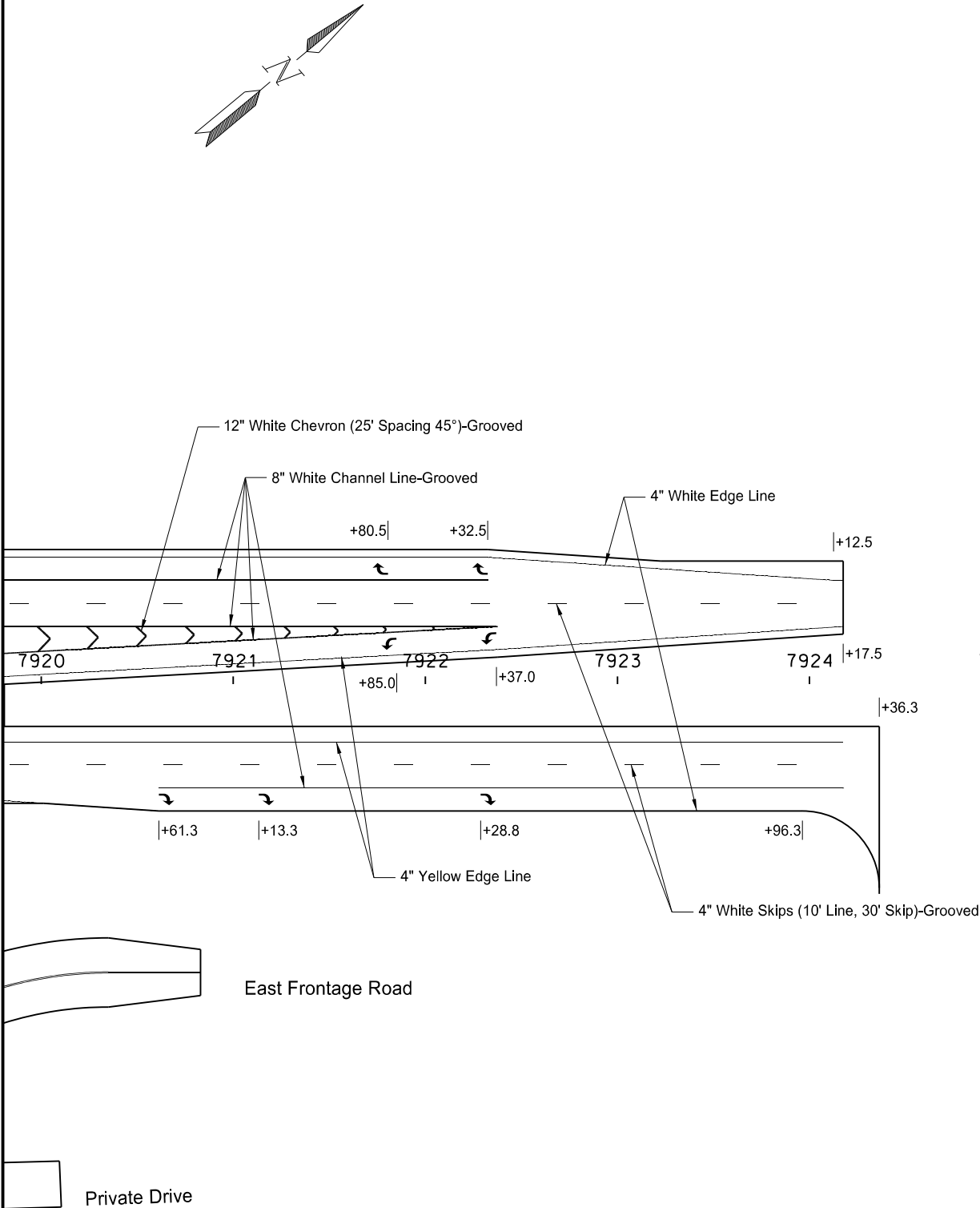


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	120	3

762	0110	Epoxy Pvmt Mk 4IN Line-Grooved		
		4" White Centerline Skip	20 Skips @ 10'/Skip =	200 LF
762	0113	Epoxy Pvmt Mk 4IN Line		
		4" White Edge Line		815 LF
		4" Yellow Edge Line		836 LF
		Total =		1651 LF
762	0122	Preformed Patterned Pvmt Mk-Message-Grooved		
		Arrow (RT)	16 SF x 5 EA =	80 SF
		Arrow (LT)	16 SF x 2 EA =	32 SF
		Total =		112 SF
762	0132	Epoxy Pvmt Mk 8IN Line-Grooved		
		8" White Channel Line		1063 LF
762	0134	Epoxy Pvmt Mk 12IN Line-Grooved		
		12" White Chevron		90 LF

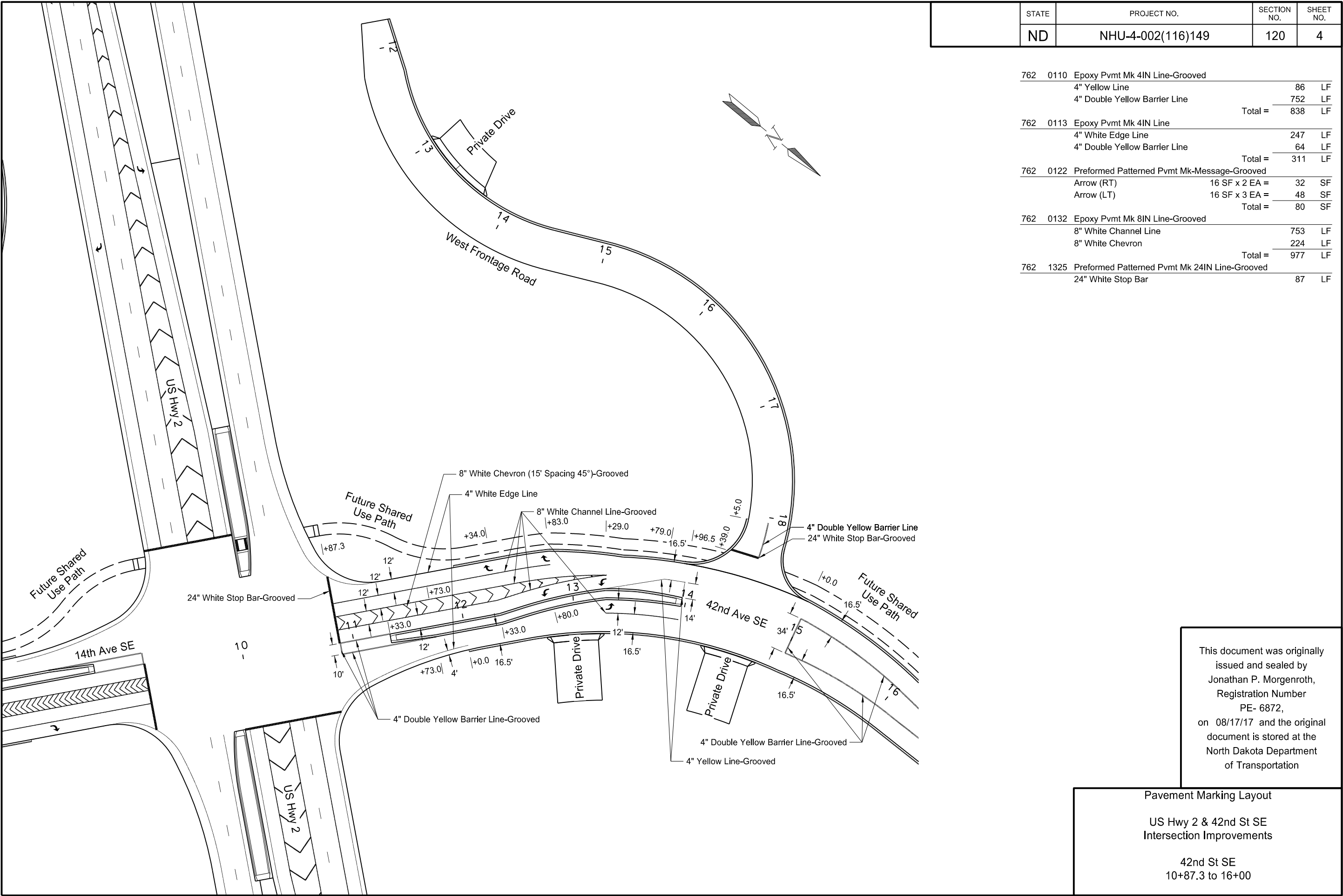


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Pavement Marking Layout

US Hwy 2 & 42nd St SE  
Intersection Improvements

US Hwy 2  
7920+00 to 7924+36.3



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-002(116)149	120	4

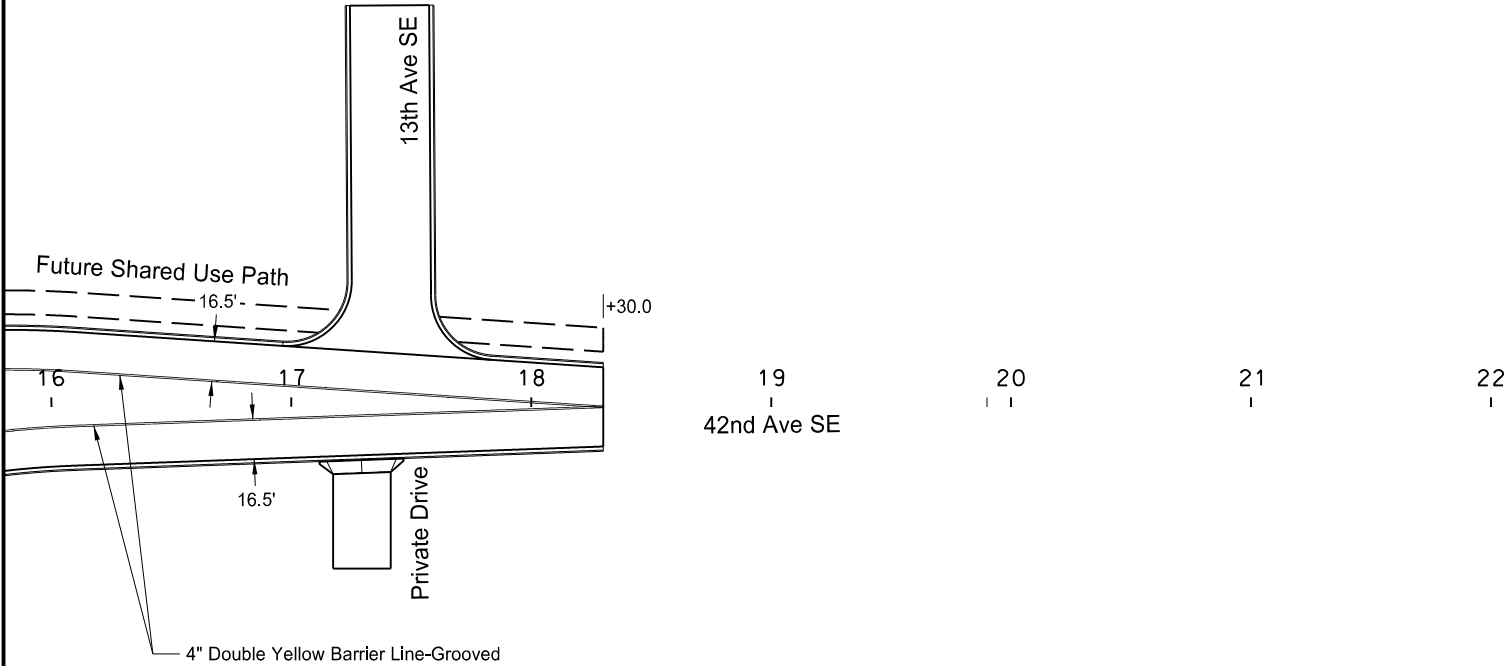
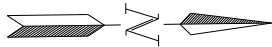
762	0110	Epoxy Pvmt Mk 4IN Line-Grooved		
		4" Yellow Line	86	LF
		4" Double Yellow Barrier Line	752	LF
		Total =	838	LF
762	0113	Epoxy Pvmt Mk 4IN Line		
		4" White Edge Line	247	LF
		4" Double Yellow Barrier Line	64	LF
		Total =	311	LF
762	0122	Preformed Patterned Pvmt Mk-Message-Grooved		
		Arrow (RT)	16 SF x 2 EA = 32	SF
		Arrow (LT)	16 SF x 3 EA = 48	SF
		Total =	80	SF
762	0132	Epoxy Pvmt Mk 8IN Line-Grooved		
		8" White Channel Line	753	LF
		8" White Chevron	224	LF
		Total =	977	LF
762	1325	Preformed Patterned Pvmt Mk 24IN Line-Grooved		
		24" White Stop Bar	87	LF

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Pavement Marking Layout  
  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
42nd St SE  
10+87.3 to 16+00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	120	5

