRAFFIC SIGNAL QUANTITIES FOR INFORMATION ONLY

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SIGNAL PLANS
18TH AVE S & UNIVERSITY DR
SUMMARY OF QUANTITIES

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	19

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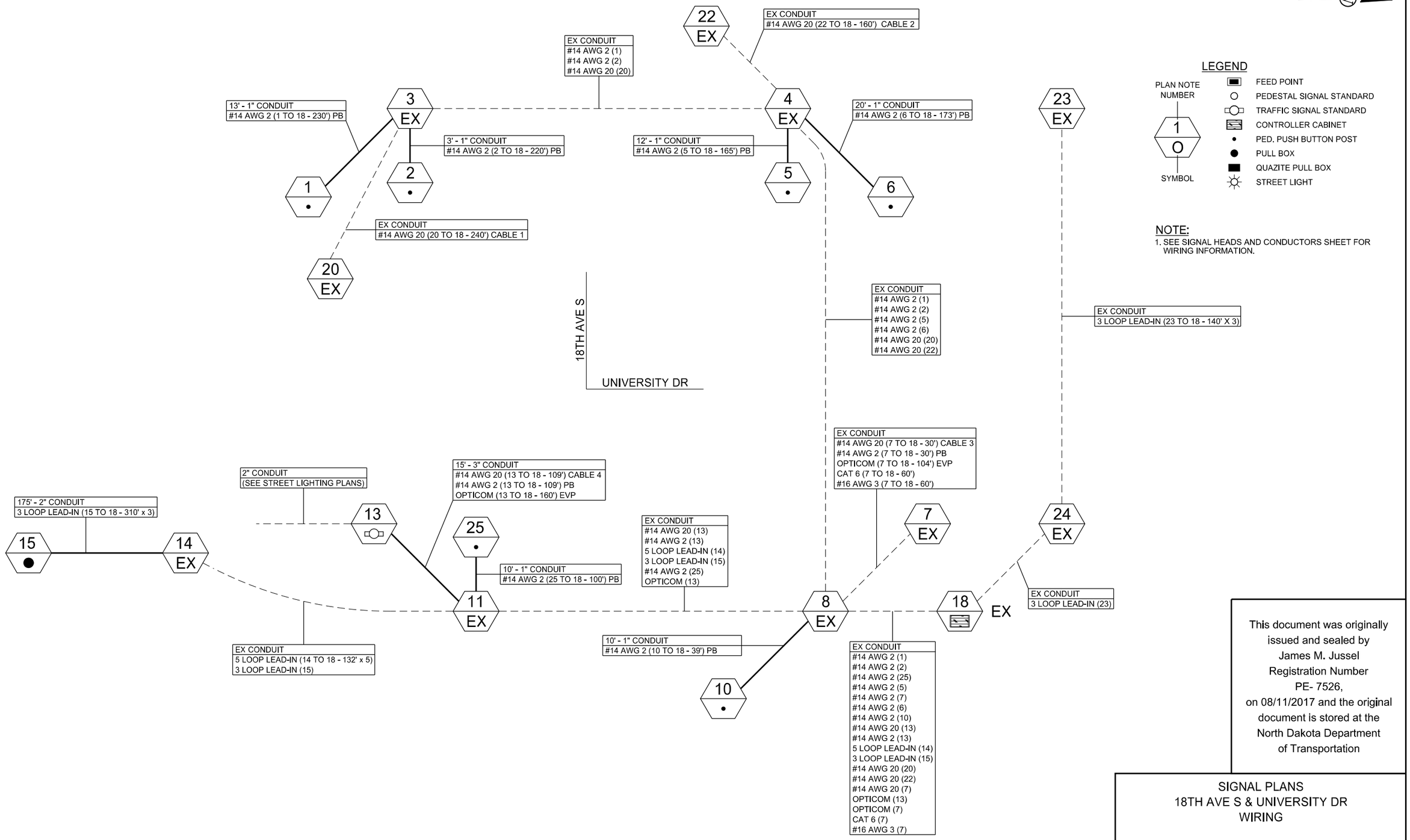

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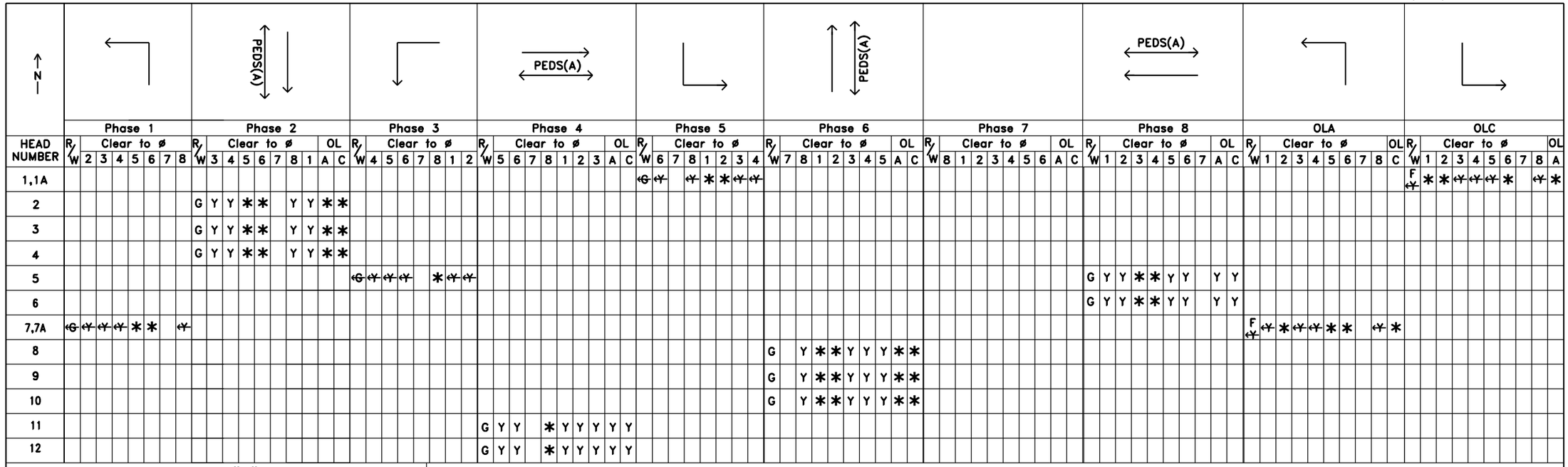
SIGNAL PLANS
18TH AVE S & UNIVERSITY DR
WIRING

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	20

NHU-8-081(039)924

18TH AVE S & UNIVERSITY DR



HEAD NUMBER	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	OLA	OLC
	R/W 2 3 4 5 6 7 8	R/W 3 4 5 6 7 8 1 A C	R/W 4 5 6 7 8 1 2	R/W 5 6 7 8 1 2 3 A C	R/W 6 7 8 1 2 3 4	R/W 7 8 1 2 3 4 5 A C	R/W 8 1 2 3 4 5 6 A C	R/W 1 2 3 4 5 6 7 A C	R/W 1 2 3 4 5 6 7 8 C	R/W 1 2 3 4 5 6 7 8 A
1,1A					G Y	Y * * Y Y				F Y * * Y Y Y * Y *
2		G Y Y * * Y Y * *								
3		G Y Y * * Y Y * *								
4		G Y Y * * Y Y * *								
5			G Y Y Y * Y Y Y					G Y Y * * Y Y Y Y		
6								G Y Y * * Y Y Y Y		
7,7A	G Y Y Y * * Y								F Y * Y Y * * Y *	
8						G Y * * Y Y Y * *				
9						G Y * * Y Y Y * *				
10						G Y * * Y Y Y * *				
11				G Y Y * Y Y Y Y Y						
12				G Y Y * Y Y Y Y Y						

CHART "A"	
On Phase	Non-Conflicting Phase Allowed to Time Concurrently
1	5,6,OLA,OLC
2	5,6,OLC,OLA
3	7,8
4	7,8
5	1,2,OLA,OLC
6	1,2,OLA,OLC
7	
8	3,4
OLA	1,2,5,6,OLC
OLC	1,2,5,6,OLA

Blank Squares Denote a Red Indication.

(*) When one phase is on alone, any nonconflicting phase may start timing concurrently without a clearance interval. (See Chart "A")

(A) Only upon pedestrian actuation.

THE CITY WILL PROGRAM THE SIGNAL TIMING INTO THE CONTROLLER PRIOR TO START UP.

TRAFFIC CONTROL SYSTEM
Controller Phasing

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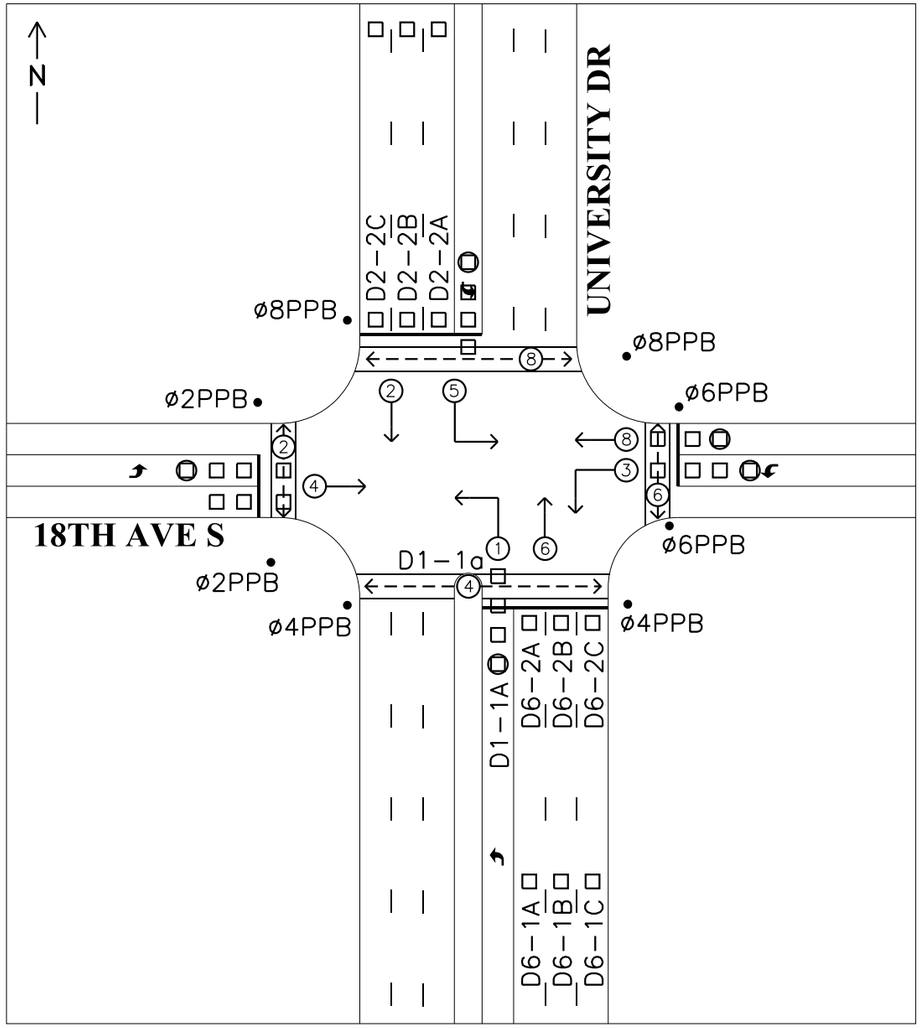
SIGNAL PLANS
18TH AVE S & UNIVERSITY DR
CONTROLLER PHASING

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	21

NHU-8-081(039)924

18TH AVE S & UNIVERSITY DR



CONTROLLER INPUT LOCATION
PHASE-LOOP
DIRECTION
LOOP TYPE
WHITE BACKGROUND
BLACK LEGEND & LINES

CH.1		1-1A	NBLT	2-1A	SB	4-1A	EB	4-3A	EBRT	5-1A	SBLT	6-1A	NB	8-1A	EB			PE1	NB	PE3	WB
		VD1	PR	VD2	P	VD3	PR	VD4	PR	VD5	PR	VD6	P	VD7	PR	VD8			ø1&ø6		ø8
CH.2		1-1a	NBLT	2-1B	SB	4-1B	EB	4-3a	EBRT	5-1a	SBLT	6-1B	NB	8-1B	EB			PE2	SB	PE4	EB
		SD1	PR	SD2	P	SD3	PR	SD4	PR	SD5	PR	SD6	P	SD7	PR	SD8			ø2&ø5		ø4
REF	POWER SUPPLY	DT1		DT2		DT3		DT4		DT5		DT6		DT7		DT8		OD1		OD2	

CH.1				2-1C	SB	4-1a	EB					6-1C	NB	8-1a	EB		
	VD9		VD10	P	VD11	PR	VD12		VD13		VD14	P	VD15	PR	VD16		
CH.2						4-1b	EB							8-1b	EB		
	VD17		VD18		VD19	PR	VD20		VD21		VD22		VD23	PR	VD24		
REF	POWER SUPPLY	DT9		DT10		DT11		DT12		DT13		DT14		DT15		DT16	

TYPICAL 8 PHASE DETECTOR LABEL

SAME PHASE MULTIPLE LEAD-INS
LETTERS A-D
LANE LOCATION START
"A" ON THE CENTER LINE
TO CURB.

PHASE-LOOP
(N)-1 = (2,4,6,8)-PASSAGE (N)-1 = (1,3,5,7)-LEFT TURN
(N)-1 = (2,4,6,8)-PRESENCE (N)-3 = (2,4,6,8)-RIGHT TURN
(N)-2 = (2,4,6,8)-CALLING (N)-5 = (1,2,3,4,5,6,7,8)- COUNT LOOP

LOOP TYPE
P = PASSAGE LT = LEFT TURN
PR = PRESENCE RT = RIGHT TURN
C = CALLING T = COUNT LOOP

CONTROLLER INPUT LOCATION
VD(#) = VEHICLE DETECTOR (1-8)
SD(#) = SPECIAL DETECTOR (1-8)
PD(#) = PEDESTRIAN DETECTOR (1-8)

EMERGENCY VEHICLE PRE-EMPTION PHASING

ø1 ø6	ø2 ø5
NORTH BOUND	SOUTH BOUND
PREEMPT 1	PREEMPT 2
TOP TUBE/BLUE WIRE	BOTTOM TUBE/YELLOW WIRE
ø8 ø3	ø4
WEST BOUND	EAST BOUND
PREEMPT 3	PREEMPT 4
TOP TUBE/BLUE WIRE	BOTTOM TUBE/YELLOW WIRE

DETECTOR LOOP SCHEDULE

DETECTION ZONE	NUMBER OF LOOPS	PHASE	SIZE (FEET)	TYPE OF LOOP	NUMBER OF TURNS	CONDUCTOR (L.F.)	SAW SLOT (L.F.)
D1-1A D1-1a	4	ø1	6 x 6	PRESENCE	3	520	268
D6-1A D6-1B D6-1C	3	ø6	6 x 6	PASSAGE	3	337	109
D6-2A D6-2B D6-2C	3	ø6	6 x 6	CALLING	3	291	117
D2-2A D2-2B D2-2C	3	ø2	6 x 6	CALLING	3	291	117
					TOTAL	1439	611