762	0110	Epoxy Pvmt Mk 4IN Line-Grooved	
		4" Double Yellow Barrier Line	922 LF

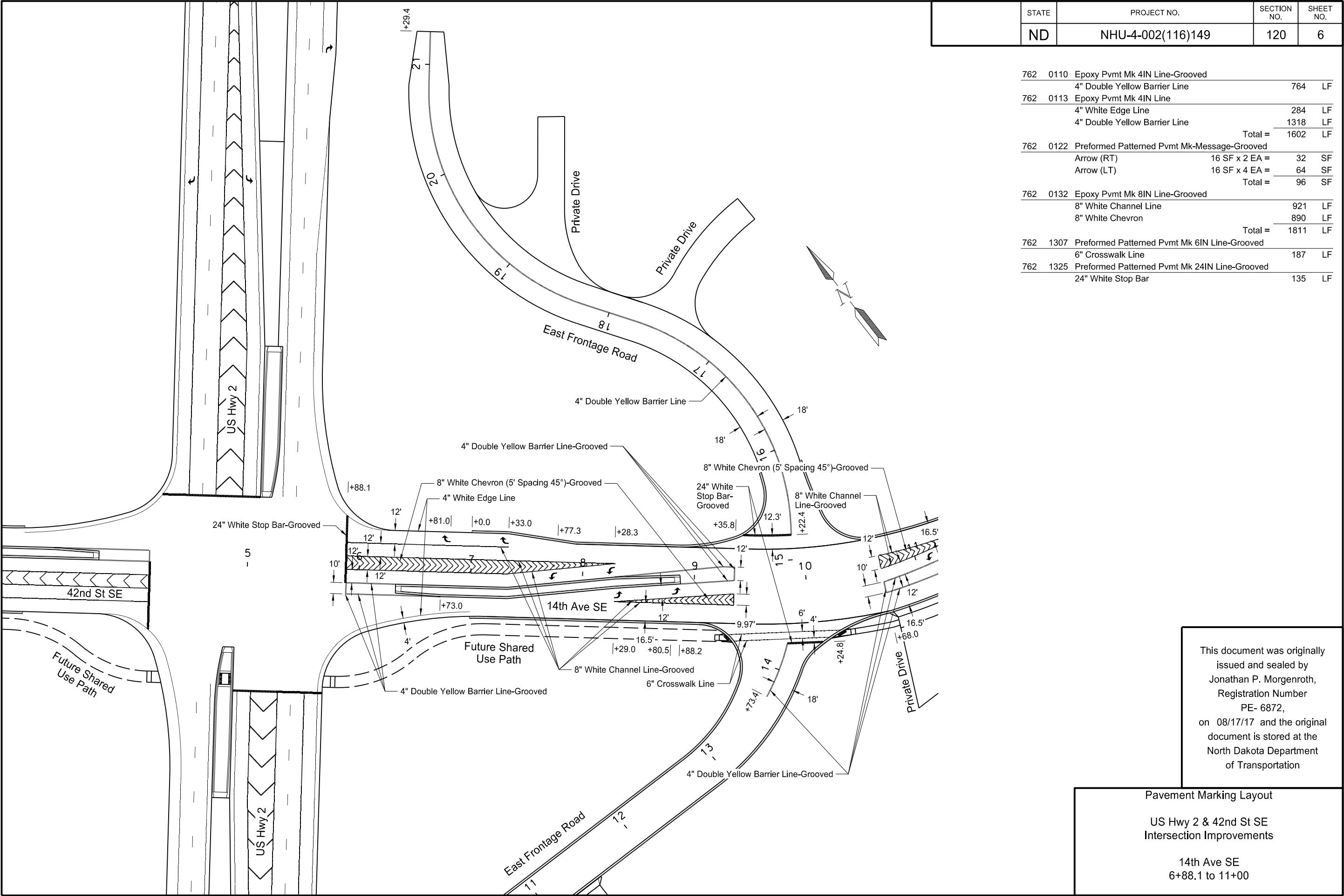


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Pavement Marking Layout

US Hwy 2 & 42nd St SE  
Intersection Improvements

42nd St SE  
16+00 to 18+30



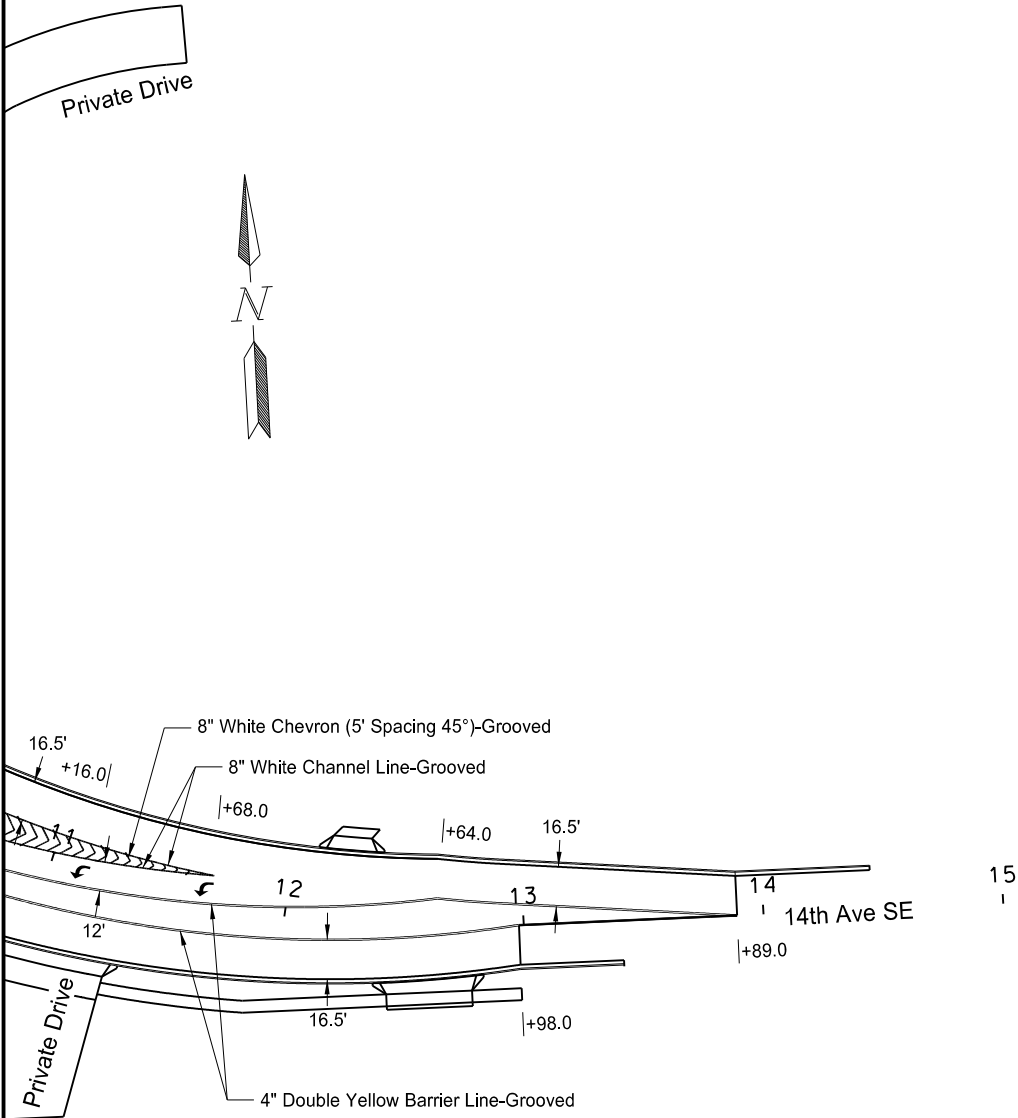
STATE		PROJECT NO.	SECTION NO.	SHEET NO.
ND		NHU-4-002(116)149	120	6
762	0110	Epoxy Pvmt Mk 4IN Line-Grooved		
		4" Double Yellow Barrier Line	764	LF
762	0113	Epoxy Pvmt Mk 4IN Line		
		4" White Edge Line	284	LF
		4" Double Yellow Barrier Line	1318	LF
		Total =	1602	LF
762	0122	Preformed Patterned Pvmt Mk-Message-Grooved		
		Arrow (RT)	16 SF x 2 EA =	32 SF
		Arrow (LT)	16 SF x 4 EA =	64 SF
		Total =	96	SF
762	0132	Epoxy Pvmt Mk 8IN Line-Grooved		
		8" White Channel Line	921	LF
		8" White Chevron	890	LF
		Total =	1811	LF
762	1307	Preformed Patterned Pvmt Mk 6IN Line-Grooved		
		6" Crosswalk Line	187	LF
762	1325	Preformed Patterned Pvmt Mk 24IN Line-Grooved		
		24" White Stop Bar	135	LF

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Pavement Marking Layout  
  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
14th Ave SE  
6+88.1 to 11+00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	120	7

762	0110	Epoxy Pvmt Mk 4IN Line-Grooved		
		4" Double Yellow Barrier Line	1168	LF
762	0122	Preformed Patterned Pvmt Mk-Message-Grooved		
		Arrow (LT)	16 SF x 2 EA =	32 SF
762	0132	Epoxy Pvmt Mk 8IN Line-Grooved		
		8" White Channel Line	134	LF
		8" White Chevron	77	LF
		Total =	211	LF



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Pavement Marking Layout

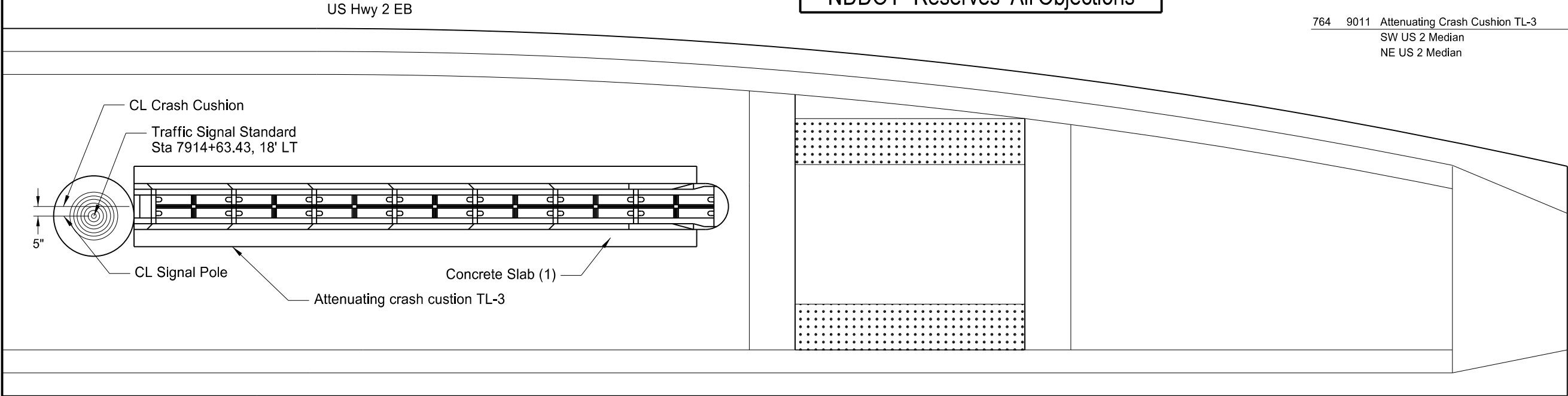
US Hwy 2 & 42nd St SE  
Intersection Improvements

14th Ave SE  
11+00 to 13+89

23 USC § 409 Documents  
NDDOT Reserves All Objections

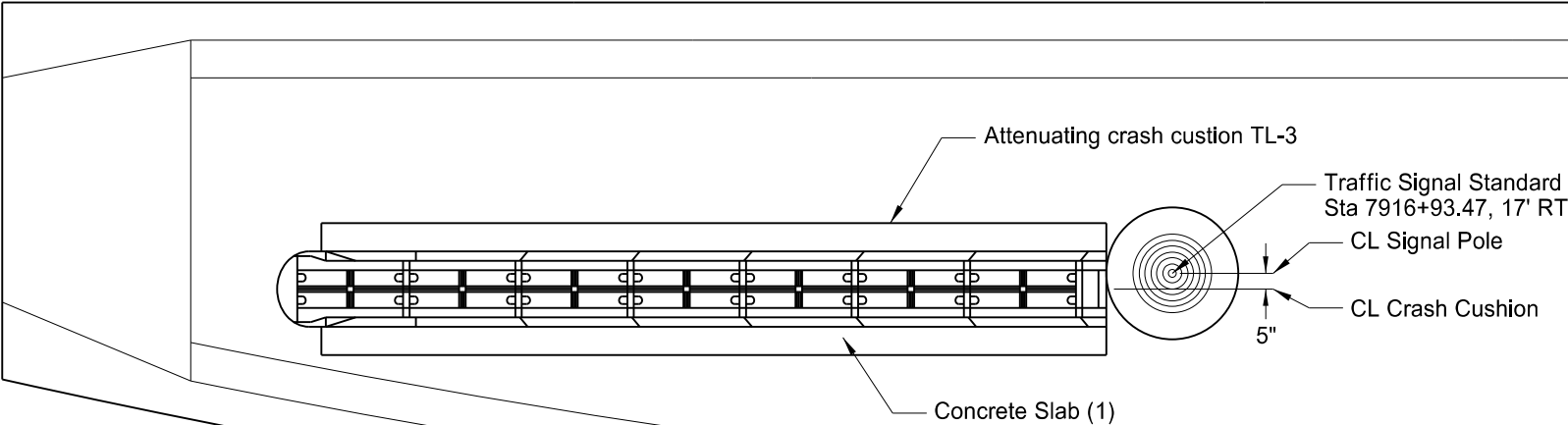
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-002(116)149	130	1

764	9011	Attenuating Crash Cushion TL-3		
		SW US 2 Median	1	EA
		NE US 2 Median	1	EA
		Total =	2	EA



US Hwy 2 WB

US Hwy 2 EB



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Note:  
1. The concrete slab shall be installed in accordance with the crash cushion manufacturer's recommendations.