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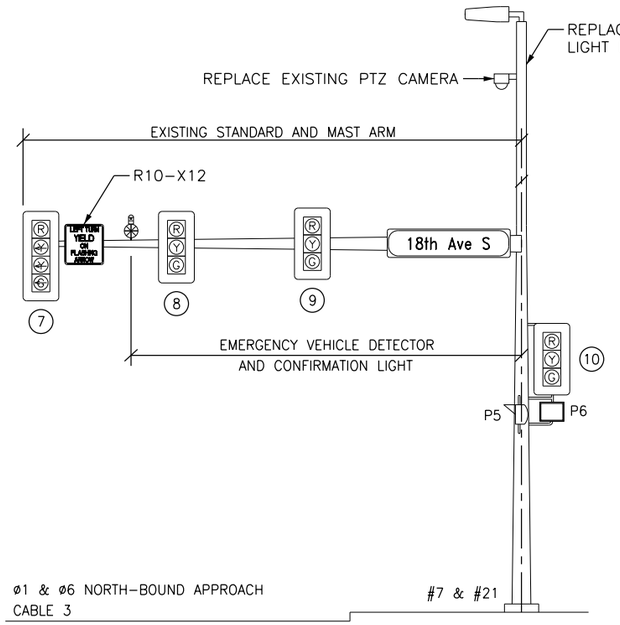
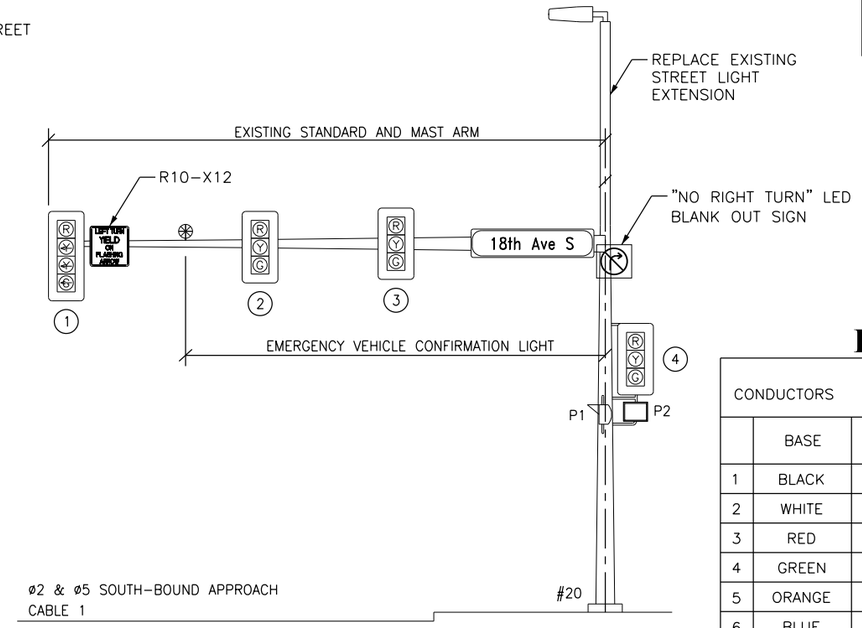
SIGNAL PLANS
18TH AVE S & UNIVERSITY DR
MISC & PHASING

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	22

NHU-8-081(039)924





68' – #14 /7	VEHICLE HEAD #7
60' – #14 /5	VEHICLE HEAD #8
48' – #14 /5	VEHICLE HEAD #9
23' – #14 /5	VEHICLE HEAD #10

13' – #14 /3	PED HEAD P5
13' – #14 /3	PED HEAD P6
13' – #14 /2	PED HEAD PB P5

68' – #14 /7	VEHICLE HEAD #1
60' – #14 /5	VEHICLE HEAD #2
48' – #14 /5	VEHICLE HEAD #3
23' – #14 /5	VEHICLE HEAD #4
23' – #14 /3	BLANK OUT SIGN

13' – #14 /3	PED HEAD P1
13' – #14 /3	PED HEAD P2

HEAD CONDUCTOR ASSIGNMENT

CONDUCTORS			No.14 Awg 3 Ped. Heads	No.14 Awg 5 Veh. Heads	No.14 Awg 7 5-Section Veh. Heads	No.14 Awg 7 4-Section Veh. Heads
	BASE	TRACER	INDICATION	INDICATION	INDICATION	INDICATION
1	BLACK		WALK	GREEN	GREEN BALL	SPARE
2	WHITE		NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
3	RED		DT.WALK	RED	RED	RED ARROW
4	GREEN			GROUND	GROUND	GROUND
5	ORANGE			YELLOW	YELLOW BALL	FLASH YELLOW ARROW
6	BLUE				GREEN ARROW	GREEN ARROW
7	WHITE	BLACK			YELLOW ARROW	YELLOW ARROW

18TH AVE S & UNIVERSITY DR FLASHING YEL ARROW OLA

CONDUCTORS			CABLE 3 #7 (14-20) NB STD		CONDUCTORS			CABLE 3 #7 (14-20) NB STD	
	BASE	TRACER	INDICATION	HEAD		BASE	TRACER	INDICATION	HEAD
1	BLACK		ø6 WALK	P6	11	BLUE	BLACK		
2	WHITE		NEUTRAL		12	BLACK	WHITE	ø8 DT.WALK	P5
3	RED		ø6 RED	8,9,10	13	RED	WHITE		
4	GREEN		GROUND		14	GREEN	WHITE	CONFIRMATION LIGHT	
5	ORANGE		ø6 YELLOW	8,9,10	15	BLUE	WHITE		
6	BLUE		ø6 GREEN	8,9,10	16	BLACK	RED		
7	WHITE	BLACK	ø6 DT.WALK	P6	17	WHITE	RED	OLA FL. YELLOW	7
8	RED	BLACK			18	ORANGE	RED	OLA YELLOW	7
9	GREEN	BLACK	ø8 WALK	P5	19	BLUE	RED	ø1 GREEN	7
10	ORANGE	BLACK			20	RED	GREEN	OLA RED	7

18TH AVE S & UNIVERSITY DR FLASHING YEL ARROW OLC

CONDUCTORS			CABLE 1 #20 (14-20) SB STD		CONDUCTORS			CABLE 1 #20 (14-20) SB STD	
	BASE	TRACER	INDICATION	HEAD		BASE	TRACER	INDICATION	HEAD
1	BLACK		ø2 WALK	P2	11	BLUE	BLACK		
2	WHITE		NEUTRAL		12	BLACK	WHITE	ø4 DT.WALK	P1
3	RED		ø2 RED	2,3,4	13	RED	WHITE		
4	GREEN		GROUND		14	GREEN	WHITE	CONFIRMATION LIGHT	
5	ORANGE		ø2 YELLOW	2,3,4	15	BLUE	WHITE		
6	BLUE		ø2 GREEN	2,3,4	16	BLACK	RED		
7	WHITE	BLACK	ø2 DT.WALK	P2	17	WHITE	RED	OLC FL. YELLOW	1
8	RED	BLACK	ø1 BLANK OUT SIGN		18	ORANGE	RED	OLC YELLOW	1
9	GREEN	BLACK	ø4 WALK	P1	19	BLUE	RED	ø5 GREEN	1
10	ORANGE	BLACK			20	RED	GREEN	OLC RED	1

ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS 2,3,4,8,9,10

ALL NEW PEDESTRIAN HEADS
16" x 18" Filled Overlay
L.E.D. PEDESTRIAN HEAD
WITH PEDESTRIAN COUNT
DOWN TIMER AND "TUNNEL"
STYLE VISOR

RED ARROW
YELLOW ARROW
FLASHING YELLOW ARROW
GREEN ARROW

ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS 1,7
ALL ARROW L.E.D. SIGNAL HEADS

NOTE: ALL SIGNAL HEADS SHALL BE SIG POLYCARBONATE. ALL BACK PLATES SHALL BE LOUVERED .063" THICK ALUMINUM.

EACH VEHICLE/PEDESTRIAN HEAD CABLE SHALL BE LABELED WITH THE HEAD #.

EACH CABLE FROM CONTROLLER CABINET SHALL HAVE A SEPARATE TERMINAL BLOCK INSIDE THE T-BASE FOR TERMINATIONS.

ALL TRAFFIC SIGNAL EQUIPMENT SHALL BE BLACK IN COLOR.

LUMINAIRES TO BE AS NOTED IN GENERAL NOTE 770-P06.

TRAFFIC STANDARD EXTENSION: LUMINAIRE EXTENSION TO BE MILLERBERND, STAINLESS STEEL, 40' MOUNTING HEIGHT, TENON TOP WITH 1' SPOKE ARM BRACKET, FROST FINISH, CAT NO. 52065156-400-SR19 OR APPROVED EQUAL. THE ORIENTATION OF LUMINAIRE SHOULD BE AS SHOWN ON STREET LIGHT PLANS (SECTION 140).

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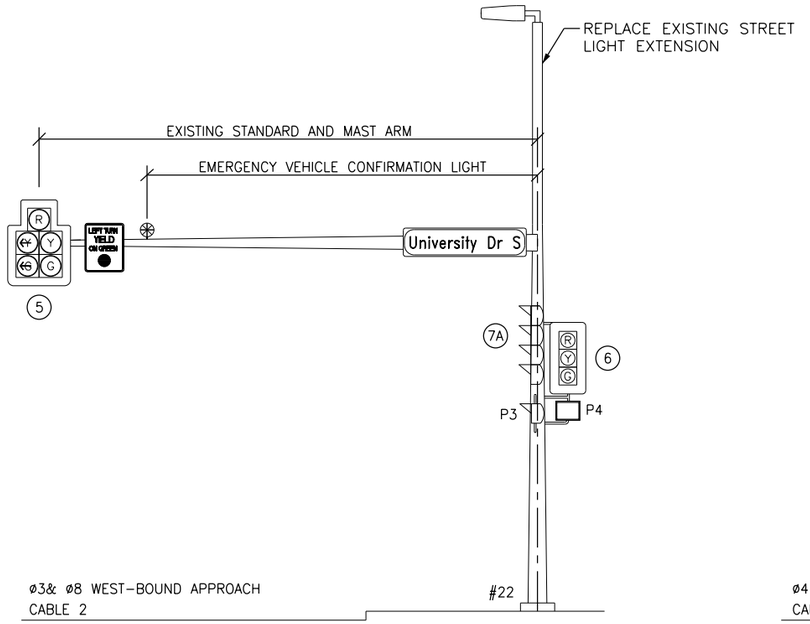
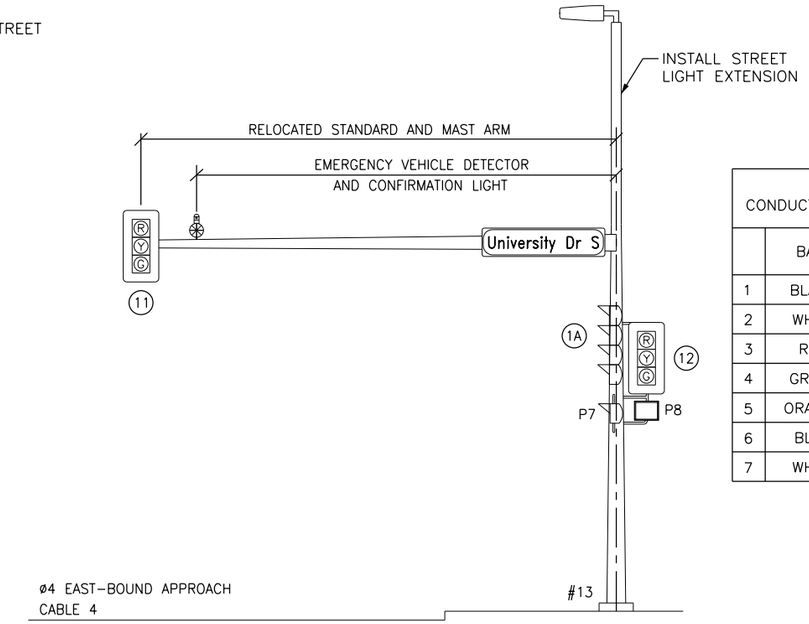
SIGNAL PLANS
18TH AVE S & UNIVERSITY DR
SIGNAL STANDARD & HEAD LOCATIONS

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	23

NHU-8-081(039)924





HEAD CONDUCTOR ASSIGNMENT

CONDUCTORS			No.14 Awg 3 Ped. Heads	No.14 Awg 5 Veh. Heads	No.14 Awg 7 5-Section Veh. Heads	No.14 Awg 7 4-Section Veh. Heads
	BASE	TRACER	INDICATION	INDICATION	INDICATION	INDICATION
1	BLACK		WALK	GREEN	GREEN BALL	SPARE
2	WHITE		NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
3	RED		DT.WALK	RED	RED	RED ARROW
4	GREEN			GROUND	GROUND	GROUND
5	ORANGE			YELLOW	YELLOW BALL	FLASH YELLOW ARROW
6	BLUE				GREEN ARROW	GREEN ARROW
7	WHITE	BLACK			YELLOW ARROW	YELLOW ARROW

48' - #14 /7	VEHICLE HEAD #5
23' - #14 /5	VEHICLE HEAD #6
23' - #14 /7	VEHICLE HEAD #7A

13' - #14 /3	PED HEAD P3
13' - #14 /3	PED HEAD P4

48' - #14 /5	VEHICLE HEAD #11
23' - #14 /5	VEHICLE HEAD #12
23' - #14 /7	VEHICLE HEAD #1A

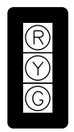
13' - #14 /3	PED HEAD P7
13' - #14 /3	PED HEAD P8
13' - #14 /2	PED HEAD PB P8

18TH AVE S & UNIVERSITY DR FLASHING YEL ARROW OLA

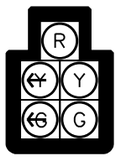
CONDUCTORS			CABLE 2 #22 (14-20) WB STD		CONDUCTORS			CABLE 2 #22 (14-20) WB STD	
	BASE	TRACER	INDICATION	HEAD		BASE	TRACER	INDICATION	HEAD
1	BLACK		ø2 WALK	P3	11	BLUE	BLACK	ø8 GREEN	5,6
2	WHITE		NEUTRAL		12	BLACK	WHITE	ø8 DT.WALK	P4
3	RED				13	RED	WHITE		
4	GREEN		GROUND		14	GREEN	WHITE	CONFIRMATION LIGHT	
5	ORANGE				15	BLUE	WHITE		
6	BLUE				16	BLACK	RED		
7	WHITE	BLACK	ø2 DT.WALK	P3	17	WHITE	RED	OLA FL. YELLOW	7A
8	RED	BLACK	ø8 RED	5,6	18	ORANGE	RED	OLA YELLOW	7A
9	GREEN	BLACK	ø8 WALK	P4	19	BLUE	RED	ø1 GREEN	7A
10	ORANGE	BLACK	ø8 YELLOW	5,6	20	RED	GREEN	OLA RED	7A

18TH AVE S & UNIVERSITY DR FLASHING YEL ARROW OLC

CONDUCTORS			CABLE 4 #13 (14-20) EB STD		CONDUCTORS			CABLE 4 #13 (14-20) EB STD	
	BASE	TRACER	INDICATION	HEAD		BASE	TRACER	INDICATION	HEAD
1	BLACK		ø6 WALK	P7	11	BLUE	BLACK	ø4 GREEN	11,12
2	WHITE		NEUTRAL		12	BLACK	WHITE	ø4 DT.WALK	P8
3	RED				13	RED	WHITE		
4	GREEN		GROUND		14	GREEN	WHITE	CONFIRMATION LIGHT	
5	ORANGE				15	BLUE	WHITE		
6	BLUE				16	BLACK	RED		
7	WHITE	BLACK	ø6 DT.WALK	P7	17	WHITE	RED	OLC FL. YELLOW	1A
8	RED	BLACK	ø4 RED	11,12	18	ORANGE	RED	OLC YELLOW	1A
9	GREEN	BLACK	ø4 WALK	P8	19	BLUE	RED	ø5 GREEN	1A
10	ORANGE	BLACK	ø4 YELLOW	11,12	20	RED	GREEN	OLC RED	1A

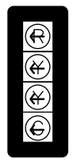


ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS 6,11,12



ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEAD 5
ALL ARROW L.E.D. SIGNAL HEADS

RED ARROW
YELLOW ARROW
FLASHING YELLOW ARROW
GREEN ARROW



ALL L.E.D. SIGNAL HEADS
12" LENSES
VEHICLE HEADS 1A,7A
ALL ARROW L.E.D. SIGNAL HEADS

ALL NEW PEDESTRIAN HEADS
16" x 18" Filled Overlay
L.E.D. PEDESTRIAN HEAD
WITH PEDESTRIAN COUNT
DOWN TIMER AND "TUNNEL" STYLE VISOR

NOTE: ALL SIGNAL HEADS SHALL BE SIG POLYCARBONATE. ALL BACK PLATES SHALL BE LOUVERED .063" THICK ALUMINUM.

EACH VEHICLE/PEDESTRIAN HEAD CABLE SHALL BE LABELED WITH THE HEAD #.

EACH CABLE FROM CONTROLLER CABINET SHALL HAVE A SEPARATE TERMINAL BLOCK INSIDE THE T-BASE FOR TERMINATIONS.

ALL TRAFFIC SIGNAL EQUIPMENT SHALL BE BLACK IN COLOR.

LUMINAIRES TO BE AS NOTED IN GENERAL NOTE 770-P06.

TRAFFIC STANDARD EXTENSION: LUMINAIRE EXTENSION TO BE MILLERBERND, STAINLESS STEEL, 40' MOUNTING HEIGHT, TENON TOP WITH 1' SPOKE ARM BRACKET, FROST FINISH, CAT NO. 52065156-400-SR19 OR APPROVED EQUAL. THE ORIENTATION OF LUMINAIRE SHOULD BE AS SHOWN ON STREET LIGHT PLANS (SECTION 140).