All costs for installing the concrete slab shall be included in the price bid for the item "Attenuating crash cushion TL-3."

US Hwy 2 WB

Guardrail

US Hwy 2 & 42nd St SE  
Intersection Improvements

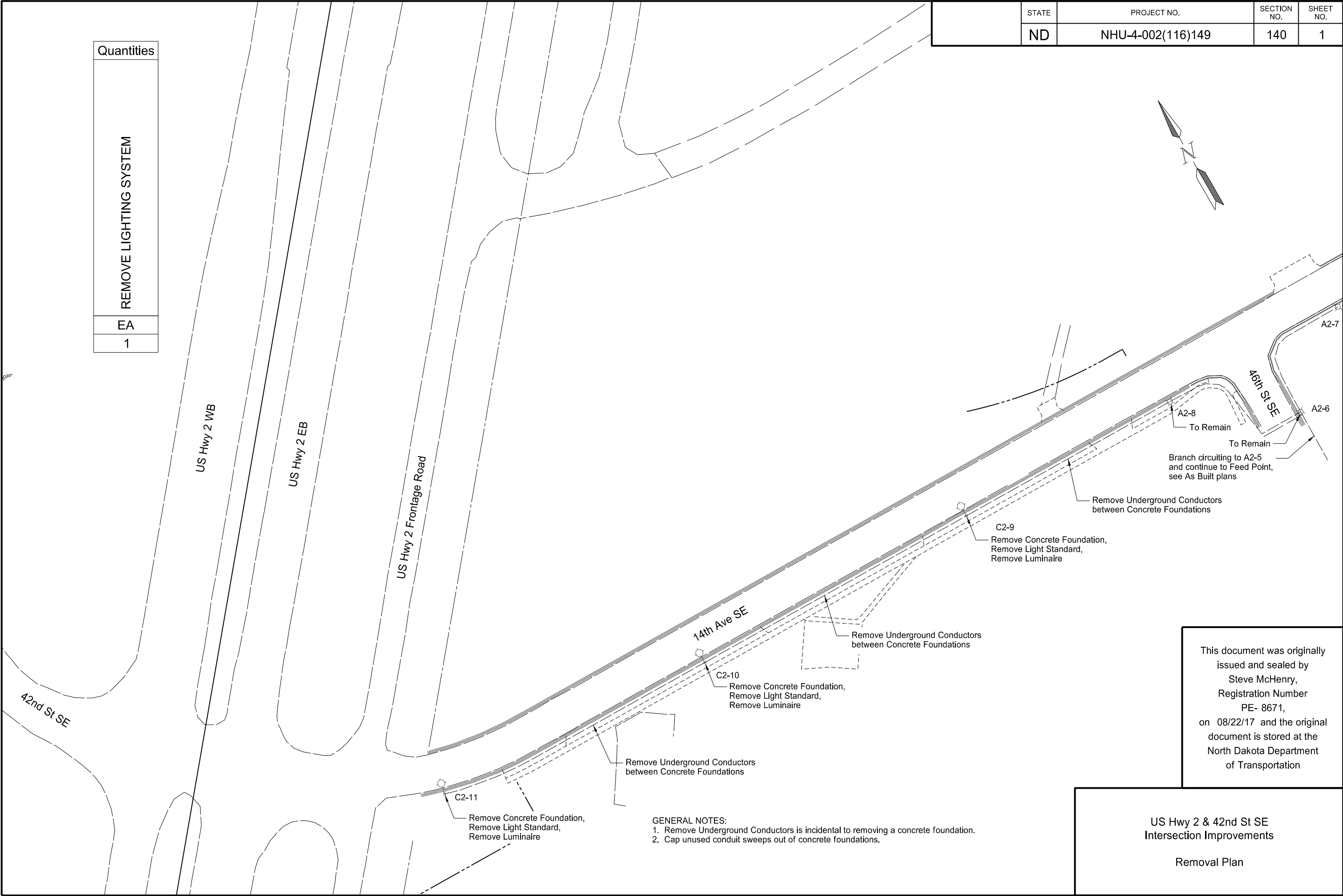
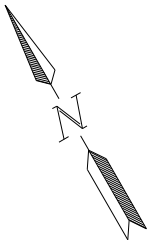
Crash Cushion Layout



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	140	1

Quantities

REMOVE LIGHTING SYSTEM
EA
1

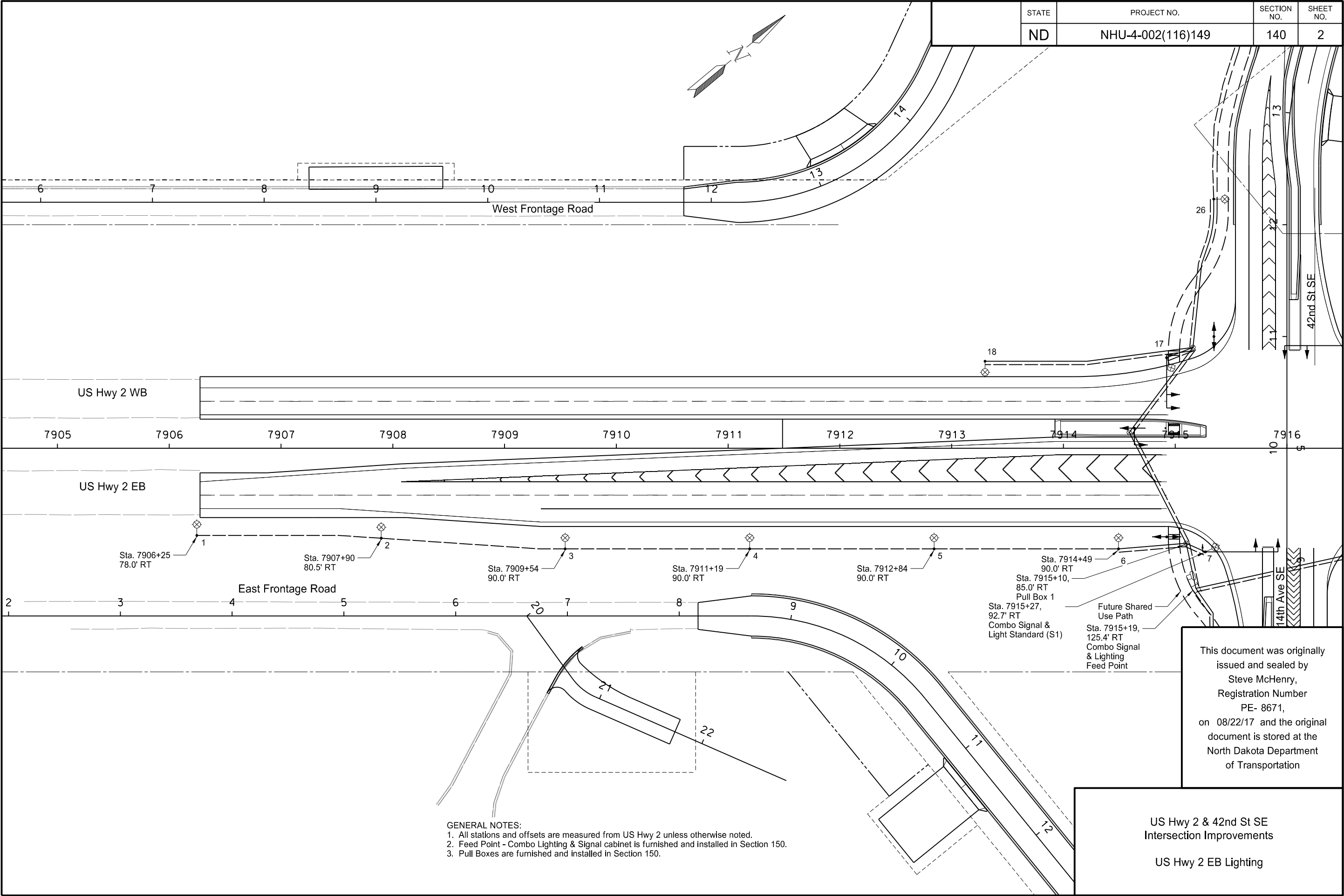


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US Hwy 2 & 42nd St SE  
Intersection Improvements

Removal Plan

- GENERAL NOTES:
1. Remove Underground Conductors is incidental to removing a concrete foundation.
  2. Cap unused conduit sweeps out of concrete foundations.

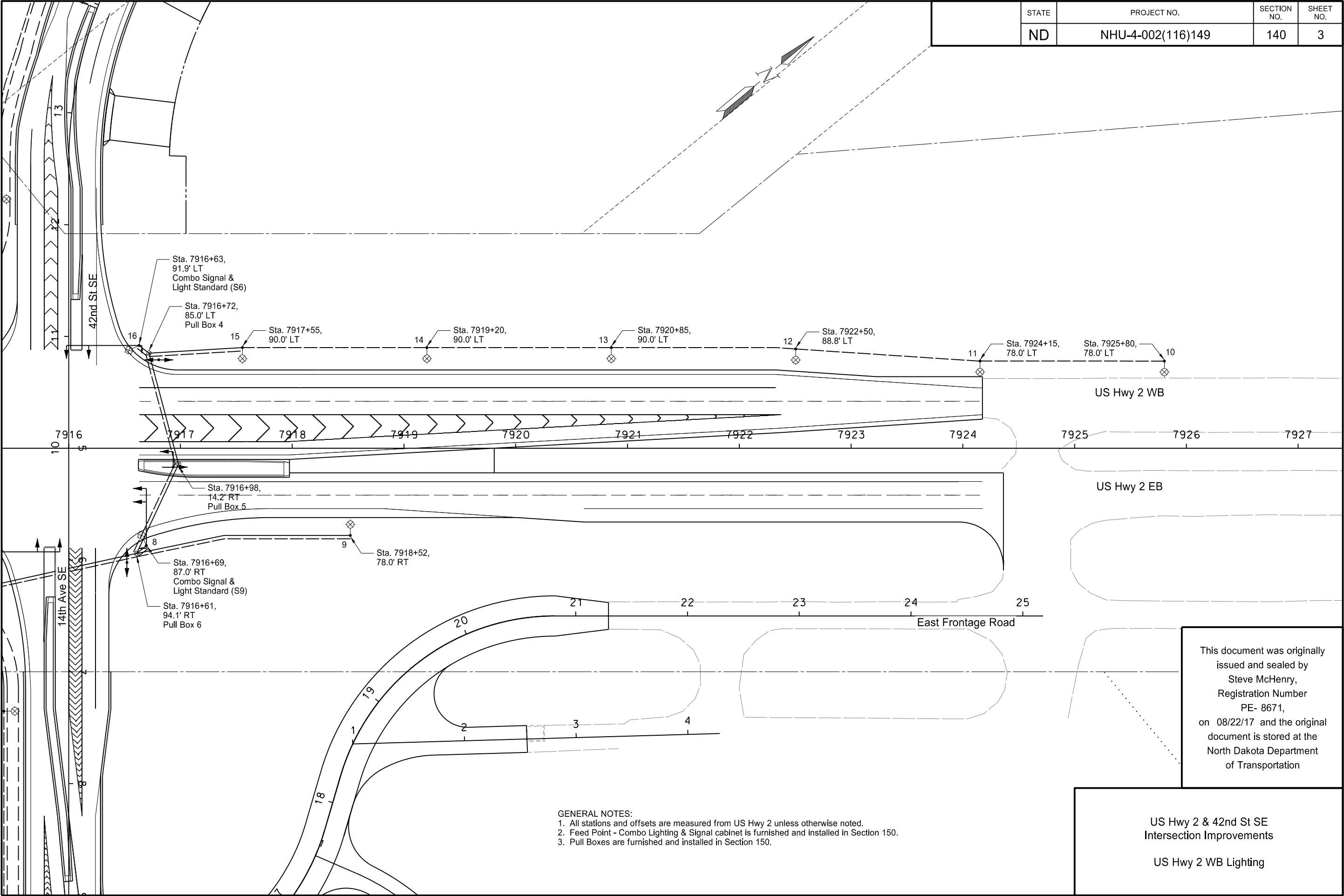


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-002(116)149	140	2

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US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
US Hwy 2 EB Lighting

- GENERAL NOTES:
- 1. All stations and offsets are measured from US Hwy 2 unless otherwise noted.
  - 2. Feed Point - Combo Lighting & Signal cabinet is furnished and installed in Section 150.
  - 3. Pull Boxes are furnished and installed in Section 150.



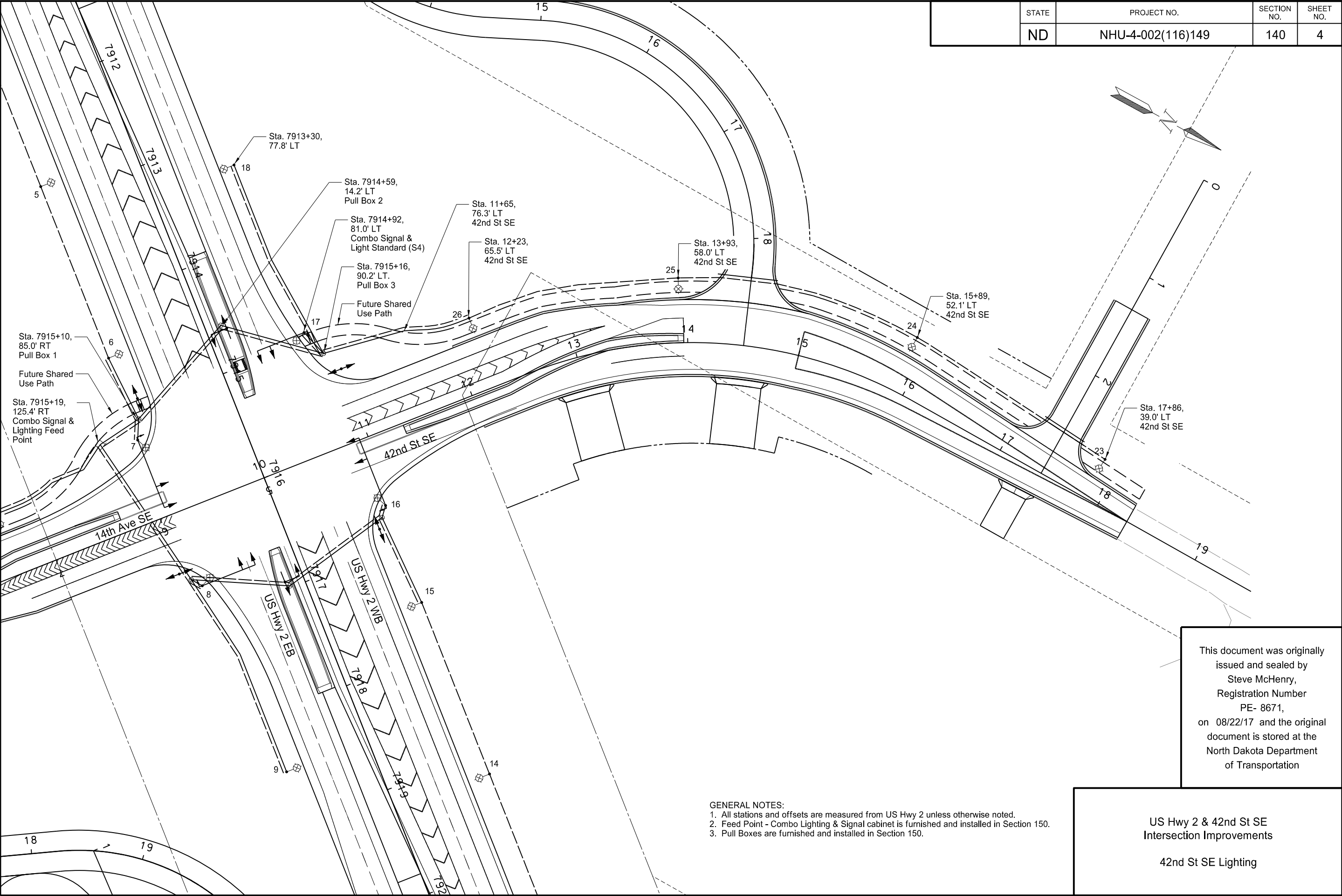
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	140	3

- GENERAL NOTES:
1. All stations and offsets are measured from US Hwy 2 unless otherwise noted.
  2. Feed Point - Combo Lighting & Signal cabinet is furnished and installed in Section 150.
  3. Pull Boxes are furnished and installed in Section 150.

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US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
US Hwy 2 WB Lighting

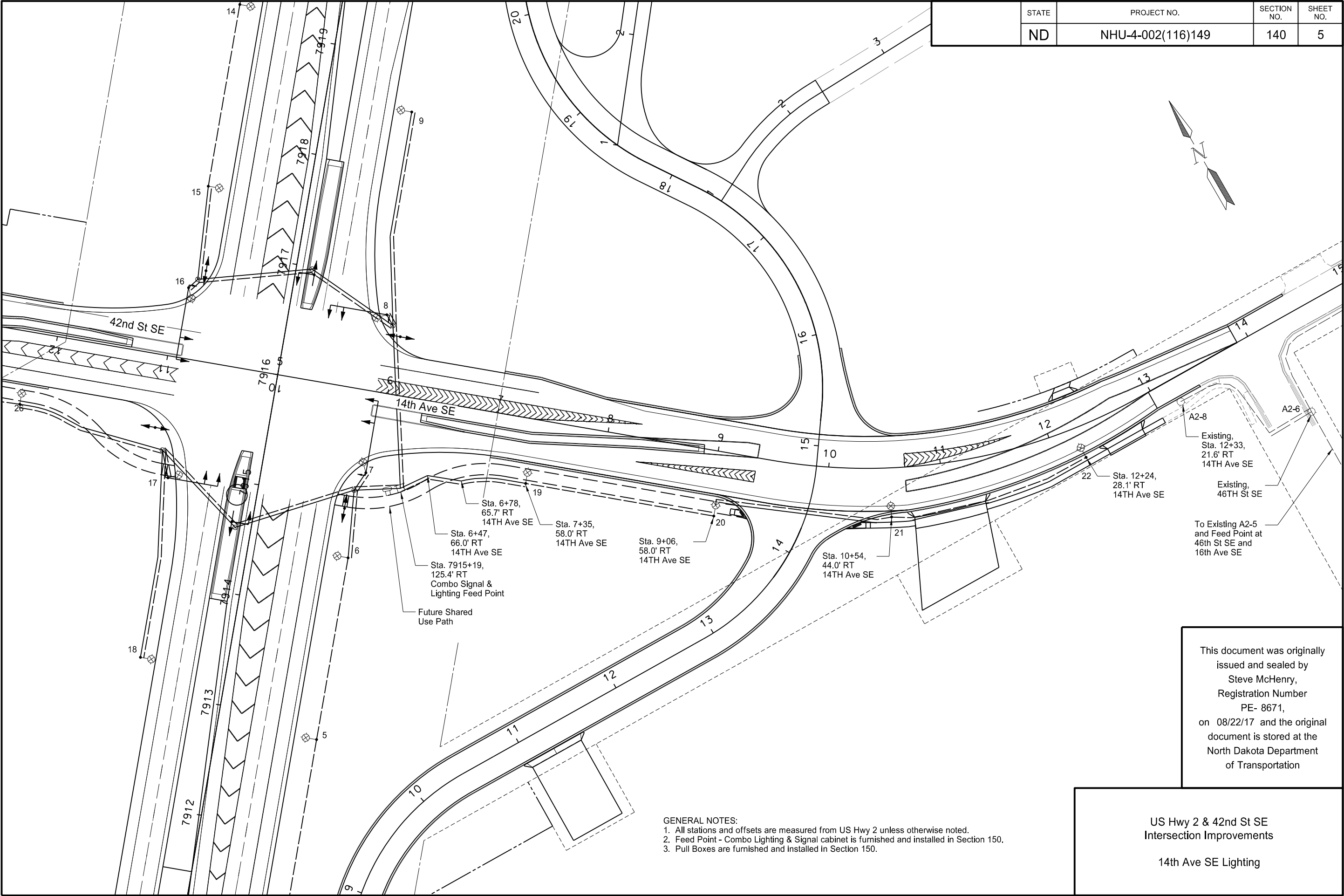
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	140	4



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GENERAL NOTES:  
1. All stations and offsets are measured from US Hwy 2 unless otherwise noted.  
2. Feed Point - Combo Lighting & Signal cabinet is furnished and installed in Section 150.  
3. Pull Boxes are furnished and installed in Section 150.

US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
42nd St SE Lighting



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-002(116)149	140	5

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- GENERAL NOTES:
1. All stations and offsets are measured from US Hwy 2 unless otherwise noted.
  2. Feed Point - Combo Lighting & Signal cabinet is furnished and installed in Section 150.
  3. Pull Boxes are furnished and installed in Section 150.

US Hwy 2 & 42nd St SE  
Intersection Improvements

14th Ave SE Lighting

Point	Station	Conduit Runs		Cable Trench	Cable Runs	
		Length (ft)	Size	Length (ft)	Length (ft)	Type
FP-1	7915+19 - 125.4' RT TO	42	2"	42	158	2 - NO 4 TYPE RHW
PB 1	7915+10 - 85.0' RT TO	19	2"	19	79	1 - NO 4 TYPE THW
7	7915+27 - 92.7' RT					
7	7915+27 - 92.7' RT TO	NOTE 6	2"	NOTE 6	184	2 - NO 4 TYPE RHW
PB 1	7915+10 - 85.0' RT TO	61	2"	61	92	1 - NO 4 TYPE THW
6	7914+49 - 90.0' RT					
6	7914+49 - 90.0' RT TO			165	346	2 - NO 4 TYPE RHW
5	7912+84 - 90.0' RT				173	1 - NO 4 TYPE THW
5	7912+84 - 90.0' RT TO			166	348	2 - NO 4 TYPE RHW
4	7911+19 - 90.0' RT				174	1 - NO 4 TYPE THW
4	7911+19 - 90.0' RT TO			166	348	2 - NO 4 TYPE RHW
3	7909+54 - 90.0' RT				174	1 - NO 4 TYPE THW
3	7909+54 - 90.0' RT TO			165	346	2 - NO 4 TYPE RHW
2	7907+90 - 80.5' RT				173	1 - NO 4 TYPE THW
2	7907+90 - 80.5' RT TO			166	348	2 - NO 4 TYPE RHW
1	7906+25 - 78.0' RT				174	1 - NO 4 TYPE THW
FP-1	7915+19 - 125.4' RT TO	146	2"	146	352	2 - NO 4 TYPE RHW
PB 6	7916+61 - 94.1' RT TO	12	2"	12	176	1 - NO 4 TYPE THW
8	7916+69 - 87.0' RT					
8	7916+69 - 87.0' RT TO	NOTE 6	2"	NOTE 6	438	2 - NO 4 TYPE RHW
PB 6	7916+61 - 94.1' RT TO	193	2"	193	219	1 - NO 4 TYPE THW
9	7918+52 - 78.0' RT					
8	7916+69 - 87.0' RT TO	NOTE 6	2"	NOTE 6	472	2 - NO 4 TYPE RHW
PB 6	7916+61 - 94.1' RT TO	89	2"	89	236	1 - NO 4 TYPE THW
PB 5	7916+98 - 14.2' RT TO	103	2"	103		
PB 4	7916+72 - 85.0' LT TO	12	2"	12		
16	7916+63 - 91.9' LT					
16	7916+63 - 91.9' LT TO	NOTE 6	2"	NOTE 6	216	2 - NO 4 TYPE RHW
PB 4	7916+72 - 85.0' LT TO	84	2"	84	108	1 - NO 4 TYPE THW
15	7917+55 - 90.0' LT					
15	7917+55 - 90.0' LT TO			165	346	2 - NO 4 TYPE RHW
14	7919+20 - 90.0' LT				173	1 - NO 4 TYPE THW
14	7919+20 - 90.0' LT TO			165	346	2 - NO 4 TYPE RHW
13	7920+85 - 90.0' LT				173	1 - NO 4 TYPE THW
13	7920+85 - 90.0' LT TO			166	348	2 - NO 4 TYPE RHW
12	7922+50 - 88.8' LT				174	1 - NO 4 TYPE THW
12	7922+50 - 88.8' LT TO			166	348	2 - NO 4 TYPE RHW
11	7924+15 - 78.0' LT				174	1 - NO 4 TYPE THW
11	7924+15 - 78.0' LT TO			165	346	2 - NO 4 TYPE RHW
10	7925+80 - 78.0' LT				173	1 - NO 4 TYPE THW
FP-1	7915+19 - 125.4' RT TO	NOTE 6		NOTE 6	600	2 - NO 4 TYPE RHW
PB 1	7915+10 - 85.0' RT TO	112	2"	112	300	1 - NO 4 TYPE THW
PB 2	7914+59 - 14.2' LT TO	96	2"	96		
PB 3	7915+16 - 90.2' LT TO	26	2"	26		
17	7914+92 - 81.0' LT					

Point	Station	Conduit Runs		Cable Trench	Cable Runs	
		Length (ft)	Size	Length (ft)	Length (ft)	Type
17	7914+92 - 81.0' LT TO	NOTE 6	2"	NOTE 6	446	2 - NO 4 TYPE RHW
PB 3	7915+16 - 90.2' LT TO	187	2"	187	223	1 - NO 4 TYPE THW
18	7913+30 - 77.8' LT					
17	7914+92 - 81.0' LT TO	NOTE 6	2"	NOTE 6	342	2 - NO 4 TYPE RHW
PB 3	7915+16 - 90.2' LT TO	135	2"	135	171	1 - NO 4 TYPE THW
	11+65 - 76.3' LT TO					
26	12+23 - 65.5' LT					
26	12+23 - 65.5' LT TO			193	402	2 - NO 4 TYPE RHW
25	13+93 - 58.0' LT				201	1 - NO 4 TYPE THW
25	13+93 - 58.0' LT TO	54	2"	224	464	2 - NO 4 TYPE RHW
24	15+89 - 52.1' LT				232	1 - NO 4 TYPE THW
24	15+89 - 52.1' LT TO	42	2"	201	418	2 - NO 4 TYPE RHW
23	17+86 - 39.0' LT				209	1 - NO 4 TYPE THW
FP-1	7915+19 - 125.4' RT TO	116	2"	116	260	2 - NO 4 TYPE RHW
	6+47 - 66.0' RT TO				130	1 - NO 4 TYPE THW
	6+78 - 65.7' RT TO					
19	7+35 - 58.0' RT					
19	7+35 - 58.0' RT TO			171	358	2 - NO 4 TYPE RHW
20	9+06 - 58.0' RT				179	1 - NO 4 TYPE THW
20	9+06 - 58.0' RT TO	137	2"	164	344	2 - NO 4 TYPE RHW
21	10+54 - 44.0' RT				172	1 - NO 4 TYPE THW
21	10+54 - 44.0' RT TO	70	2"	184	384	2 - NO 4 TYPE RHW
22	12+24 - 28.1' RT				192	1 - NO 4 TYPE THW