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SIGNAL PLANS
18TH AVE S & UNIVERSITY DR
SIGNAL STANDARD & HEAD LOCATIONS

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	24

NHU-8-081(039)924

TRAFFIC SIGNAL STANDARD FOUNDATIONS

TRAFFIC SIGNAL STANDARD FOUNDATION SELECTION TABLE				
SIGNAL STANDARD DESCRIPTION	24" DIAMETER FOOTING DEPTH	30" DIAMETER FOOTING DEPTH	36" DIAMETER FOOTING DEPTH	42" DIAMETER FOOTING DEPTH
TYPE I, II, V, VI, VII STANDARD				
10–14' HEIGHT	4'	4'	3'	–
15'–17' HEIGHT	6'	6'	5'	–
TYPE IV SIGNAL STANDARD				
0'–25' MAST ARM	–	11'	11'	11'
26'–30' MAST ARM	–	12'	12'	12'
31'–35' MAST ARM	–	12'	12'	12'
36'–39' MAST ARM	–	13'	13'	13'
40'–45' MAST ARM	–	15'	15'	15'
46'–50' MAST ARM	–	16'	15'	15'
51'–55' MAST ARM	–	16'	16'	16'
56'–60' MAST ARM	–	17'	17'	17'
61'–65' MAST ARM	–	18'	18'	18'
COMBO SIGNAL STANDARD 30' MT HEIGHT				
0'–25' MAST ARM	–	11'	11'	11'
26'–30' MAST ARM	–	12'	12'	12'
31'–35' MAST ARM	–	13'	13'	13'
36'–39' MAST ARM	–	14'	14'	14'
40'–45' MAST ARM	–	16'	15'	15'
46'–50' MAST ARM	–	16'	16'	16'
51'–55' MAST ARM	–	17'	16'	16'
56'–60' MAST ARM	–	18'	17'	17'
61'–65' MAST ARM	–	19'	18'	18'
COMBO SIGNAL STANDARD 40' MT HEIGHT				
0'–25' MAST ARM	–	12'	12'	12'
26'–30' MAST ARM	–	13'	13'	13'
31'–35' MAST ARM	–	13'	13'	13'
36'–39' MAST ARM	–	14'	14'	14'
40'–45' MAST ARM	–	16'	15'	15'
46'–50' MAST ARM	–	16'	16'	16'
51'–55' MAST ARM	–	17'	16'	16'
56'–60' MAST ARM	–	18'	17'	17'
61'–65' MAST ARM	–	19'	18'	18'
COMBO SIGNAL STANDARD 50' MT HEIGHT				
0'–25' MAST ARM	–	12'	12'	12'
26'–30' MAST ARM	–	13'	13'	13'
31'–35' MAST ARM	–	13'	13'	13'
36'–39' MAST ARM	–	14'	14'	14'
40'–45' MAST ARM	–	16'	16'	16'
46'–50' MAST ARM	–	16'	16'	16'
51'–55' MAST ARM	–	17'	17'	17'
56'–60' MAST ARM	–	18'	18'	17'
61'–65' MAST ARM	–	19'	19'	18'

FOUNDATION NOTES:

1. SEE PLANS FOR CORRECT LOCATION OF FOUNDATION. THE GRADE AND EXACT LOCATION SHALL BE ESTABLISHED BY THE ENGINEER IN THE FIELD.

2. THE FOUDATION SHALL PROVIDE A MINIMUM OF 3" OF CONCRETE COVER FROM THE ANCHOR BOLTS TO THE REBAR CAGE AND A MINIMUM OF 3" OF CONCRETE COVER OVER THE REBAR CAGE TO THE OUTSIDE OF THE FOUNDATION. THE DIAMETER OF THE FOUNDATION SHALL BE INCREASED TO ACCOMODATE A LARGER BOL CIRCLE.

3. AN ANCHOR BOLT CAGE SHALL BE SHOP FABRICATED FROM #6 BAR CIRCLE OR ¾" SQUARE STOCK OR APPROVED EQUAL WELDED TO THE INSIDE OF THE ANCHOR BOLT TO HOLD ALIGNMENT.

4. GROUND ROD SHALL BE PLACED PRIOR TO CONCRETE PLACEMENT. THE ROD SHALL PROJECT 4" ABOVE THE FINISHED FOUNDATION AND SHALL EXTEND 12" BELOW THE FOUNDATION BOTTOM.

5. CONDUIT BENDS SHALL BE 90°. CONDUIT SHALL BE LOCATED 24" MINIMUM BELOW GROUND LEVEL. A SPARE 2" CONDUIT SHALL BE INSTALL IN EACH FOUNDATION WITH BOTH ENDS PLUGED AS PER SPARE CONDUIT SPECIFICATION.

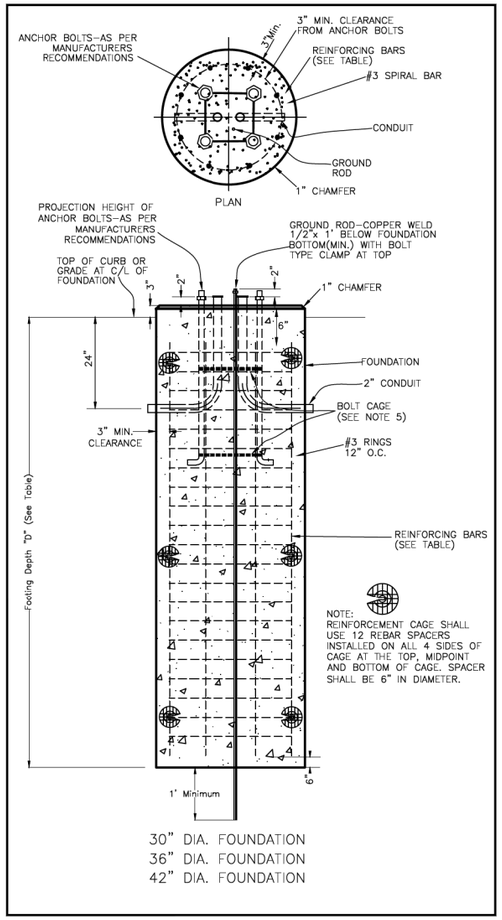
CONCRETE FOUNDATION:

1. CONCRETE USED IN THE WORK SHALL BE CLASS AE PORTLAND CEMENT CONCRETE MIXED AND PROPORTIONED AS SPECIFIED IN SECTION 802 IN ND STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

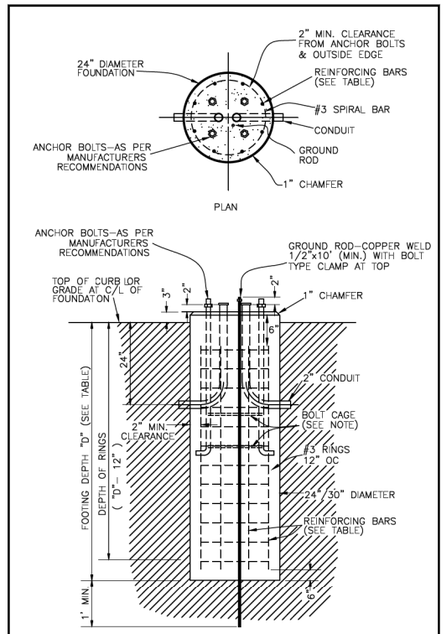
NOTE:
THE TOP OF THE FOUNDATION SHALL BE CIRCULAR. IF APPROVED BY THE ENGINEER A SQUARE CASING MAY BE USED. PRIOR TO FINAL GRADING OR SIDEWALK PLACEMENT THE CASING TUBES SHALL BE REMOVED TO A POINT 6" BELOW GRADE.

NOTES:
① NO REINFORCEMENT IS REQUIRED IF THE ANCHOR BOLTS EXTEND TO WITHIN 3" TO 6" ABOVE THE BOTTOM OF THE FOUNDATION FOR THE 24" DIAMETER FOUNDATION.
② ALL REINFORCING STEEL TO BE GRADE 40 OR 60.
③ RINGS SHALL BE SPACED AT EQUAL SPACE TO A MAXIMUM OF 12" OC, STARTING WITH THE FIRST AT THE TOP OF THE LONGITUDINAL REINFORCING AND THE LAST AT THE BOTTOM OF THE LONGITUDINAL REINFORCING. RINGS SHALL HAVE A MIN OF 12" OVERLAP.
④ SEE PLANS FOR CONDUIT SIZE, NUMBER OF BENDS AND CORRECT POSITIONING FOR EACH FOUNDATION.

FOUNDATION REINFORCING TABLE	
FOOTING DEPTH	LONGITUDINAL REINFORCING
12' or Less	8 – #5
13'–14'	8 – #6
15'–16'	8 – #7
17'–19'	8 – #8



30" DIA. FOUNDATION
36" DIA. FOUNDATION
42" DIA. FOUNDATION



24" DIA. FOUNDATION ①

SECTION NO. 4200	DRAWING NO. 5.1
REV.D. 2016	
TRAFFIC SIGNAL FOUNDATION	
CITY OF FARGO ENGINEERING DEPARTMENT	
APPROVED	DATE

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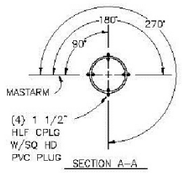
SIGNAL PLANS
TRAFFIC SIGNAL FOUNDATION

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

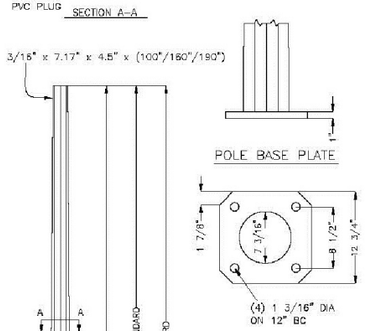
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	25

NHU-8-081(039)924

TYPE V, TYPE V,TYPE VIII SIGNAL STANDARDS



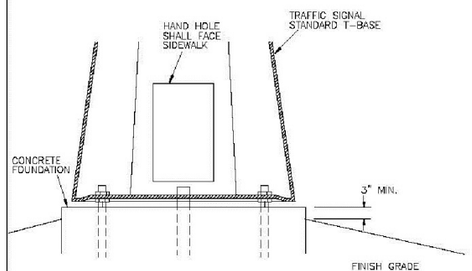
POLES:
ALL TYPE V AND TYPE VI SIGNAL STANDARDS SHALL BE MANUFACTURED BY MILLERBERND MANUFACTURING AND HAVE A T-BASE INSTALLED.

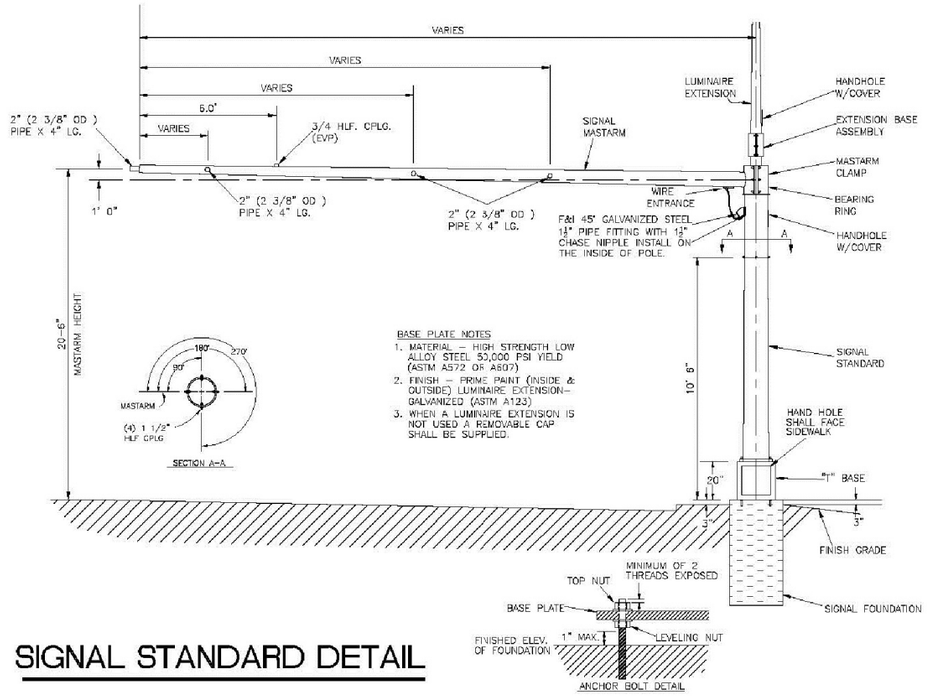


NOTE:
POLE MATERIAL-HIGH STRENGTH LOW ALLOY STEEL 50,000 PSI MIN. YIELD PER ASTM A572 OR A1011(A871 OR A606 IF SELF WEATHERING) BASE PLATE MATERIAL-36,000 PSI MIN. YEILD PER ASTM A36(A588 IF SELF WEATHERING) SHALL BE PAINTED USING THE MILLERBOND 12/ZRU PAINT SYSTEM WITH A TOP CLEAR COAT.

(4) 1-8NC x 3 ½" LG HVY HX HD BOLT, HVY HX NUT & LOCKWASHER (ASTM A325-GV) (INSTALL HD UP)

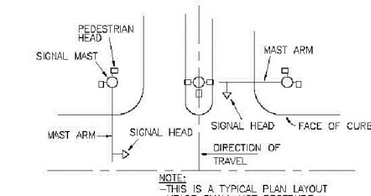
390C66 T-BASE
1" ANCHOR BOLTS ON 15" BC WITH 4" PROJ



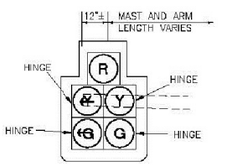


SIGNAL STANDARD DETAIL

SIGNAL MAST ARM HEAD MOUNTING

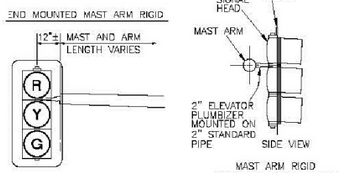


NOTE:
-THIS IS A TYPICAL PLAN LAYOUT
-HEADS SHALL NOT PROTRUDE OVER THE FACE OF THE CURB



NOTE:
5-SECTION CLUSTER HEAD ASTRO BRACKET SHALL BE MOUNTED TO THE MAST ARM AT THE CENTER OF THE YELLOW BALL HEAD.

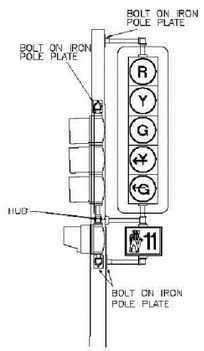
NOTE:
ALL HINGES SHALL BE ON OUTSIDE OF 5 SECTION CLUSTER



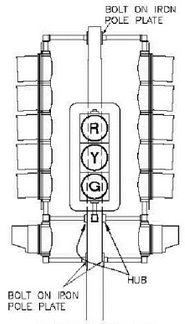
MAST ARM RIGID MOUNTED SIGNAL HEADS

NOTE:
TYPE V,TYPE VI, AND TYPE VIII SIGNAL STANDARDS THAT ARE 15' OR 17.5' IN HEIGHT SHALL USE A 24" CONCRETE SIGNAL FOUNDATION THAT IS 6' IN DEPTH.

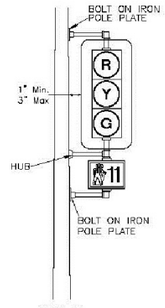
ALL VEHICLE AND PEDESTRIAN MOUNTING HARDWARE SHALL BE STEEL.



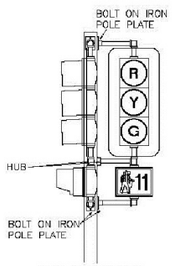
TYPE VI-17.5' HEIGHT
PEDESTAL MOUNTED-VEHICULAR
PEDESTAL MOUNTED-PEDESTRIAN



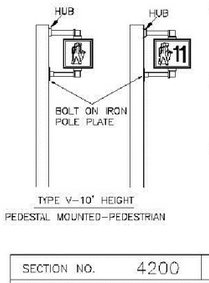
TYPE VIII-17.5' HEIGHT
PEDESTAL MOUNTED-VEHICULAR
PEDESTAL MOUNTED-PEDESTRIAN



TYPE IV
POST MOUNTED-VEHICULAR
POST MOUNTED-PEDESTRIAN



TYPE V-15' HEIGHT
PEDESTAL MOUNTED-VEHICULAR AND PEDESTRIAN HEADS



TYPE V-10' HEIGHT
PEDESTAL MOUNTED-PEDESTRIAN

NOTES:

CLEARANCE
CLEARANCE FROM GROUND LINE OR SIDEWALK TO THE BOTTOM OF POST OF PEDESTAL MOUNTED VEHICULAR SIGNAL HEADS SHALL BE 10 FT. MINIMUM FROM PEDESTRIAN SIGNAL SHALL BE 8 FT. MINIMUM.