No.	Station	Offset	Wattage	Circuit	IES-Type	Pole Ht.	Mast Arm	Note
1	7906+25	78.0' RT	133	1	3	42'	10'	1,5
2	7907+90	80.5' RT	133	1	3	42'	10'	1,5
3	7909+54	90.0' RT	133	1	3	42'	10'	1,5
4	7911+19	90.0' RT	224	1	4	42'	10'	2,5
5	7912+84	90.0' RT	224	1	4	42'	10'	2,5
6	7914+49	90.0' RT	224	1	4	42'	10'	2,5
7	7515+27	92.7' RT	224	1	4	42'	10'	2,3
8	7916+69	87.0' RT	224	3	4	42'	10'	2,3
9	7918+52	78.0' RT	133	3	3	42'	10'	1,5
10	7925+80	78.0' LT	133	3	3	42'	10'	1,5
11	7924+15	78.0' LT	133	3	3	42'	10'	1,5
12	7922+50	88.8' LT	133	3	3	42'	10'	1,5
13	7920+85	90.0' LT	224	3	4	42'	10'	2,5
14	7919+20	90.0' LT	224	3	4	42'	10'	2,5
15	7917+55	90.0' LT	224	3	4	42'	10'	2,5
16	7916+63	91.9' LT	224	3	4	42'	10'	2,3
17	7914+92	81.0' LT	224	4	4	42'	10'	2,3
18	7913+30	77.8' LT	133	4	3	42'	10'	1,5
19	7+35	58.0' LT	224	2	4	40'	6'	2,4
20	9+06	58.0' RT	224	2	4	40'	6'	2,4
21	10+54	44.0' RT	224	2	4	40'	6'	2,4
22	12+24	28.1' RT	133	2	3	40'	6'	1,4
23	17+86	39.0' LT	133	4	3	40'	6'	1,4
24	15+89	52.1' LT	133	4	3	40'	6'	1,4
25	13+93	58.0' LT	224	4	4	40'	6'	2,4
26	12+23	65.5' LT	224	4	4	40'	6	2,4

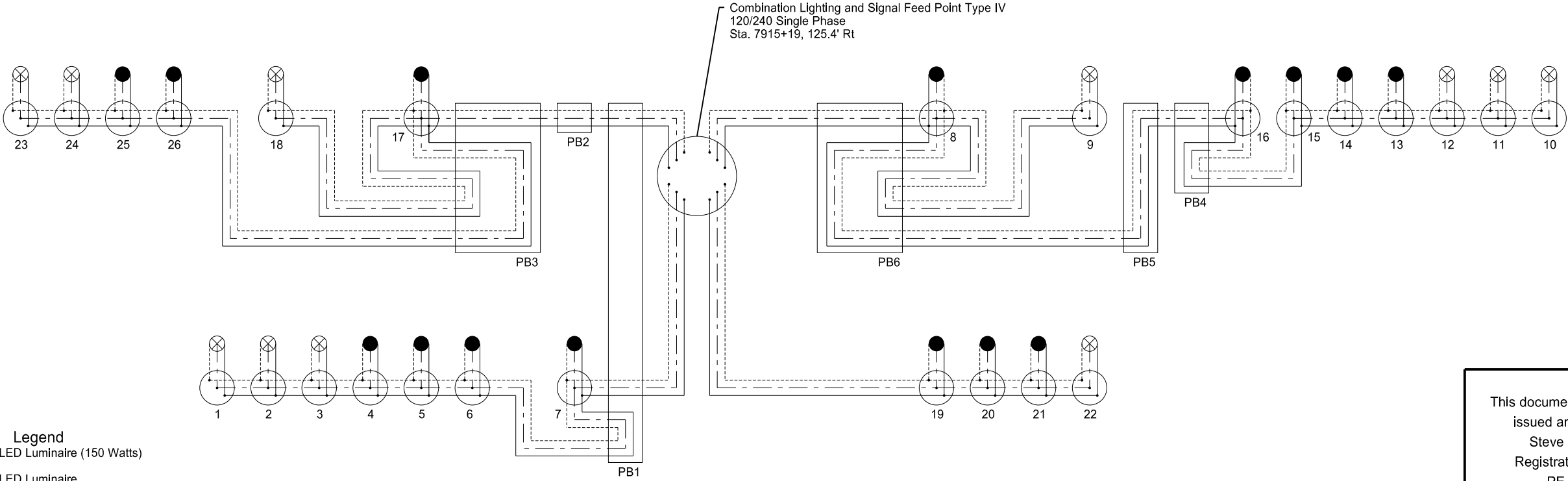
Note:  
1 - LED Luminaire (133 Watts, 60 LEDs, 700mA driver, 3000k)  
2 - LED Luminaire (224 Watts, 80 LEDs, 850mA driver, 3000k)  
3 - Mounted on signal davit mast arm  
4 - 3' Setback from the curb face to the center of the foundation  
5 - 24' Setback from the edge of travel lane to the center of the foundation  
6 - Quantity added in a previous total

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US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
Lighting Quantities

US HWY 2 - PRIMARY REGIONAL  
URBAN ROADS  
TOTAL

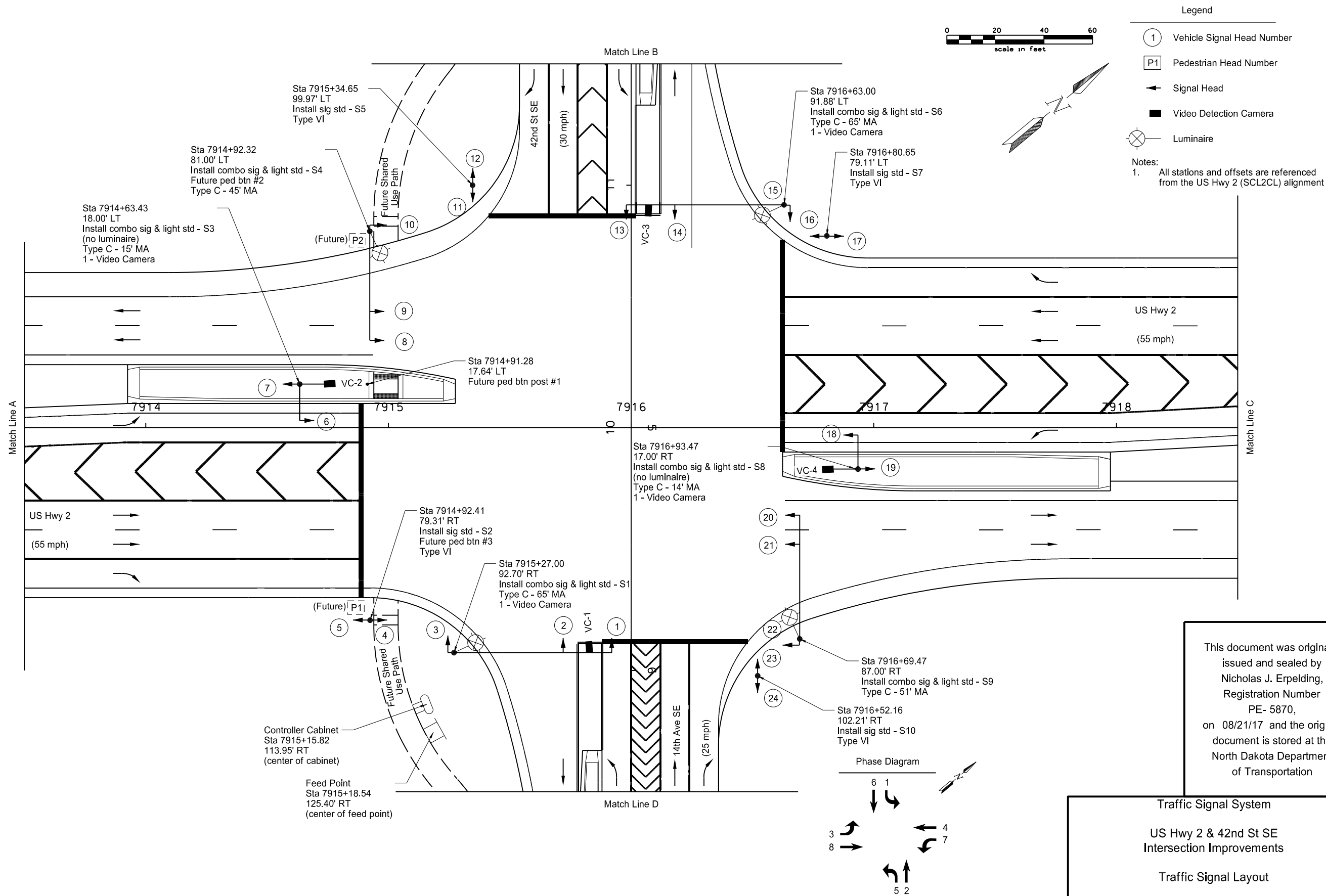
Quantities								
CONCRETE FOUNDATION- HIGHWAY LIGHTING	CABLE TRENCH-TYPE II	2IN DIAMETER RIGID CONDUIT	UNDERGROUND CONDUCTOR NO4- TYPE RHW	UNDERGROUND CONDUCTOR NO4- TYPE THW	LT STD 6FT MA 40FT MT HT BREAKAWAY	LT STD 10FT MA 42FT MT HT BREAKAWAY	LED LUMINAIRE	LED LUMINAIRE (150 WATTS)
EA	LF	LF	LF	LF	EA	EA	EA	EA
13	2650	995	5890	2945		13	10	7
9	1575	741	3418	1709	8	1	5	4
22	4225	1736	9308	4654	8	14	15	11



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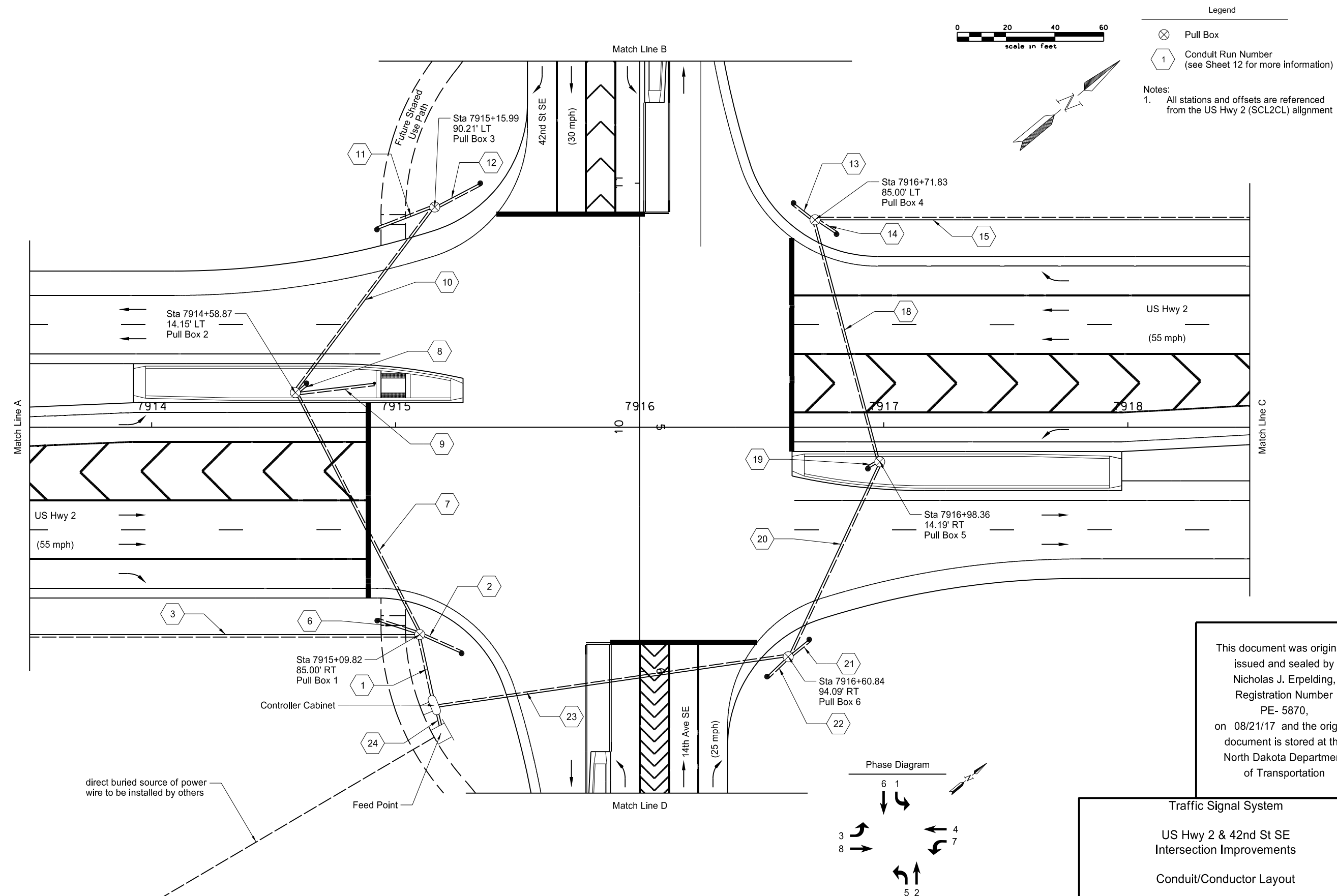
US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
Lighting Quantities and Wiring Diagram