SIGNAL HEADS
SHALL BE BLACK(UNLESS NOTED OTHER IN PLANS), SEE TRAFFIC LAYOUT FOR CORRECT MOUNTING POSITION, NUMBER, SIZE, AND ARRANGEMENT OF LENSES.

POLE CLAMPS
A POLE PLATE WITH SUITABLE BANDING MATERIAL AS APPROVED BY ENGINEER SHALL BE USED.

PAINT
SIGNAL HOUSING SHALL BE PAINTED BLACK. SEE PLANS. BACK PLATES SHALL BE PAINTED FLAT BLACK. POLE CLAMPS AND SIGNAL HEAD MOUNTING HARDWARE SHALL BE PAINTED THE SAME COLOR AS THE SIGNAL STANDARD.

TRAFFIC SIGNAL HEAD MOUNTING

SECTION NO. 4200	DRAWING NO. 5.2
REV.D. 2016	

SIGNAL STANARDS & HEAD MOUNTING

CITY OF FARGO
ENGINEERING DEPARTMENT

APPROVED	DATE

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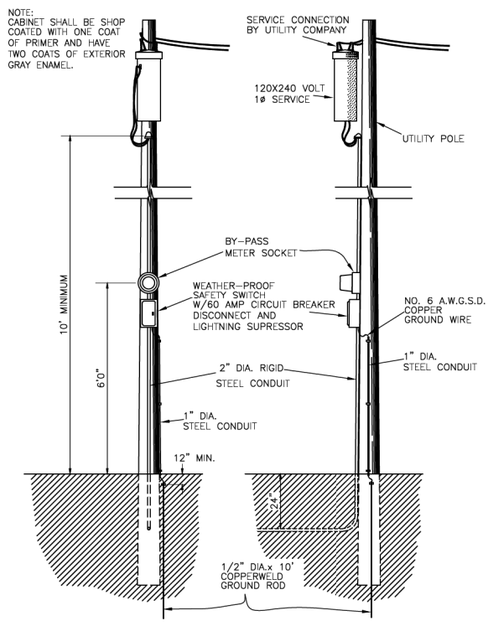
SIGNAL PLANS
SIGNAL STANDARDS & HEAD MOUNTING

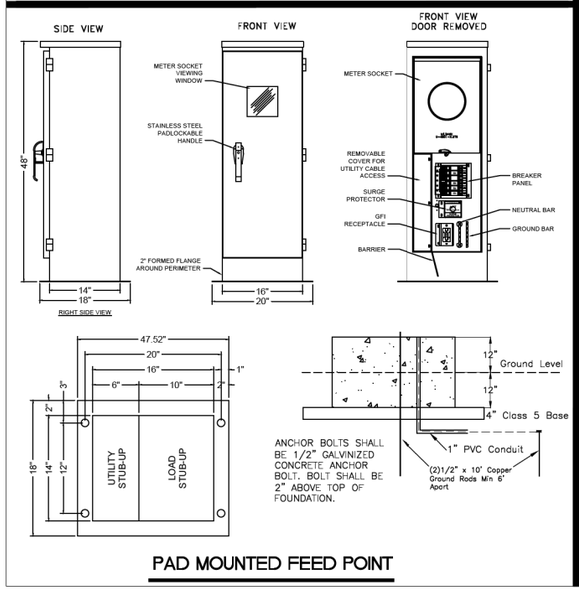
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	26

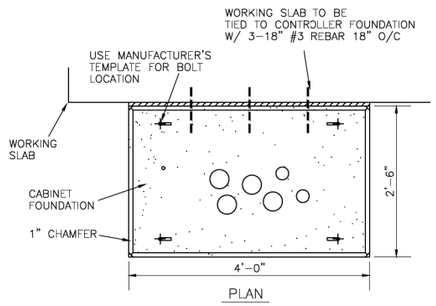
NHU-8-081(039)924

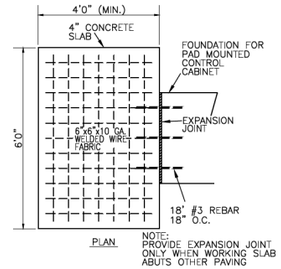


POLE MOUNTED FEED POINT

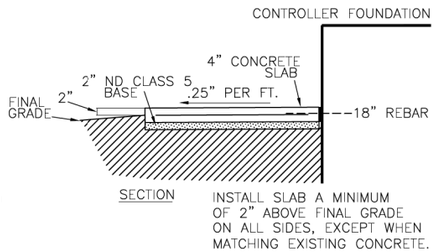


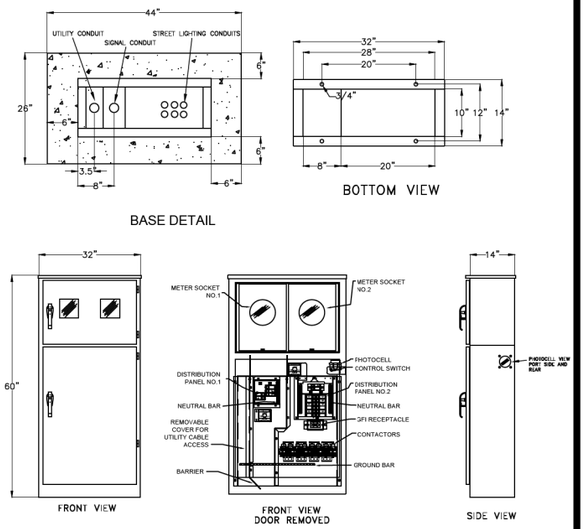
PAD MOUNTED FEED POINT



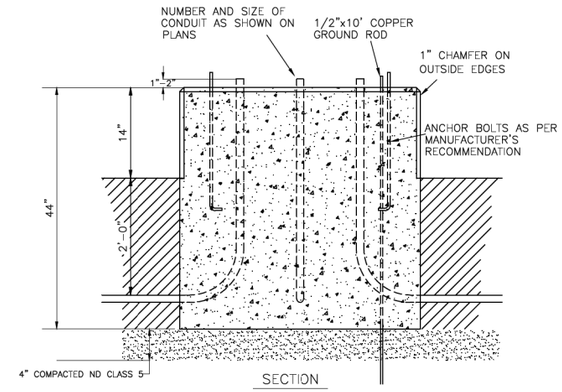


CONTROLLER WORKING SLAB





COMBO PAD MOUNTED FEED POINT



ANCHOR BOLTS MUST BE SET INTO CONTROLLER FOUNDATION WHEN POURED

CONTROLLER CABINET FOUNDATION PAD MOUNT

SECTION NO. 4200	DRAWING NO. 5.3
REV,D. 2016	
FEED POINT, PED. POST & CABINET FOUNDATION	
CITY OF FARGO ENGINEERING DEPARTMENT	
APPROVED	DATE

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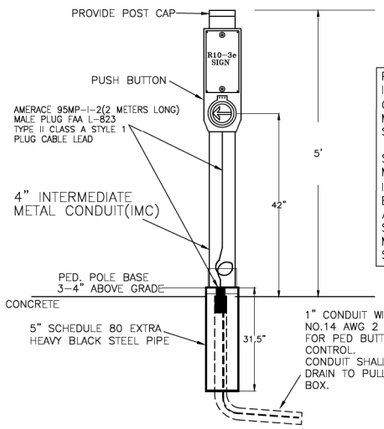
SIGNAL PLANS
FEED POINT, PED. POST & CABINET FOUNDATION

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	27

NHU-8-081(039)924

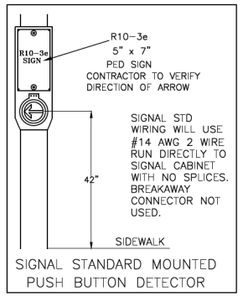
PEDESTRIAN PUSH BUTTON POST DETAILS



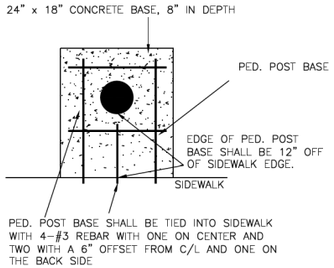
PED. POST PIPE

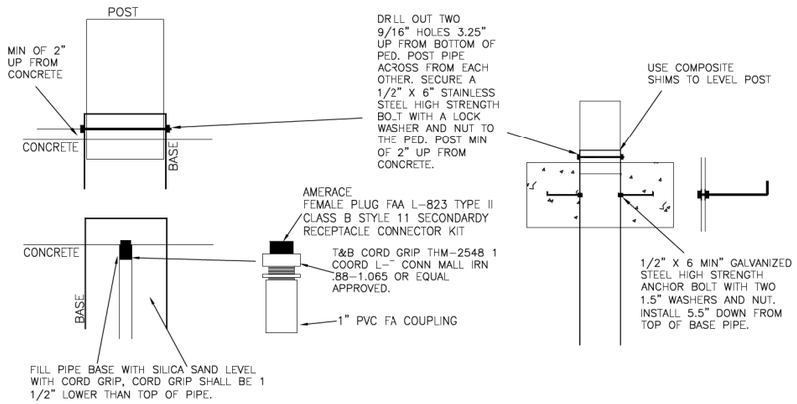
PED. POST SHALL BE INTERMEDIATE METAL CONDUIT(IMC). AVAILABLE AT MOST ELECTRICAL OR STEEL SUPPLIER IN FARGO.

STEEL PIPE IS AVAILABLE AT MCNEILUS STEEL INC. IN FARGO IN 21' LENGTHS PART NUMBER BX500. IT MAY ALSO BE AVAILABLE FROM ANY OTHER STEEL MANUFACTURER, BUT MUST MEET THE EXACT SAME SPECIFICATIONS.

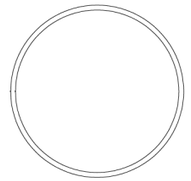


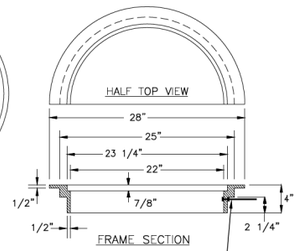
SIGNAL STANDARD MOUNTED PUSH BUTTON DETECTOR

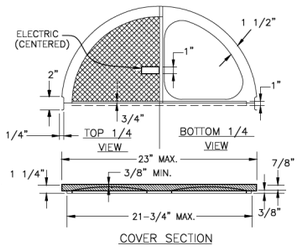




PULL BOX METAL FRAME AND COVER

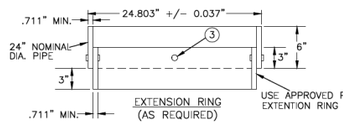


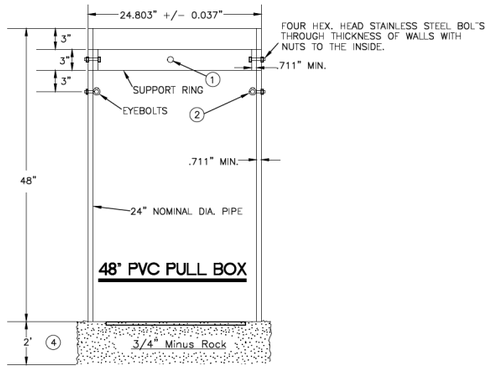


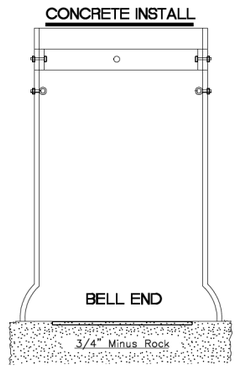


FRAME AND COVER CASTING

NOTE:
ALL CASTINGS ARE GRAY IRON AS PER SPEC. 3321 CLASS 35B







① ATTACH SPLIT 24" NOM. DIA. P.V.C. COVER SUPPORT RING WITH FOUR 3/8 " DIA. X 2" LONG STAINLESS STEEL HEX HEAD BOLTS WITH HEX NUTS AT 90° APART.

② TWO TYPE 2 SHOULDER EYEBOLTS, 3/8 " DIA. X 1 1/4 " SHANK LENGTH, WITH HEX. NUTS AT 180° APART (FOR LIFTING HANDHOLES AND SUPPORTING ELECTRICAL CABLES)

③ ATTACH SPLIT 24" NOM. DIA. P.V.C. COVER SUPPORT EXTENSION RING WITH FOUR 3/8 " DIA. X 2" LONG HEX. HEAD STAINLESS STEEL BOLTS WITH HEX. NUTS AT 90° APART. BOLT ASSEMBLY TOGETHER.

④ PLACE COMPACTED 2'-0" AGGRETGATE DRAIN BED BELOW BOTTOM OF HANDHOLE, TO THE SATISFACTION OF THE ENGINEER.

⑤ CONDUIT HOLES LOCATED IN THE BARREL SECTION ARE SIZED NO MORE THAN 1" LARGER THAN THE CONDUIT USED.

⑥ AFTER HANDHOLE AND CONDUIT INSTALLATION,

⑦ THE P.V.C. PIPE COMPLIES WITH ASTM F679T-1.

⑧ HEX. HEAD BOLTS AND NUTS ARE TO BE STAINLESS STEEL. OTHER FASTENERS TO BE GALVANIZED AS PER AASHTO M-232

⑨ ALL CONDUITS SHALL EXTEND A MAXIMUM OF 3" INTO PULL BOX.

SECTION NO. 4200	DRAWING NO. 5.6
REV.D. 2016	
PUSH BUTTON POST & PULLBOX DETAIL	
CITY OF FARGO ENGINEERING DEPARTMENT	
APPROVED	DATE

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SIGNAL PLANS
PUSHBUTTON POST & PULL BOX

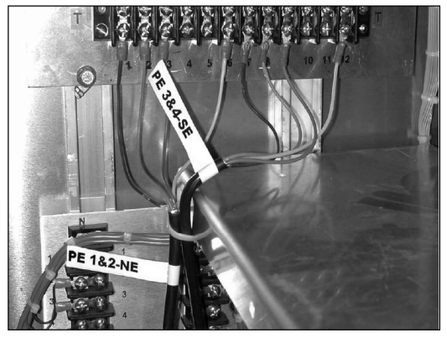
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

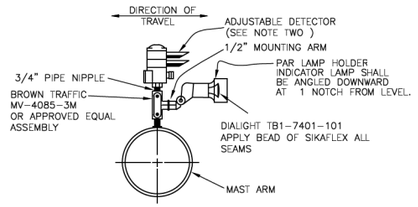
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	28

NHU-8-081(039)924

PRE-EMPTION CABLE TERMINATION

TERMINAL T1
PRE-EMPTION 1 AND 2-SHRINK WRAP GROUND WIRE
TERMINAL T2
PRE-EMPTION 1 AND 2-ORANGE WIRE-TOP TUBE
TERMINAL T3
PRE-EMPTION 1-TOP TUBE-BLUE WIRE
TERMINAL T6
PRE-EMPTION 2-BOTTOM TUBE-YELLOW WIRE
TERMINAL T7
PRE-EMPTION 3 AND 4-SHRINK WRAP GROUND WIRE
TERMINAL T8
PRE-EMPTION 3 AND 4-ORANGE WIRE-BOTTOM TUBE
TERMINAL T9
PRE-EMPTION 3-TOP TUBE-BLUE WIRE
TERMINAL T12
PRE-EMPTION 4-BOTTOM TUBE-YELLOW WIRE



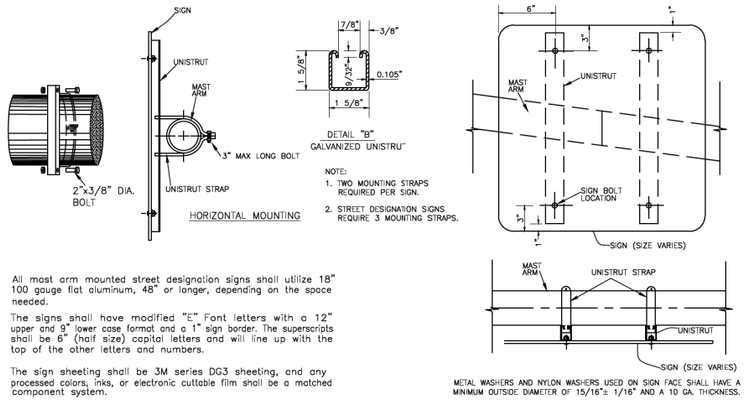


(ONE WAY DETECTION)

NOTES:
1. TWO WAY DETECTOR SHALL HAVE TYPE X UNILET WITH ONE PAR LAMP HOLDERS AND LAMP.
2. TWO-WAY DETECTOR SHALL HAVE THE DETECTOR LENS ROTATED TO FACE THE DIRECTIONS OF TRAVEL.

EMERGENCY VEHICLE DETECTOR DETAIL (ADJUSTABLE)

(LOCATION AS SHOWN IN PLANS)



All mast arm mounted street designation signs shall utilize 18" 100 gauge flat aluminum, 48" or longer, depending on the space needed.

The signs shall have modified "E" Font letters with a 12" upper and 9" lower case format and a 1" sign border. The superscripts shall be 6" (half size) capital letters and will line up with the top of the other letters and numbers.

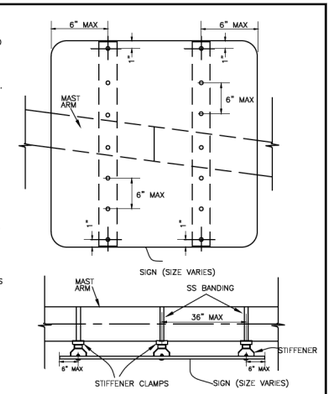
The sign sheeting shall be 3M series DG3 sheeting, and any processed colors, inks, or electronic cuttable film shall be a matched component system.

NOTE:
SIGNS MOUNTED ON THE SIGNAL STANDARD VERTICAL POST, EXCLUDING THE MAST ARMS SHALL BE INSTALLED BY DRILLING, TAPPING AND DIE THE POLE AND INSTALLING SIGNS WITH A 3/8" x 1" STAINLESS STEEL HEX BOLT USING A 3/8" STAINLESS STEEL FLAT WASHER AND A NYLON WASHER.

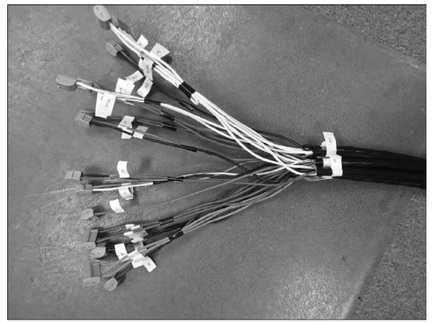
MAST ARM MOUNTED SIGN DETAIL

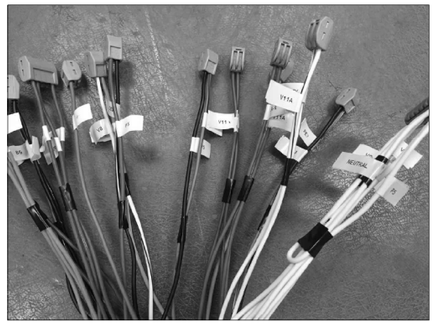
INSTALLATION NOTES:

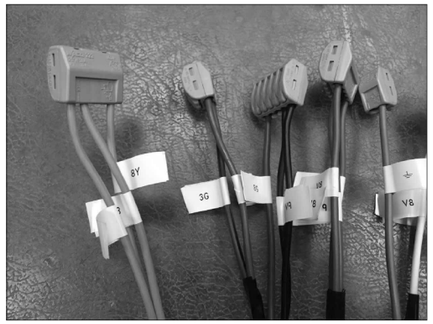
1. SIGNS SHALL BE AFFIXED TO UPPER AND LOWER MAST ARM CHORDS WHENEVER POSSIBLE.
2. POSITION BOTTOM OF SIGN PANEL 17' MINIMUM ABOVE ROAD CENTERLINE ELEVATION.
3. SIGN PANELS SHALL BE MOUNTED PLUMB.
4. HORIZONTAL INSET FROM PANEL EDGE TO STIFFENER SHALL NOT EXCEED 6"
5. HORIZONTAL SPACING BETWEEN STIFFENERS SHALL NOT EXCEED 36".
6. VERTICAL INSET FROM PANEL EDGE TO STIFFENER SHALL BE 0" TO 0.5".
7. RIVETS ATTACHING STIFFENERS TO SIGN PANELS SHALL BE INSTALLED 1" TO CENTER FROM THE TOP AND BOTTOM OF THE PANEL, AND THEN SPACED NO MORE THAN 6" ON CENTER.
8. BANDING SHALL BE ¾"X 0.03" 316 STAINLESS STEEL. BANDING BUCKLES SHALL BE ¾" STAINLESS STEEL. (2) BANDING STRAPS PER MOUNTING BUCKLE, SECOND STRIP NEEDED TO BE INSTALLED DIRECTLY OVER FIRST, TIGHTEN TO MANUFACTURES SPECS.

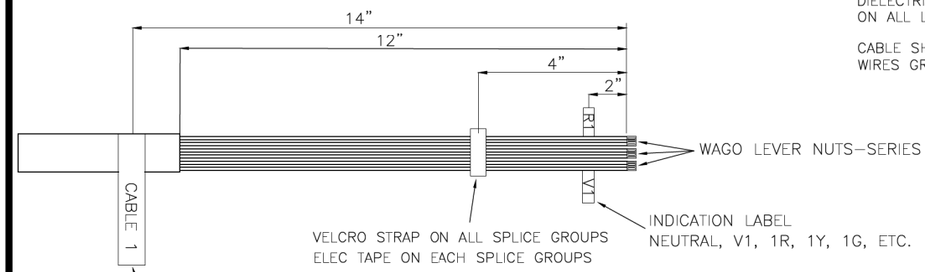


DETAIL "B"
STIFFENER AND BANDING









T- BASE SPLICING DETAIL

NOTE:
DIELECTRIC GREASE SHALL BE INSTALLED IN ALL OPENINGS ON ALL LEVER NUTS BEFORE WIRES ARE INSALLED

CABLE SHALL BE SPLICED IN A NEATLY MANNER, SO NO WIRES GROUPS/PAHSE ARE INTERTWINED WITH EACH OTHER.

SECTION NO. 4200	DRAWING NO. 5.5
REV.D. 2016	

EVP SYSTEM, SIGNING & SPLICING DETAIL

CITY OF FARGO
ENGINEERING DEPARTMENT

APPROVED	DATE

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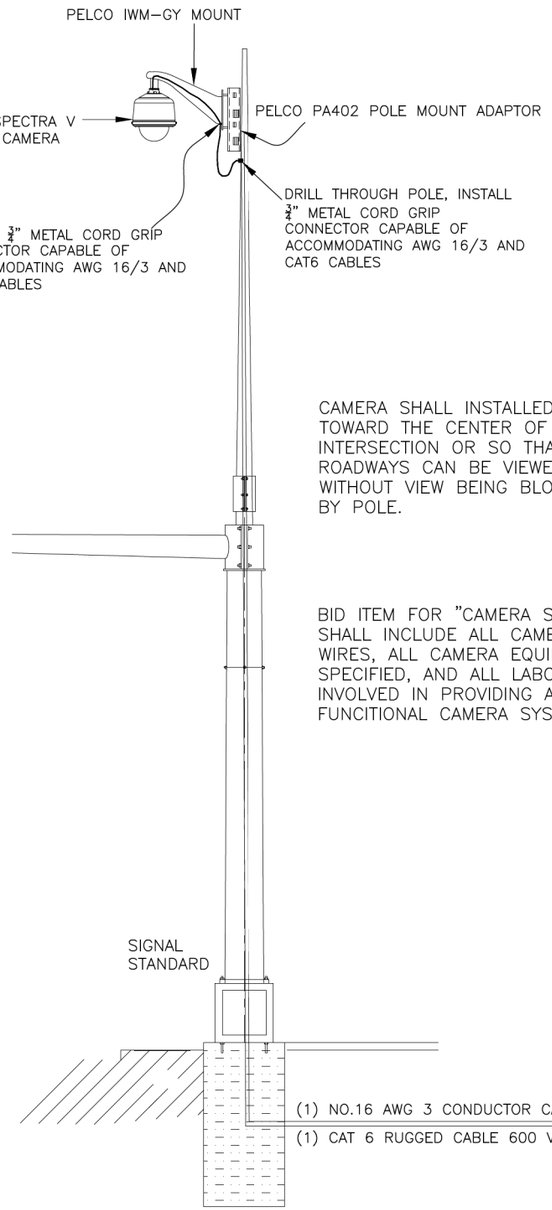
SIGNAL PLANS
EVP SYSTEM, SIGNING & SPLICING

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	29

NHU-8-081(039)924



CAMERA SHALL INSTALLED TOWARD THE CENTER OF THE INTERSECTION OR SO THAT ALL ROADWAYS CAN BE VIEWED WITHOUT VIEW BEING BLOCKED BY POLE.

BID ITEM FOR "CAMERA SYSTEM" SHALL INCLUDE ALL CAMERA WIRES, ALL CAMERA EQUIPMENT SPECIFIED, AND ALL LABOR INVOLVED IN PROVIDING A FULLY FUNCITIONAL CAMERA SYSTEM.

CONTRACTOR SUPPLIED EQUIPMENT:
–ETHERNET SWITCH AS SPECIFIED ON PLAN
–CAT 6 RUGGED CABLE 600 V RATED
–NO.16 AWG 3 POWER CABLE
–PELCO IWM–GY MOUNT
–24 VAC POWER SUPPLY
–PA402 POLE MOUNT
–PELCO S6230–EG1 SPECTRA V HD NETWORK COLOR–B/W DOME WITH 30X OPTICAL ZOOM AND IMAGE STABILIZATION

CAMERA SYSTEM

SECTION NO. 4200	DRAWING NO. 5.9
REV,D. 2016	
TRAFFIC CAMERA DETAIL	
CITY OF FARGO ENGINEERING DEPARTMENT	
APPROVED	DATE

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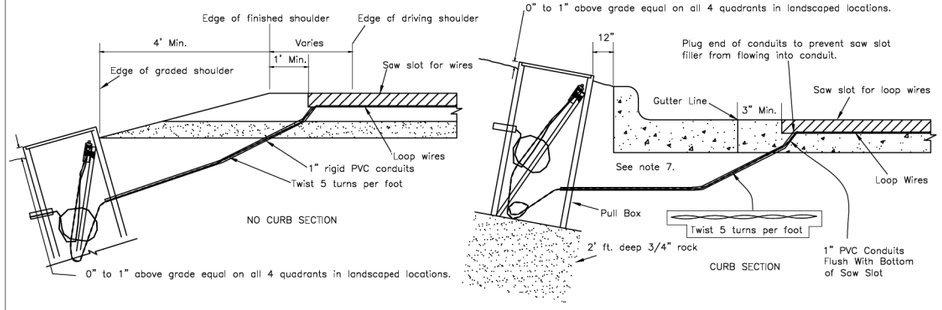
SIGNAL PLANS
TRAFFIC CAMERA

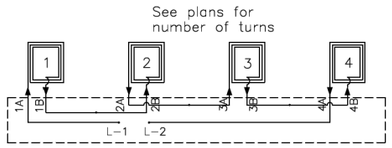
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	150	30

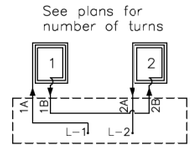
NHU-8-081(039)924

EXISTING PAVEMENT SAW SLOT TO PULL BOX DETAILS





MULTIPLE LOOP CONNECTION
All conductors shall be labeled in the pull box as shown (1A,1B,2A, etc.) The loop connections shall be spliced in the pull box: 1A to L1, 1B to 2B, 2A to 3A, 3B to 4B, and 4A to L2.



MULTIPLE LOOP CONNECTION
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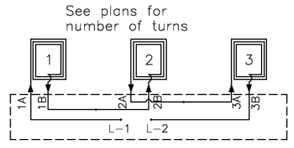
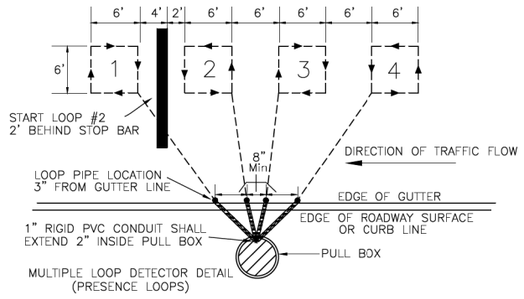


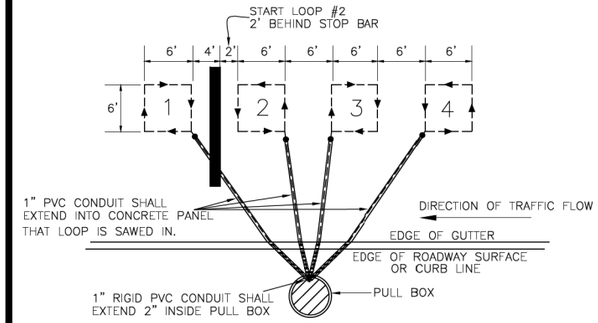
MULTIPLE LOOP CONNECTION
All conductors shall be labeled in the pull box as shown (1A,1B,2A, etc.) The loop connections shall be spliced in the pull box: 1A to L1, 1B to 2B, 2A to 3A, and 3B to L2.



NOTES

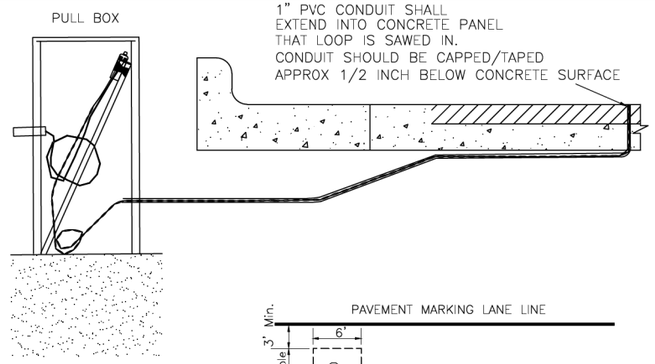
1) Loop saw cut shall be 2" deep in concrete and 2 1/2" to 4" deep in asphalt, saw depth in asphalt shall be determined by the engineer in the field, depending on road conditions.
2) All contraction joints and cracks crossed by saw slot must use a 1 1/4" wide saw slot. See note 1) for depth. See contraction joint detail. Contraction joint saw slot cut shall be cut in a single pass using stacked blades.
3) Duct type wire shall be used for all loops consisting of a High Density XLPE polyethylene tube and XHHW insulated wire. Provide slack at all drilled corners and contraction and crack joints. Use 1" long pieces of 3/4" backer rod at required intervals, 2' max, in saw cut to prevent wire from floating.
4) Provide 3 turns in all loops.
5) Spacing of lead-in conduits shall be a minimum of 8" at the edge of road way surface or gutter line(on existing pavement). See multiple loop detector detail. Lead-in loop pipe shall not enter gutter section.
6) Provide loop wire slack in J-box such that loop wire will extend a minimum of 6-feet above the top of the J-box.
7) Splices and Conductors in Pull Boxes: There shall be no splices below grade except for loop lead-in conductors. Wire nut together the spliced wires and encapsulate in an UraSeal CK200 epoxy splice kit. Conductors in the splice kit shall not be taped together. Loop lead-in and loop wires shall have sufficient slack to extend a minimum of 6 feet above the pull box opening and be installed in the pull box with the splice kit taped to a length of 1/2 PVC so the splice is secured inside the upper 1/4 of pull box (See Detail). Pull through. Conductors shall have sufficient slack to extend a minimum of 18-inches above the pull box opening.
8) Pull boxes in landscaped areas shall have the top of the box 0 to 1 inches above final grade and sloped to match the slope of the final grade on all four sides. Pull boxes in concrete areas shall be set with the top of the box flush with the final grade at all four sides. See pull box detail.

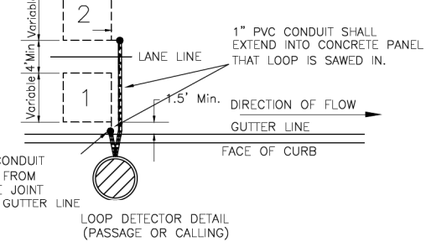
NEW PAVEMENT LOOP PIPE TO PULL BOX DETAILS

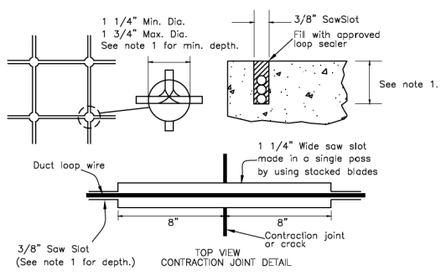


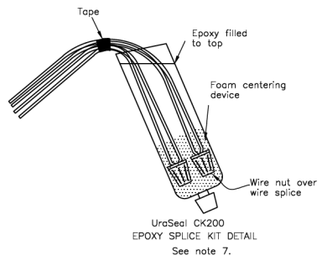
WIRE SHALL BE INSTALLED IN A CLOCKWISE/COUNTER CLOCKWISE ROTATION ON ALL LOOPS AS PER DETAIL.