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	150	1





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	150	2



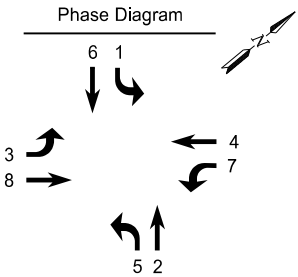
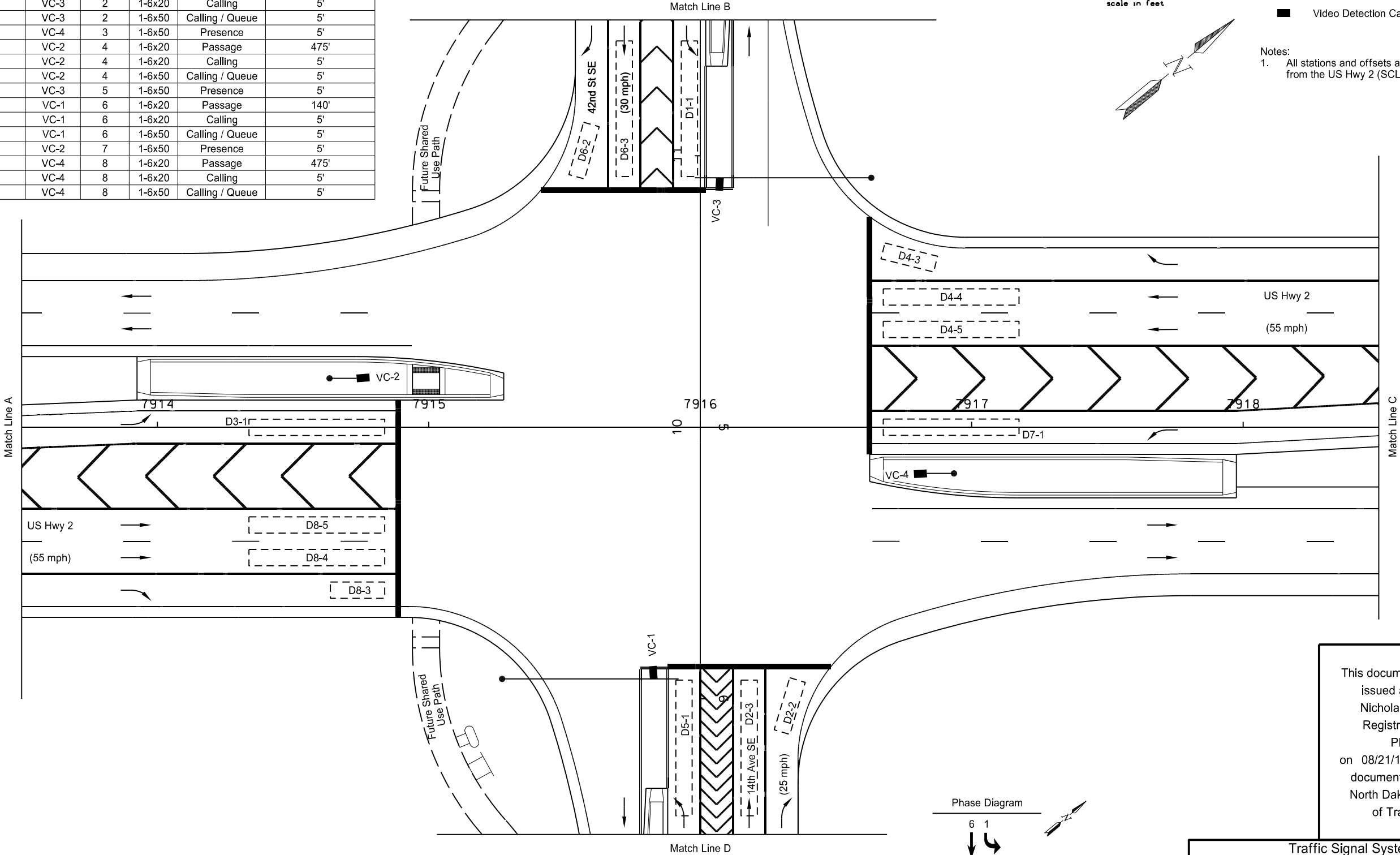
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	150	3

Zone	Video Camera	Phase	Size (ft)	Type	Approximate Distance from Stop Bar to Detection Zone
D1-1	VC-1	1	1-6x50	Presence	5'
D2-1	VC-3	2	1-6x20	Passage	100'
D2-2	VC-3	2	1-6x20	Calling	5'
D2-3	VC-3	2	1-6x50	Calling / Queue	5'
D3-1	VC-4	3	1-6x50	Presence	5'
D4-1, D4-2	VC-2	4	1-6x20	Passage	475'
D4-3	VC-2	4	1-6x20	Calling	5'
D4-4, D4-5	VC-2	4	1-6x50	Calling / Queue	5'
D5-1	VC-3	5	1-6x50	Presence	5'
D6-1	VC-1	6	1-6x20	Passage	140'
D6-2	VC-1	6	1-6x20	Calling	5'
D6-3	VC-1	6	1-6x50	Calling / Queue	5'
D7-1	VC-2	7	1-6x50	Presence	5'
D8-1, D8-2	VC-4	8	1-6x20	Passage	475'
D8-3	VC-4	8	1-6x20	Calling	5'
D8-4, D8-5	VC-4	8	1-6x50	Calling / Queue	5'



- Legend
- [---] Video Detection Zone
  - Video Detection Camera

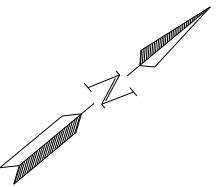
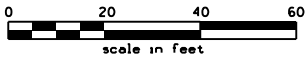
Notes:  
1. All stations and offsets are referenced from the US Hwy 2 (SCL2CL) alignment



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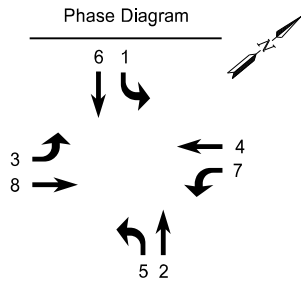
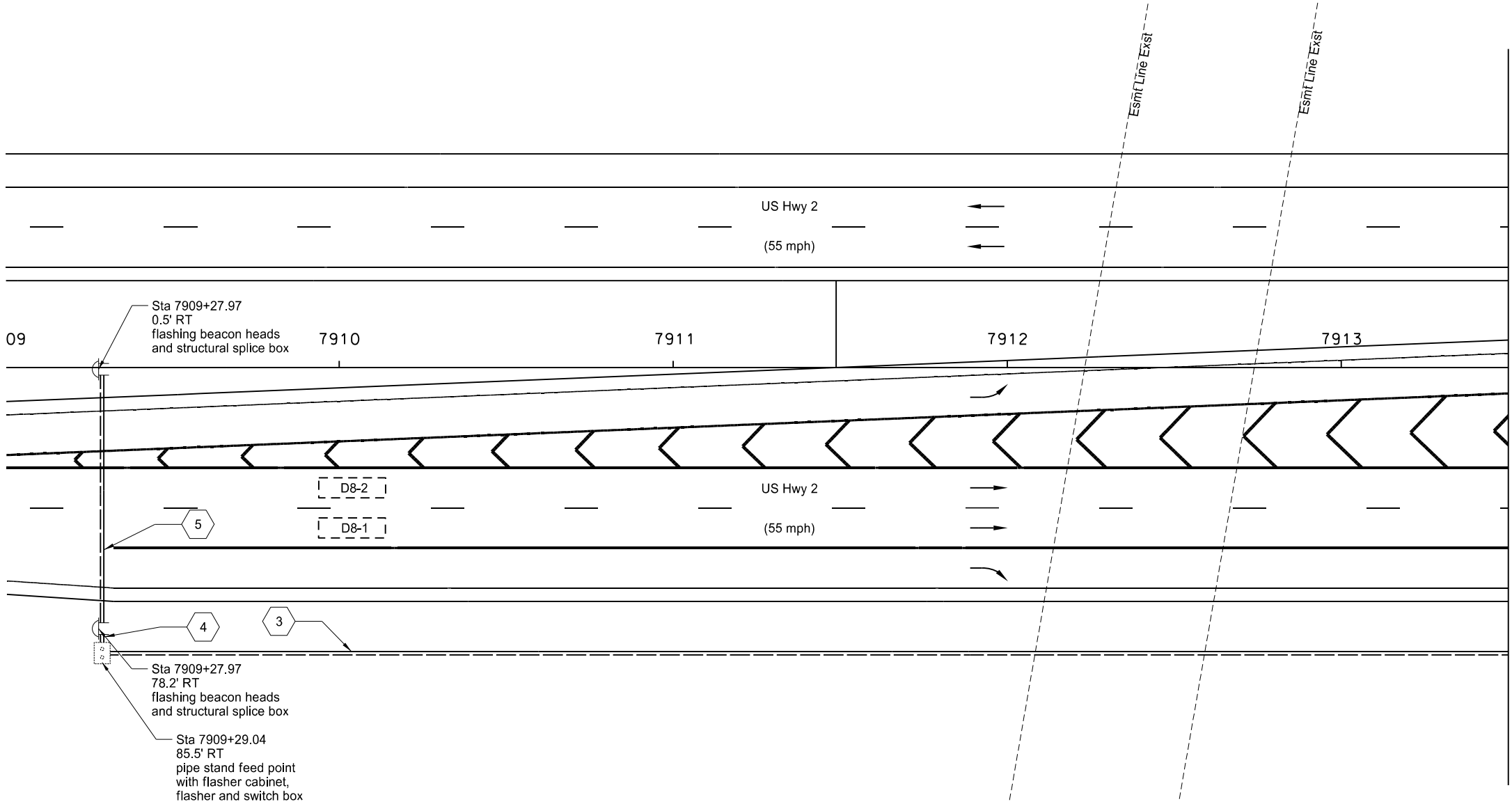
Traffic Signal System  
  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
Traffic Signal Video Detection Layout

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	150	4



Legend

- [ ] Video Detection Zone
- 1 Conduit Run Number (see Sheet 12 for more information)



- Notes:
- All stations and offsets are referenced from the US Hwy 2 (SCL2CL) alignment

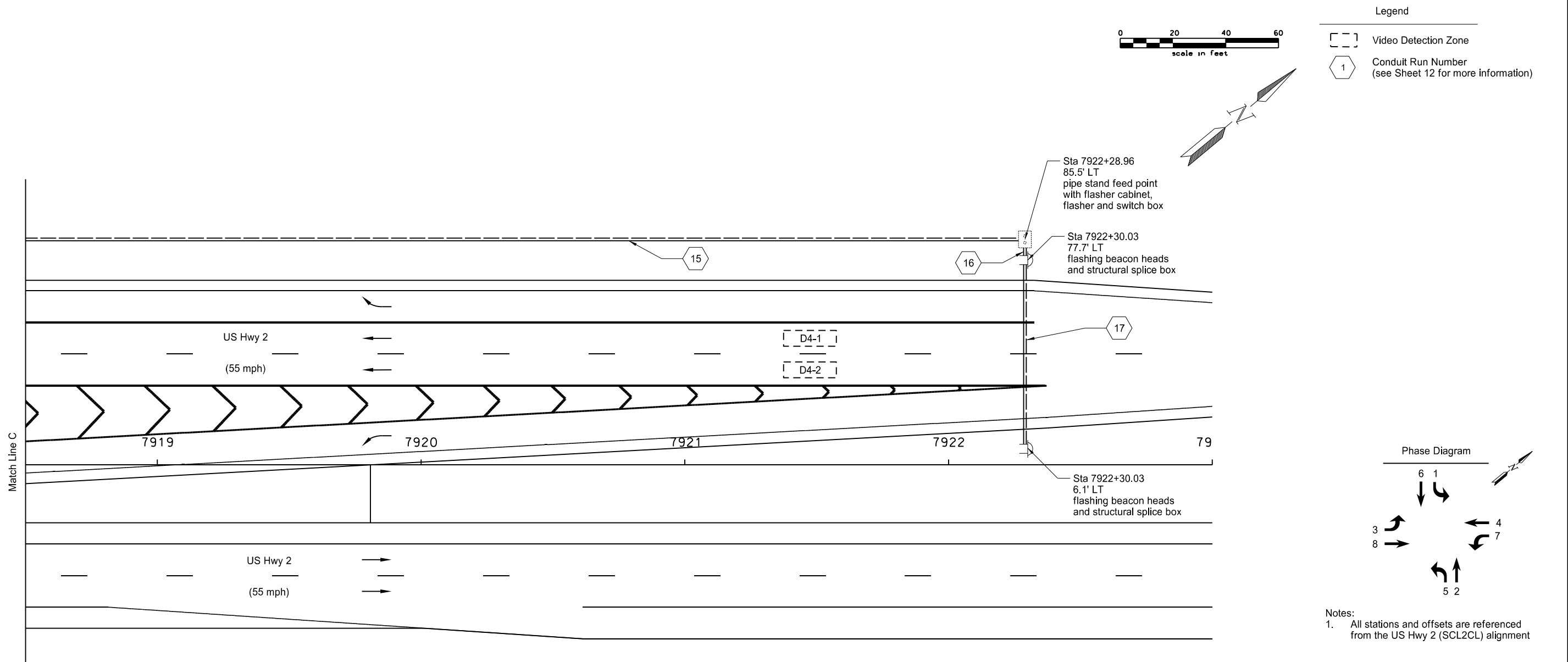
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Traffic Signal System