BOTH ENDS OF THE LOOP SHALL BE LABELED AS PER LOOP DETAIL.









SECTION NO. 4200	DRAWING NO. 5.4
REV,D. 2016	
DETECTOR LOOPS DETAILS	
CITY OF FARGO ENGINEERING DEPARTMENT	
APPROVED	DATE

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SIGNAL PLANS
DETECTOR LOOPS

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	160	1

NHU-8-081(039)924

0 80' 160'

REMOVE IT-PULL BOX

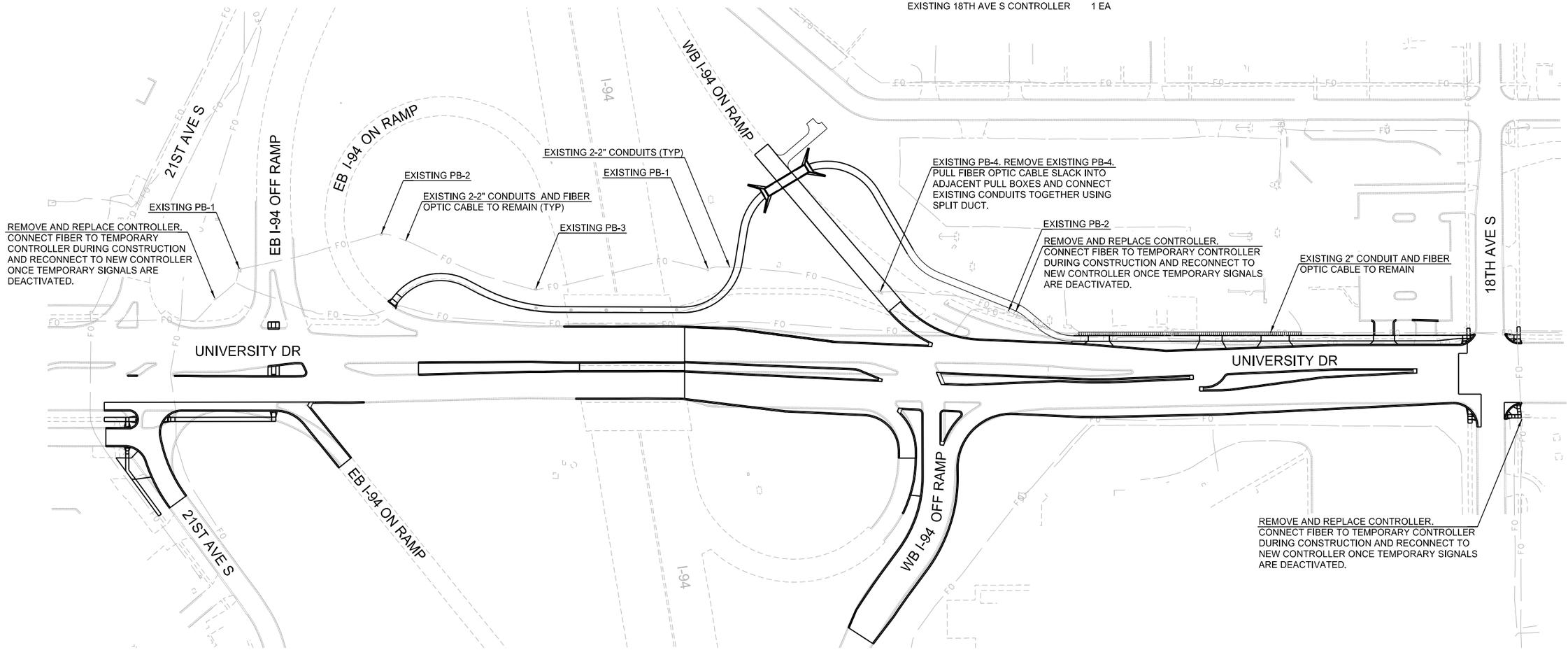
PB-4	1 EA

IT - 2" SPLIT DUCT

PB-4	20 LF

REVISE CONTROLLER

EXISTING SOUTH CONTROLLER	1 EA
EXISTING NORTH CONTROLLER	1 EA
EXISTING 18TH AVE S CONTROLLER	1 EA



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NOTES:
1. CONTRACTOR SHALL COORDINATE WITH NDDOT AND CITY OF FARGO TRAFFIC FOR INTERCONNECT ADJUSTMENTS.

SIGNAL INTERCONNECT PLANS
IT CONDUIT LAYOUT

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	160	2

NHU-8-081(039)924

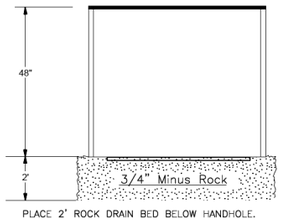
FIBER OPTIC BUFFER TUBE COLOR CODE
MULTIMODE FIBERS 1–24/SINGLE MODE FIBERS 25–120

1. BLUE
2. ORANGE
3. GREEN
4. BROWN
5. SLATE
6. WHITE
7. RED
8. BLACK
9. YELLOW
10. VIOLET
11. ROSE
12. AQUA

INSTALL FAN OUT KIT ON ALL TERMINATED OR FIBER STRANDS WHEN TERMINATING THE FIBER OPTIC CABLE

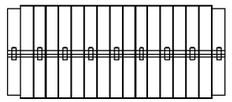
FIBER OPTIC CABLE:
TUBE 1 = BLUE TUBE 1–12 MM FIBERS
TUBE 2 = ORANGE TUBE 13–24 MM FIBERS
TUBE 3 = GREEN TUBE 25–36 SM FIBERS
TUBE 4 = BROWN TUBE 37–48 SM FIBERS
TUBE 5 = SLATE TUBE 49–60 SM FIBERS
TUBE 6 = WHITE TUBE 61–72 SM FIBERS
TUBE 7 = RED TUBE 73–84 SM FIBERS
TUBE 8 = BLACK TUBE 85–96 SM FIBERS
TUBE 9 = YELLOW TUBE 97–108 SM FIBERS
TUBE 10 = VIOLET TUBE 109–120 SM FIBERS

QUAZITE PULL BOX
30" x 48" x 48"



PLACE 2" ROCK DRAIN BED BELOW HANDHOLE.

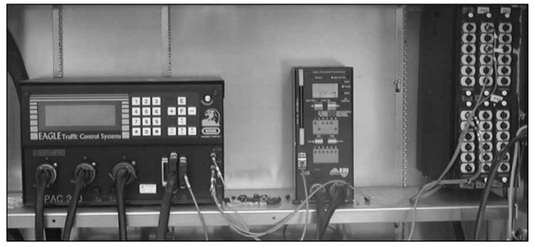
TYCO ENCLOSURE



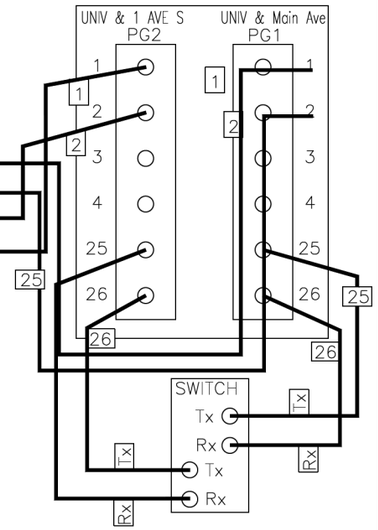
FIBER OPTIC ENCLOSURE SHALL BE A TYCO CLOSURE. FIBER OPTIC CABLES SHALL BE INSTALLED IN THE TYCO AS PER MANUFACTURE'S INSTRUCTIONS AND RECOMMENDATIONS. SEE COMMUNICATION CABLE SPECIFICATION NOTES FOR FURTHER INSTRUCTIONS.

EAGLE EPAC CONTROLLER

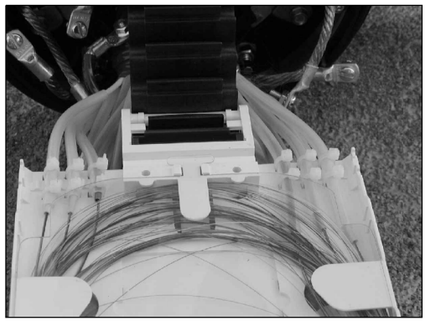
Rx
Tx
Rx
Tx



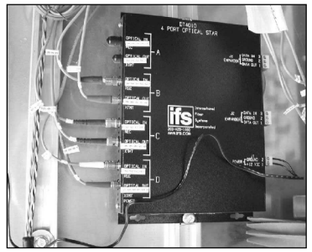
FIBER DISTRIBUTION PANEL



INSTALL PROTECTIVE TUBE SLEEVE AND TIE WRAP EACH TUBE TO SPLICE CASE.



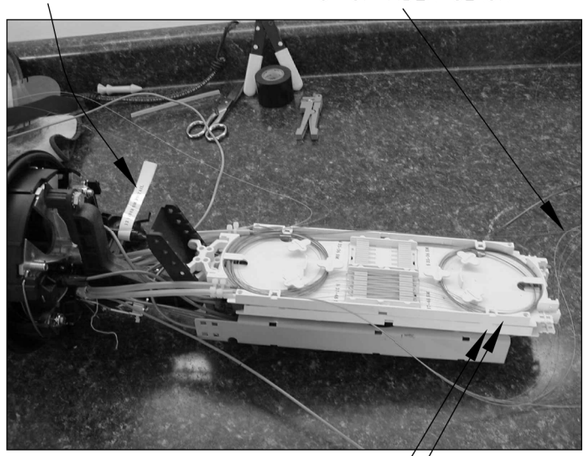
FIBER OPTIC STAR MODEM



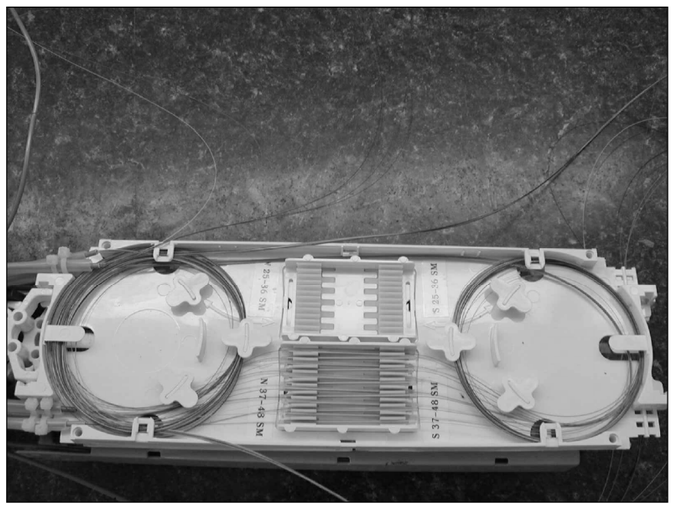
LABEL STAR MODEM 1–8.

LABEL FIBER

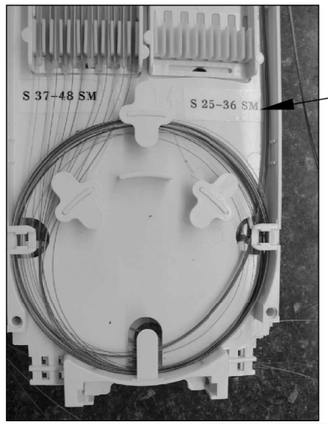
3' OF FIBER SLACK



SEPARATE SPLICE TRAY FOR EVERY 2 TUBES OF FIBER INCLUDING NON–SPLICED FIBER TUBES



HEAT TUBE FUSION SPLICE HOLDERS SHALL BE MANUFACTURED BY TYCO ELECTRONICS PART # SMOUV–1120–01–US.



FIBER SHALL BE NEATLY INSTALLED IN SPLICE CASE AND LABELED.

ALL FIBER CABLES SHALL BE LABELED INSIDE AND OUTSIDE THE TYCO CASE AND SHALL BE COLOR CODE AS FOLLOWS:
NORTH=ORANGE
EAST=GREEN
SOUTH=BROWN
WEST=SLATE

SECTION NO. 4200	DRAWING NO. 5.10
REV,D. 2016	
FIBER OPTIC DETAIL	
CITY OF FARGO ENGINEERING DEPARTMENT	
APPROVED	DATE

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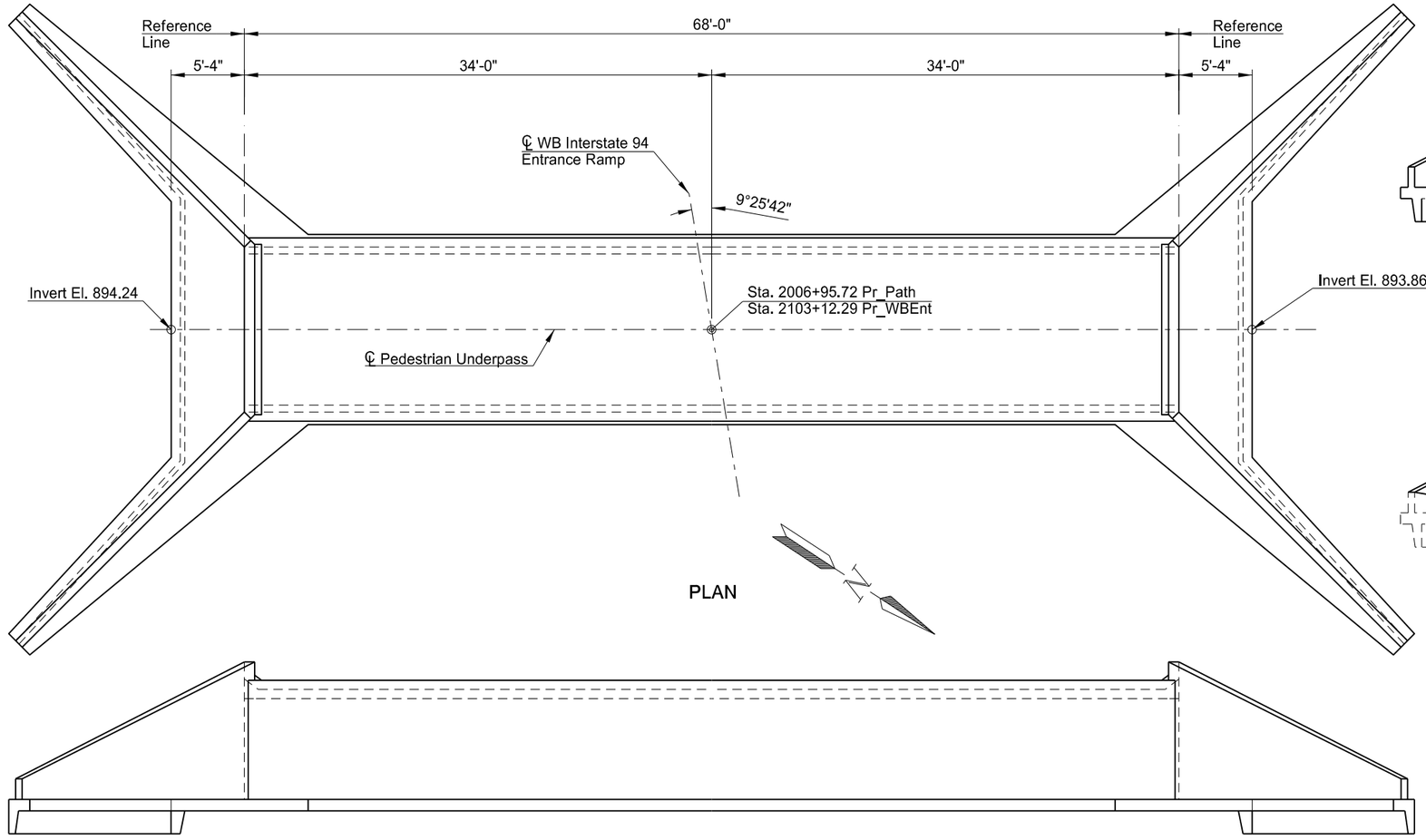
SIGNAL INTERCONNECT PLANS
FIBER OPTIC

BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

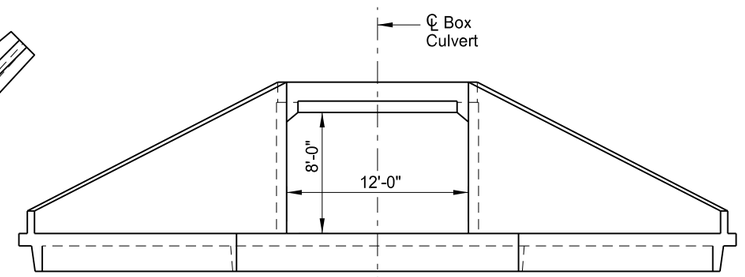
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	170	1

NHU-8-081(039)924

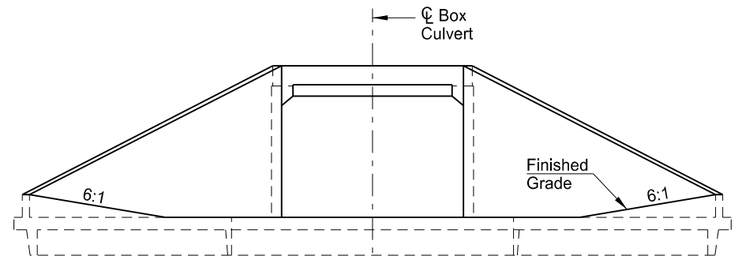


PLAN

ELEVATION



(SHOWING DIMENSIONS)
END VIEW



(SHOWING FINISHED SECTION)
END VIEW

DESIGN STRENGTHS:

f'c = 3,000 psi ~ Class AE-3 Concrete
fy = 60,000 psi ~ Reinforcing Steel

Load & Resistance Factor Design

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BOX CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	1,415
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
602	1131	CLASS AE-3 CONCRETE-BOX CULVERT	CY	114.3
612	0114	REINFORCING STEEL-GRADE 60-BOX CULVERT	LBS	21,129
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	161

HL-93 DESIGN LOADING

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVS S

REINFORCED CONCRETE
SINGLE BOX CULVERT LAYOUT

CLEAR SPAN 12' CLEAR HEIGHT 8'
MAXIMUM FILL 5'

PROJECT: IM-8-094(090)351
STATION: 2006+95.72
CASS COUNTY

8/28/17 (DATE) Jon Ketterling /s/ (BRIDGE ENGINEER)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	170	2

NOTES

100 SCOPE OF WORK: Work at this site consists of building a new single barrel 8’ x 12’ x 68’-0” reinforced concrete box culvert under the westbound I-94 entrance ramp.

210 ORDINARY BACKFILL: Compact material as specified in Section 203.04 E.2.a.

602 CONCRETE: Cast the following elements of each section in one continuous run:

1: Floor slab and wing footings
2: Each sidewall up to the bottom of fillets with its adjacent wings complete to the top
3: Roof slab and parapets

Allow the concrete in the walls to set at least two hours before the roof slab is poured.

612 REINFORCING STEEL: When the distance between end bars is not evenly divisible by bar spacing, adjust the odd distance by a few irregular spaces near the center, not at the ends of the culvert.

Place bolsters and bar supports for the roof steel at a maximum of 4-foot spacing.

Dimensions of bent bars are given out to out. All bends conform to A.C.I. Standards unless indicated otherwise.

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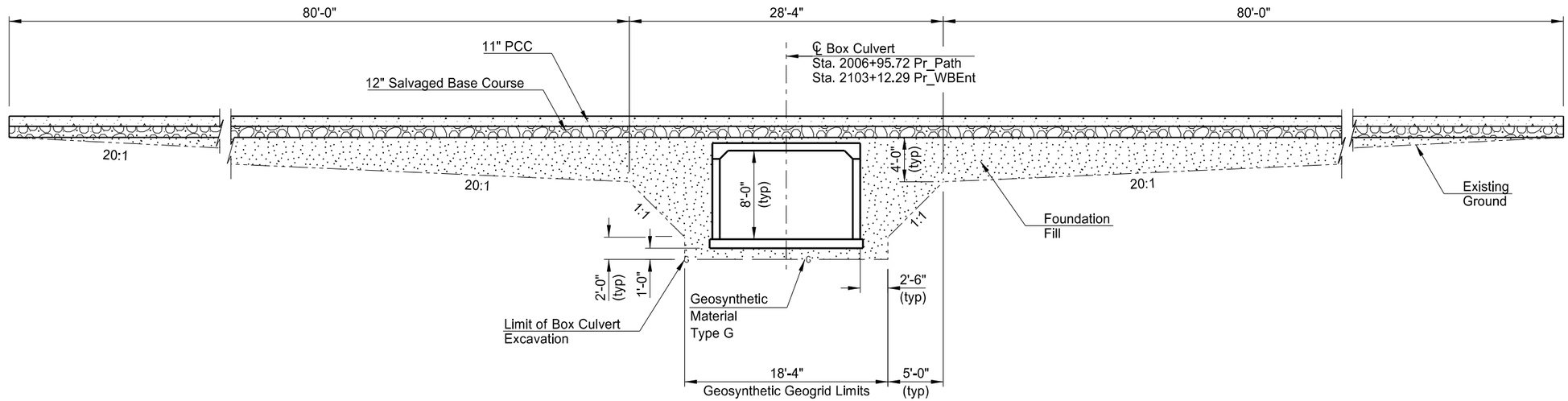
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	170	3

NHU-8-081(039)924



(SHOWING SECTION ALONG ℄ ROADWAY)

GEOSYNTHETIC GEOGRID PLACEMENT AND FOUNDATION FILL THROUGH EXISTING EMBANKMENT

NOTES:

Provide a 1'-0" minimum depth of foundation fill under the floor. Remove and replace all unsound material under the box with foundation fill. The Engineer will determine the depth required.

Extend the geosynthetic material and foundation fill to the end of the apron.

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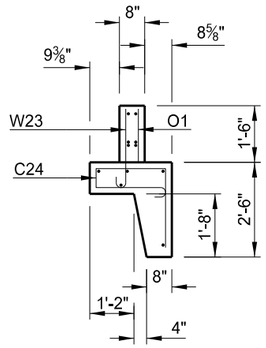
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

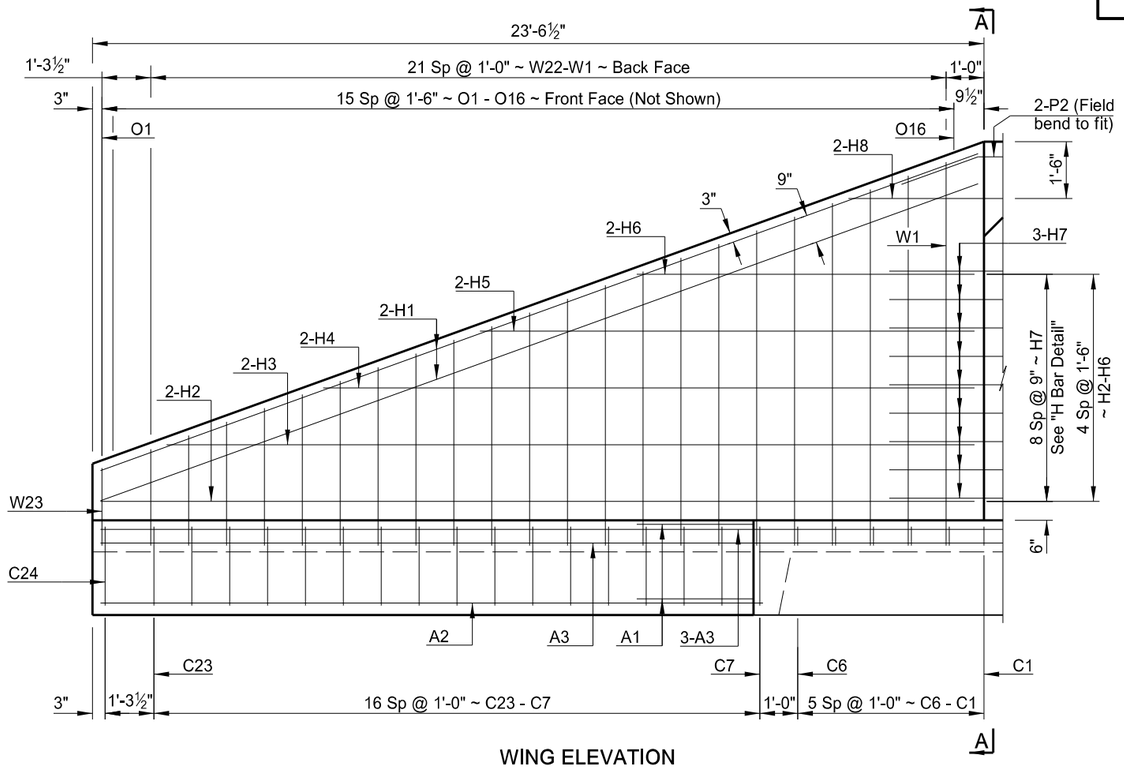
EXCAVATION & FOUNDATION FILL DETAILS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	170	4

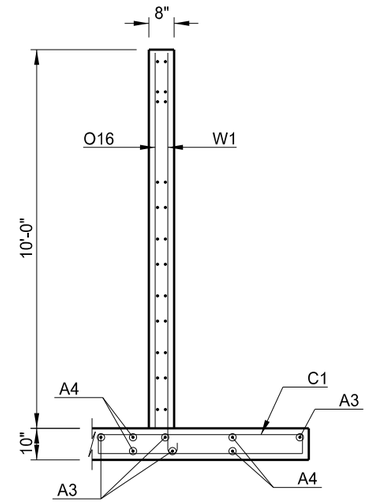
NHU-8-081(039)924



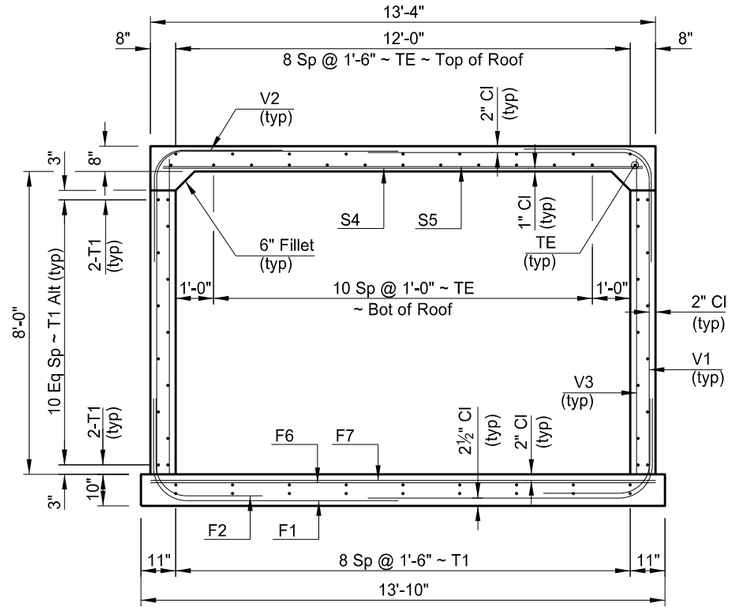
END VIEW



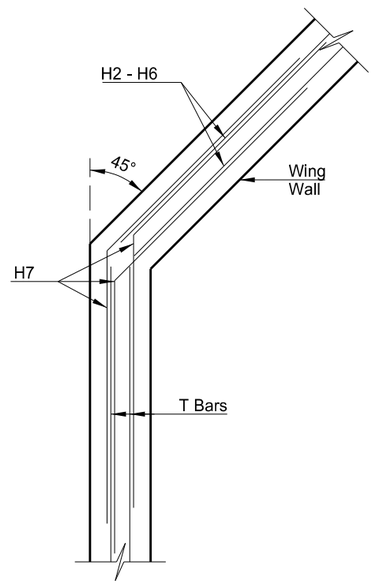
WING ELEVATION



A-A



SECTION OF BARREL



H BAR DETAIL

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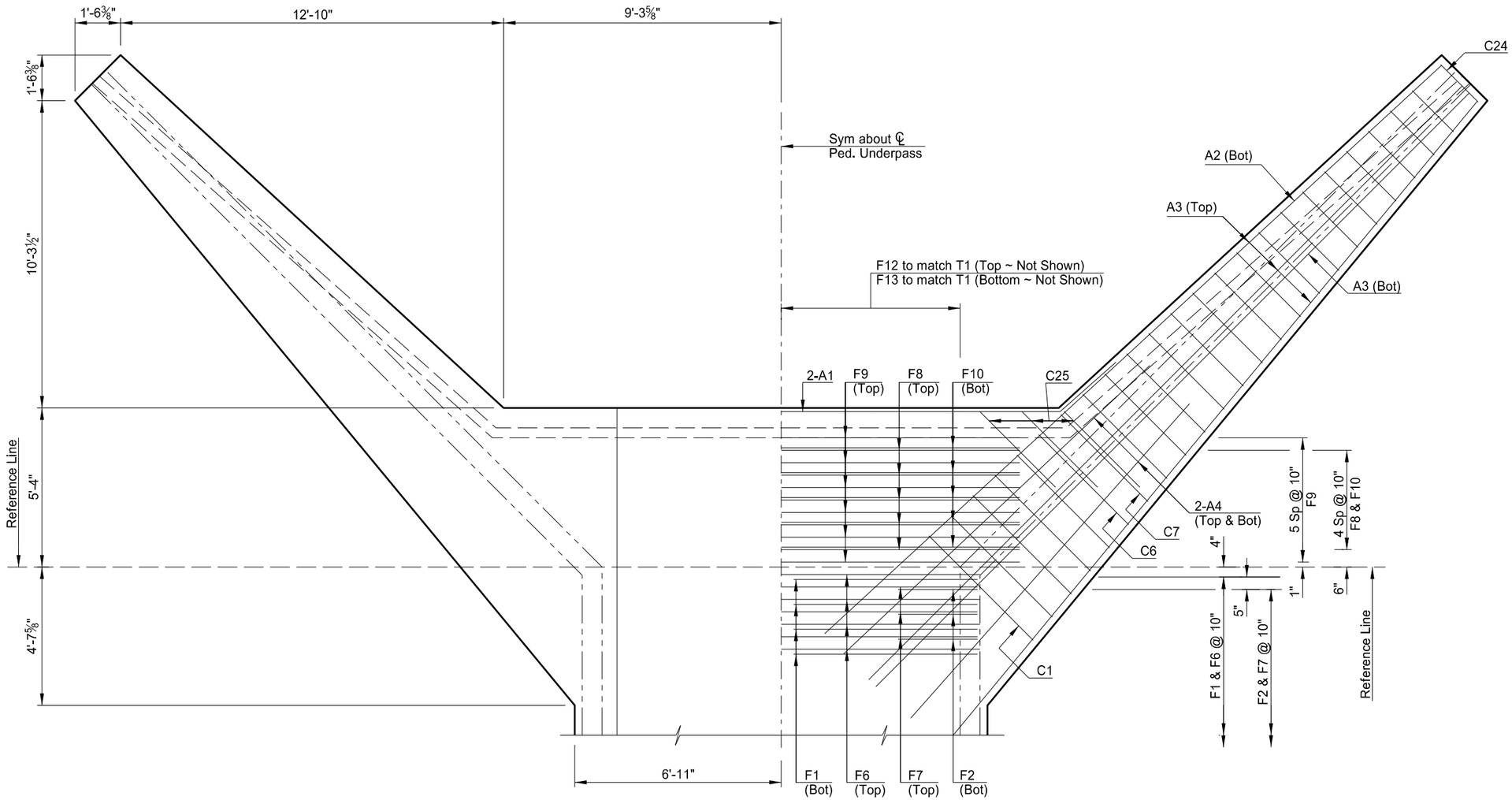
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

BARREL SECTION & WING WALL

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	170	5

NHU-8-081(039)924



(SHOWING DIMENSIONS) (SHOWING REINFORCING)