US Hwy 2 & 42nd St SE  
Intersection Improvements

Traffic Signal Video Detection Layout  
and Advance Warning Flasher System

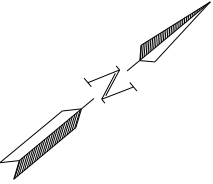
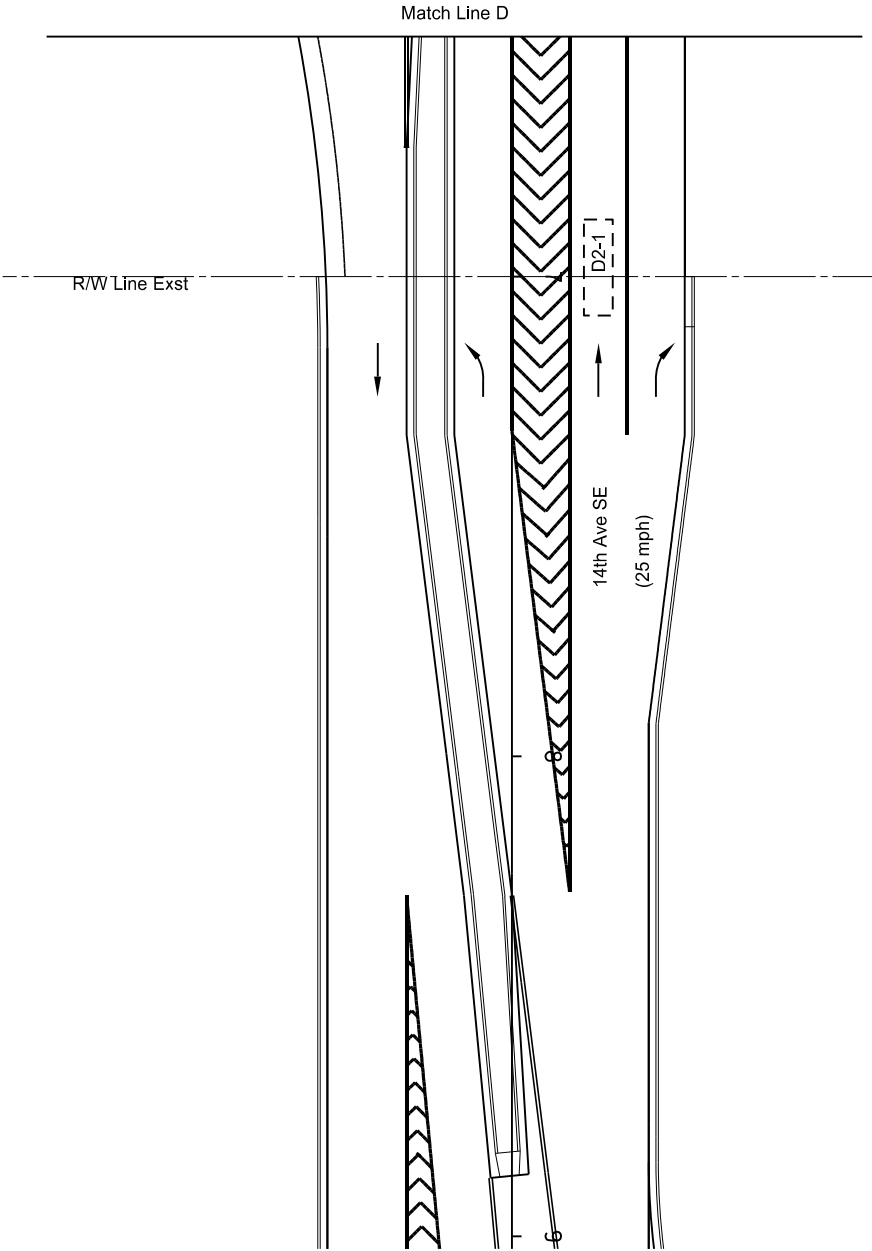
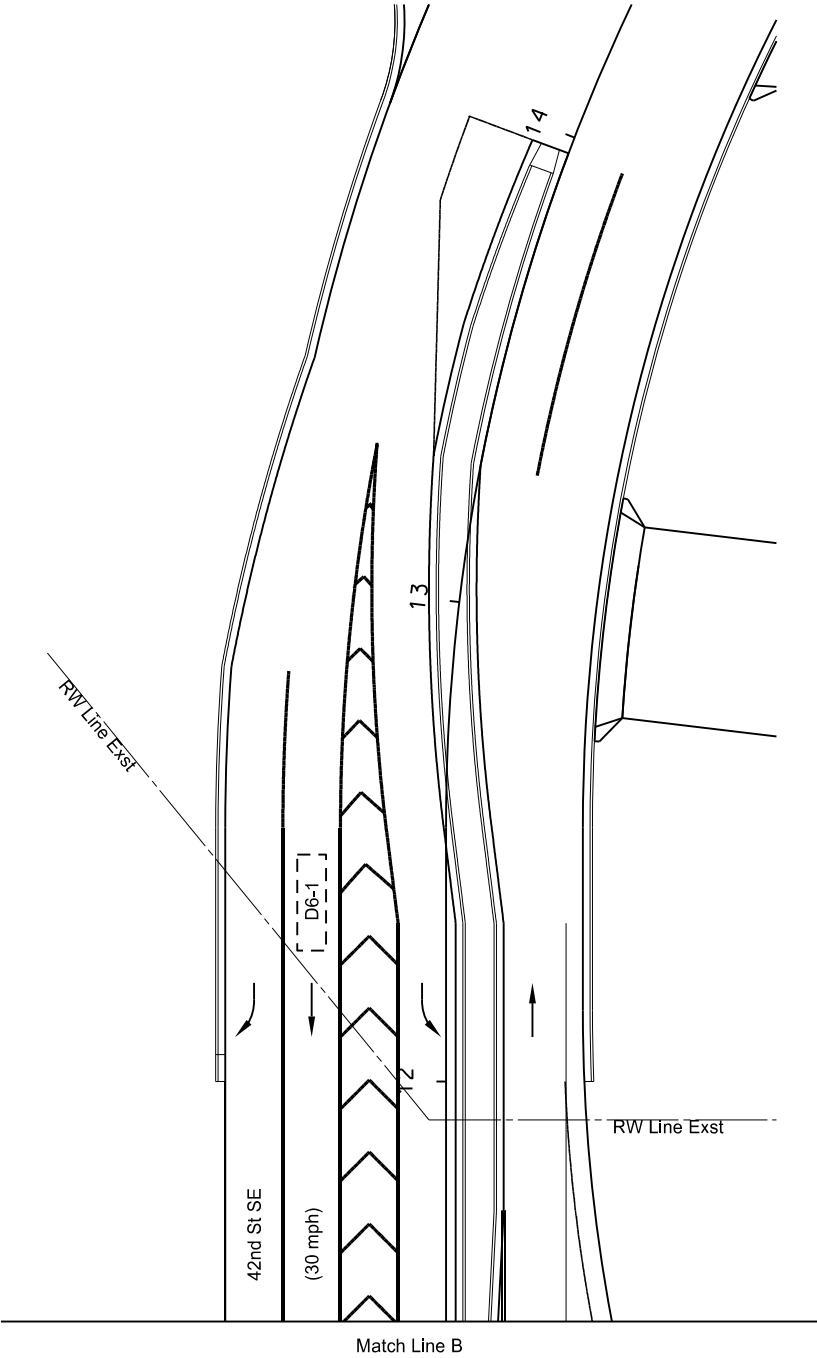
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	ND	NHU-4-002(116)149	150	5



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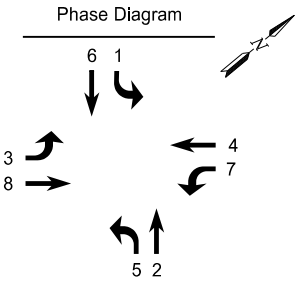
Traffic Signal System  
  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
Traffic Signal Video Detection Layout  
and Advance Warning Flasher System

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	150	6



Legend  
[ ] Video Detection Zone

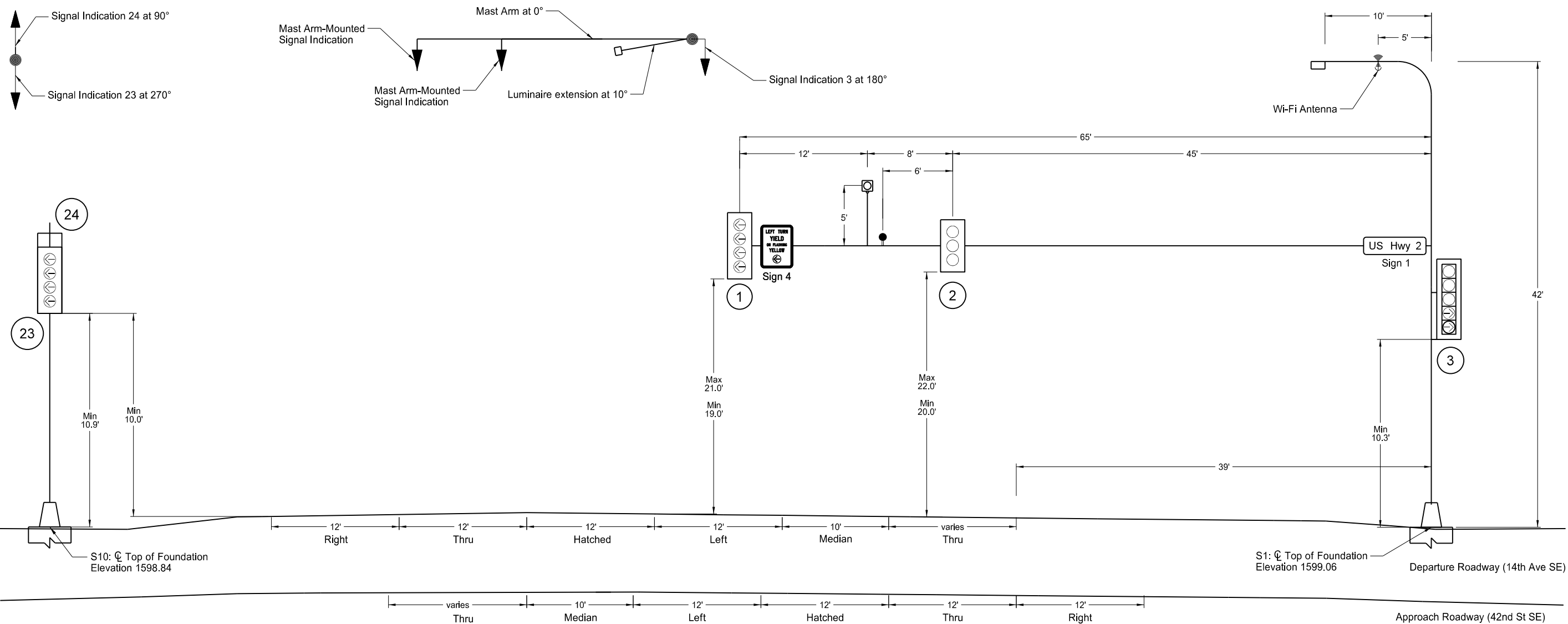
Notes:  
1. All stations and offsets are referenced from the US Hwy 2 (SCL2CL) alignment



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Traffic Signal System  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
Traffic Signal Video Detection Layout

Pole-Mounted Signal  
Indication Orientation Detail  
Not to Scale



Legend

- Transformer Base
- Video Detection Camera
- Traffic Signal Head
- Pedestrian Signal Head
- Vehicle Signal Head Number
- Pedestrian Head Number
- Emergency Vehicle Detection Unit

Southbound 42nd St SE  
Phases 1 & 6  
(S1 & S10)

- Notes:
- Luminaire extension shall be 42' mounting height and 10' mast arm.
  - Furnish and install LED luminaire. See section 140 for details.
  - The final location of the video detection camera shall be determined by the contractor to provide a functional system.
  - Support brackets for pole mounted signal heads shall not restrict access to mast arm handhole.
  - See section 110 for sign details.