FLOOR PLAN

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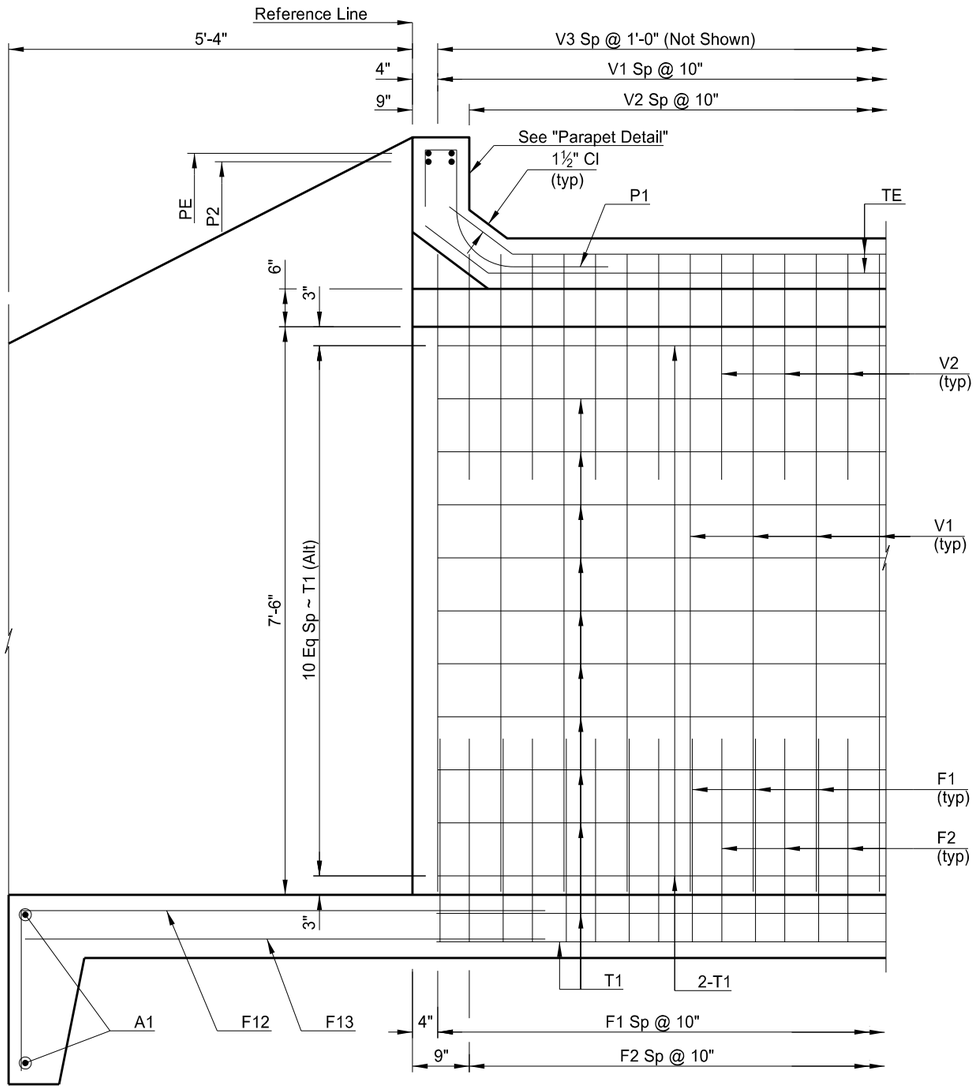
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

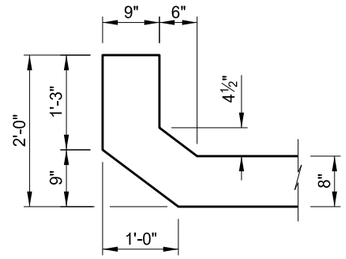
FLOOR DETAILS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	170	6

NHU-8-081(039)924



LONGITUDINAL SECTION



PARAPET DETAIL

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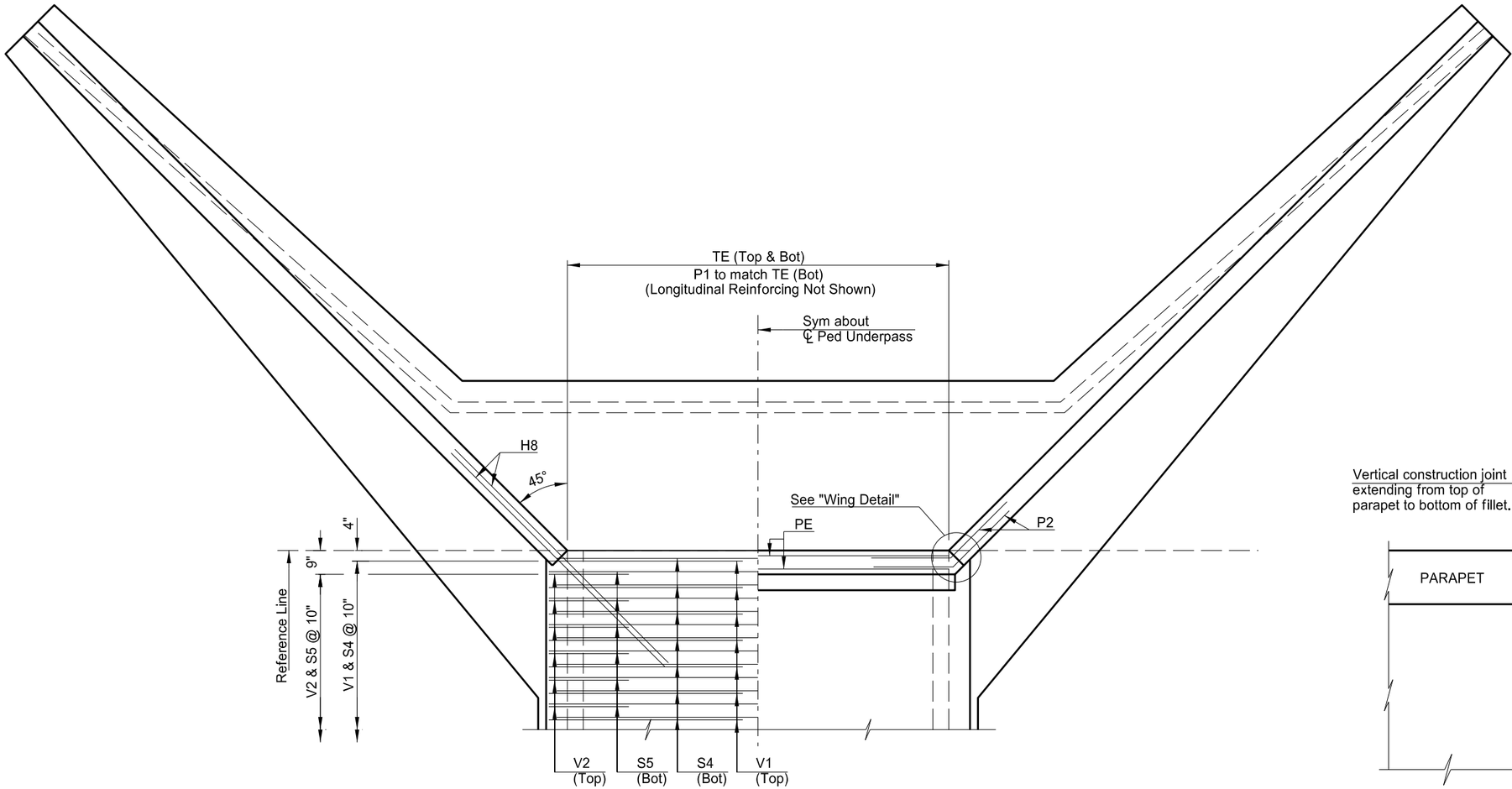
BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

WALL DETAILS &
PARAPET DETAIL

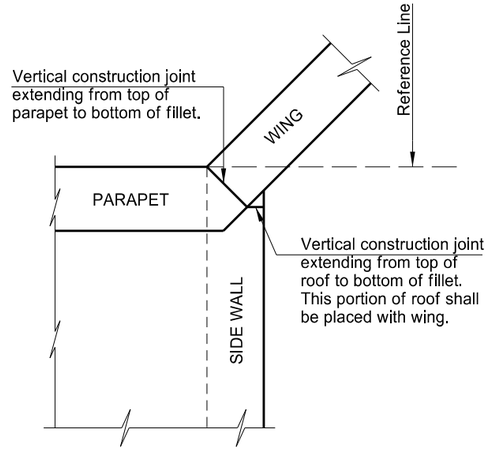
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-8-094(090)351	170	7

NHU-8-081(039)924



(SHOWING ROOF REINFORCING) (SHOWING PARAPET REINFORCING)

ROOF PLAN



WING DETAIL

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BUSINESS US 81 (UNIVERSITY DRIVE)
21ST AVE S TO 18TH AVE S

ROOF DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-8-094(090)351	170	8

NHU-8-081(039)924

BAR LIST (CONSTANT)				
MARK	SIZE	NO.	LENGTH	SHAPE
W1	7	4	10'-11"	BENT
W2	7	4	10'-6"	BENT
W3	6	4	10'-0"	BENT
W4	6	4	9'-8"	BENT
W5	6	4	9'-3"	BENT
W6	5	4	8'-10"	BENT
W7	5	4	8'-6"	BENT
W8	4	4	8'-0"	BENT
W9	4	4	7'-8"	BENT
W10	4	4	7'-4"	BENT
W11	4	4	6'-11"	BENT
W12	4	4	6'-7"	BENT
W13	4	4	6'-3"	BENT
W14	4	4	5'-10"	BENT
W15	4	4	5'-6"	BENT
W16	4	4	5'-2"	BENT
W17	4	4	4'-9"	BENT
W18	4	4	4'-4"	BENT
W19	4	4	4'-0"	BENT
W20	4	4	3'-8"	BENT
W21	4	4	3'-3"	BENT
W22	4	4	2'-11"	BENT
W23	4	4	2'-6"	BENT
C1	5	4	11'-6"	BENT
C2	5	4	11'-2"	BENT
C3	5	4	10'-10"	BENT
C4	5	4	10'-6"	BENT
C5	5	4	10'-4"	BENT
C6	5	4	10'-0"	BENT
C7	4	4	11'-4"	BENT
C8	4	4	11'-0"	BENT
C9	4	4	10'-8"	BENT
C10	4	4	10'-6"	BENT
C11	4	4	10'-2"	BENT
C12	4	4	9'-10"	BENT
C13	4	4	9'-8"	BENT
C14	4	4	9'-4"	BENT
C15	4	4	9'-0"	BENT
C16	4	4	8'-10"	BENT
C17	4	4	8'-6"	BENT
C18	4	4	8'-4"	BENT
C19	4	4	8'-0"	BENT
C20	4	4	7'-8"	BENT
C21	4	4	7'-6"	BENT
C22	4	4	7'-2"	BENT
C23	4	4	7'-0"	BENT
C24	4	4	6'-8"	BENT
C25	4	12	5'-8"	BENT
H1	7	16	24'-8"	STR.
H2	4	8	23'-1"	STR.
H3	4	8	21'-5"	STR.
H4	4	8	17'-3"	STR.
H5	4	8	13'-2"	STR.
H6	4	8	9'-0"	STR.
H7	4	108	6'-0"	BENT
H8	6	8	9'-6"	STR.
O 1-O16	4	4 SETS	87'-4"	STR.
A1	6	8	12'-10"	BENT
A2	6	4	17'-7"	STR.
A3	6	16	28'-5"	STR.
A4	6	16	14'-1"	STR.
P1	4	26	4'-7"	BENT
P2	6	8	5'-0"	BENT
PE	6	4	11'-8"	STR.

BAR LIST (CONSTANT)				
MARK	SIZE	NO.	LENGTH	SHAPE
F8	6	10	16'-0"	STR.
F9	6	12	16'-0"	STR.
F10	4	10	16'-0"	STR.
F12	4	18	8'-4"	BENT
F13	4	18	6'-7"	STR.
BAR LIST (VARIABLE)				
V1	4	164	15'-3"	BENT
V2	6	162	6'-0"	BENT
V3	4	138	8'-4"	STR.
F1	4	164	9'-3"	BENT
F2	5	162	5'-9"	BENT
F6	6	82	13'-4"	STR.
F7	6	81	13'-4"	STR.
S4	7	82	12'-8"	STR.
S5	5	81	12'-8"	STR.
T1	4	44	68'-10"	STR.
TE	4	22	70'-2"	BENT

NOTE:

Unless construction requirements dictate otherwise, the Contractor has the option to construct the box culvert using construction joints or as one continuous unit. If construction joints are used, the longitudinal bar lengths may be adjusted, but a minimum lap length of 1'-3" must be maintained.

CONCRETE QUANTITY FORMULAS			
ENTIRE FLOOR	"L" X 0.42695 + 21.33115	=	50.4 CY
TWO OUTSIDE WALLS & FOUR WINGS	"L" X 0.37037 + 13.36934	=	38.6 CY
ENTIRE ROOF	"L" X 0.36317 + 0.66826	=	25.4 CY
TOTAL	"L" X 1.16049 + 35.36874	=	114.3 CY

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QUANTITIES	
CLASS AE-3 CONCRETE	114.3 CY
REINFORCING STEEL	21,129 LBS

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REINFORCING BAR LIST

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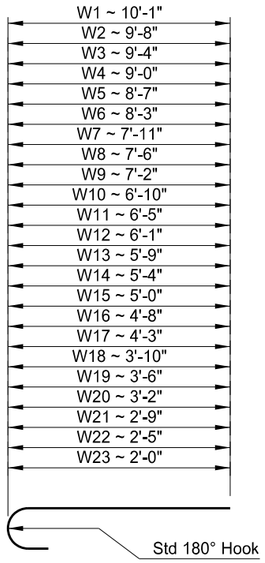
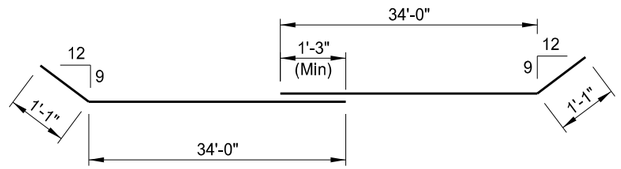
	ND	IM-8-094(090)351	170	9

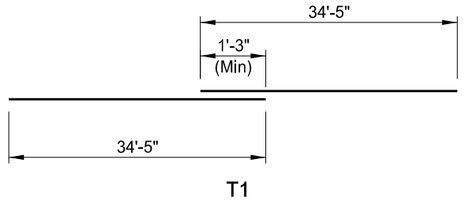
NHU-8-081(039)924



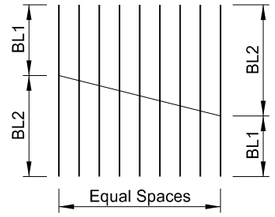
W1 - W23



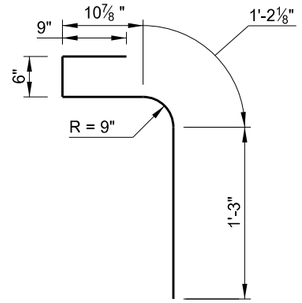
TE



T1



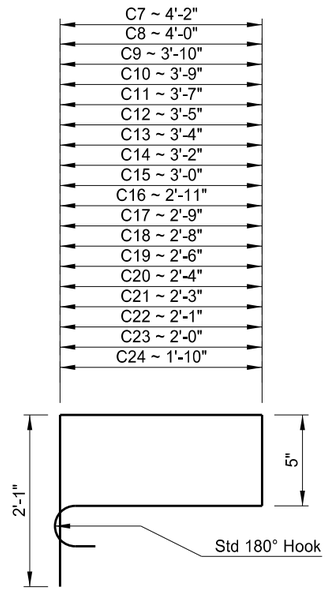
2 SETS SHOWN



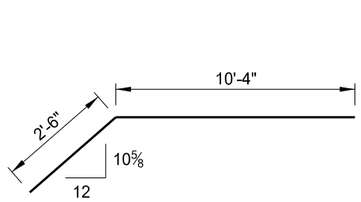
P1

MARK	LENGTH 1 SET	BL1	BL2	SPACES
O1-O16	87'-4"	1'-5"	9'-6"	15

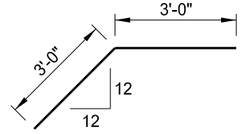
BAR CUTTING DETAILS



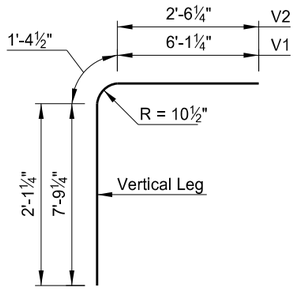
C7 - C24



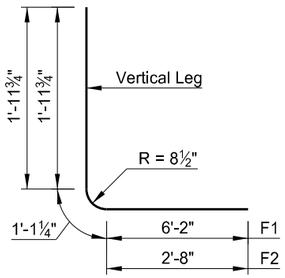
A1



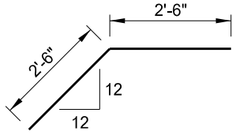
H7



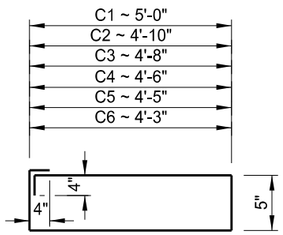
V1 & V2



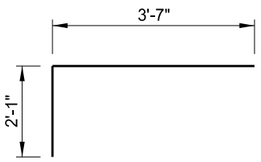
F1 & F2



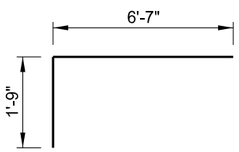
P2



C1 - C6



C25



F12

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BAR DETAILS