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Traffic Signal System

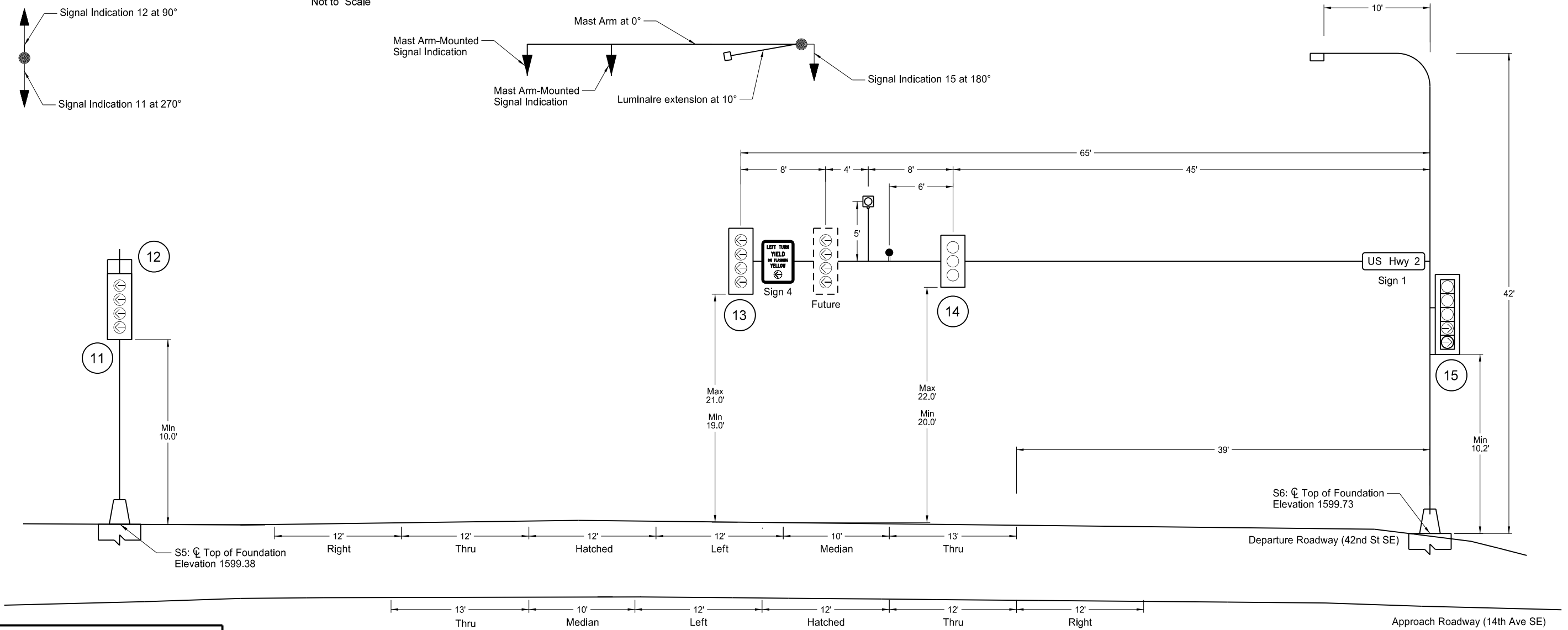
US Hwy 2 & 42nd St SE  
Intersection Improvements

Signal Standard & Head Locations



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	150	9

Pole-Mounted Signal  
Indication Orientation Detail  
Not to Scale



Legend

- Transformer Base
- Video Detection Camera
- Traffic Signal Head
- Pedestrian Signal Head
- Vehicle Signal Head Number
- Pedestrian Head Number
- Emergency Vehicle Detection Unit

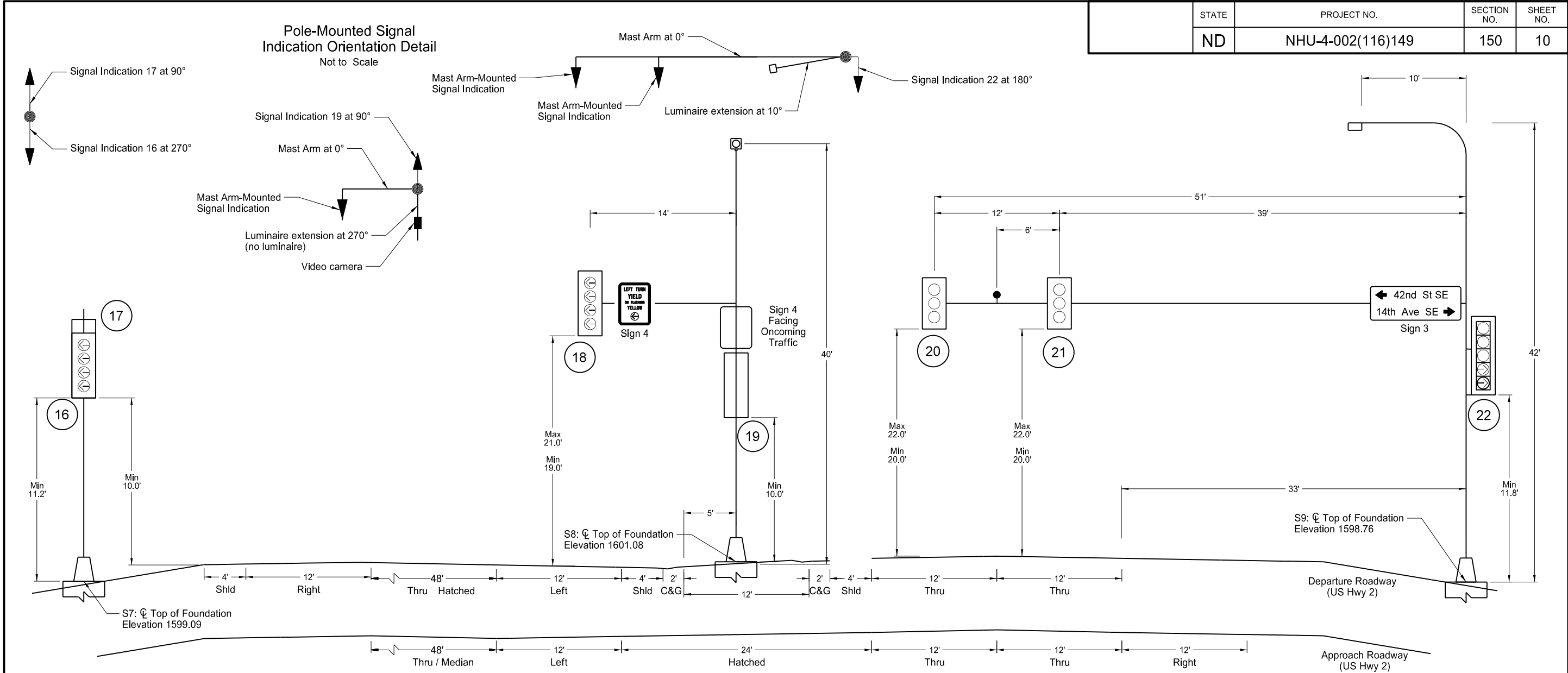
- Notes:
- Luminaire extension shall be 42' mounting height and 10' mast arm.
  - Furnish and install LED luminaire. See section 140 for details.
  - The final location of the video detection camera shall be determined by the contractor to provide a functional system.
  - Support brackets for pole mounted signal heads shall not restrict access to mast arm handhole.
  - See section 110 for sign details.

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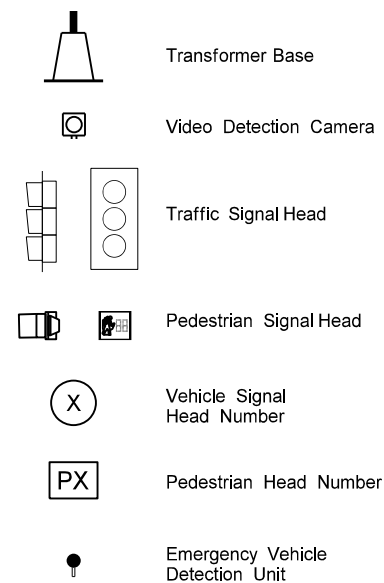
Traffic Signal System  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
Signal Standard & Head Locations



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-002(116)149	150	10



#### Legend



#### Eastbound US Hwy 2 Phases 3 & 8 (S7, S8, & S9)

#### Notes:

- Luminaire extension on combo sig/lt std S9 shall be 40' mounting height and 10' mast arm. Luminaire extension on combo sig/lt std S8 shall be 42' mounting height and 10' mast arm.
- Furnish and install LED luminaire on combo sig/lt std S9. See section 140 for details.
- The final location of the video detection camera shall be determined by the contractor to provide a functional system.
- Support brackets for pole mounted signal heads shall not restrict access to mast arm handhole.
- See section 110 for sign details.

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#### Traffic Signal System

US Hwy 2 & 42nd St SE  
Intersection Improvements

Signal Standard & Head Locations

Signal Standard Foundation Table			
Description	Footing Depth "D" 24" & 30" Diameters (FT)	Footing Depth "D" 36" & 42" Diameters (FT)	Footing Depth "D" 42" Diameter (FT)
Type VI Signal Std.			
S2	4	3	
S5	4	3	
S7	4	3	
S10	4	3	
Combination Signal & Light Std.			
S1 - Single 65' MA			20
S3 - Single 15' MA	12,12	12,12	
S4 - Single 45' MA	17,16	16,16	
S6 - Single 65' MA			20
S8 - Single 14' MA	12,12	12,12	
S9 - Single 51' MA	18,17	17,17	

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Traffic Signal System  
  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
Signal Standard Foundation Table

Conduit Run	Location	Conduit Run		Cable Run			
		Length	Size	Length	Code	QTY	Type
1	Controller to Pull Box 1	30	4"	90	A	2	No. 12 AWG 3 Conductor Cable
				90	B	2	Emergency Detector Cable
				225	C	5	No. 12 AWG 12 Conductor Cable
				45	C	1	No. 12 AWG 5 Conductor Cable
				135	C	3	Push Button
				45	C	1	Mult 3 No 6 USE
				90	D	2	Video Detector Cable
				45	F	1	Antenna Cable
				120	A	1	No. 12 AWG 3 Conductor Cable
				120	B	1	Emergency Detector Cable
				120	C	1	No. 12 AWG 12 Conductor Cable
				120	D	1	Video Detector Cable
				120	F	1	Antenna Cable
3	Pull Box 1 to Flasher Cabinet	585	2"	605	C	1	Mult 3 No 6 USE 0
4	Flasher Cabinet to Flasher	15	1"	100	C	2	No. 12 AWG 5 Conductor Cable
		10	2"				
5	Flasher to Flasher	15	1"	125	C	1	No. 12 AWG 5 Conductor Cable
		80	2"				
6	Pull Box 1 to Signal S2	25	3"	45	C	1	No. 12 AWG 12 Conductor Cable
				45	C	1	No. 12 AWG 5 Conductor Cable
				40	C	1	Push Button
7	Pull Box 1 to Pull Box 2	115	4"	125	A	1	No. 12 AWG 3 Conductor Cable
				125	B	1	Emergency Detector Cable
				365	C	3	No. 12 AWG 12 Conductor Cable
				245	C	2	Push Button
				125	D	1	Video Detector Cable
8	Pull Box 2 to Signal S3	10	4"	55	C	1	No. 12 AWG 12 Conductor Cable
				65	D	1	Video Detector Cable
9	Pull Box 2 to Pedestrian Push Btn. 1	40	2"	55	C	1	Push Button
10	Pull Box 2 to Pull Box 3	100	4"	110	A	1	No. 12 AWG 3 Conductor Cable
				110	B	1	Emergency Detector Cable
				215	C	2	No. 12 AWG 12 Conductor Cable
				110	C	1	Push Button
11	Pull Box 3 to Signal S4	30	3"	105	A	1	No. 12 AWG 3 Conductor Cable
				105	B	1	Emergency Detector Cable
				105	C	1	No. 12 AWG 12 Conductor Cable
				45	C	1	Push Button
12	Pull Box 3 to Signal S5	25	3"	45	C	1	No. 12 AWG 12 Conductor Cable

Conduit Run	Location	Conduit Run		Cable Run			
		Length	Size	Length	Code	QTY	Type
13	Pull Box 4 to Signal S6	15	3"	110	A	1	No. 12 AWG 3 Conductor Cable
				110	B	1	Emergency Detector Cable
				110	C	1	No. 12 AWG 12 Conductor Cable
				110	D	1	Video Detector Cable
14	Pull Box 4 to Signal S7	15	3"	35	C	1	No. 12 AWG 12 Conductor Cable
15	Pull Box 4 to Flasher Cabinet	560	2"	580	C	1	Mult 3 No 6 USE
16	Flasher Cabinet to Flasher	15	1"	100	C	2	No. 12 AWG 5 Conductor Cable
		10	2"				
17	Flasher to Flasher	15	1"	120	C	1	No. 12 AWG 5 Conductor Cable
		75	2"				
18	Pull Box 5 to Pull Box 4	105	4"	115	A	1	No. 12 AWG 3 Conductor Cable
				115	B	1	Emergency Detector Cable
				225	C	2	No. 12 AWG 12 Conductor Cable
				115	C	1	Mult 3 No 6 USE
				115	D	1	Video Detector Cable
				55	C	1	No. 12 AWG 12 Conductor Cable
				65	D	1	Video Detector Cable
20	Pull Box 6 to Pull Box 5	90	4"	100	A	1	No. 12 AWG 3 Conductor Cable
				100	B	1	Emergency Detector Cable
				290	C	3	No. 12 AWG 12 Conductor Cable
				100	C	1	Mult 3 No 6 USE
				195	D	2	Video Detector Cable
				95	A	1	No. 12 AWG 3 Conductor Cable
				95	B	1	Emergency Detector Cable
				95	C	1	No. 12 AWG 12 Conductor Cable
22	Pull Box 6 to Signal S10	15	3"	35	A	1	No. 12 AWG 12 Conductor Cable
23	Controller to Pull Box 6	150	4"	330	A	2	No. 12 AWG 3 Conductor Cable
				330	B	2	Emergency Detector Cable
				825	C	5	No. 12 AWG 12 Conductor Cable
				165	C	1	Mult 3 No 6 USE
				330	D	2	Video Detector Cable
24	Controller to Feed Point	10	2"	20	E	1	Mult 3 No 6 USE

Cable Code

A = Emergency Vehicle Indicator Lamp  
B = Emergency Vehicle Detector Cable  
C = Signal Control Cable  
D = Video Detection Cable  
E = Power Cable  
F = Other Cable

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Traffic Signal System

US Hwy 2 & 42nd St SE Intersection Improvements

Conduit Schedule

Head #																																																																	Head #																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	R/W		Clear to Phase						R/W		Clear to Phase						R/W		Clear to Phase						R/W		Clear to Phase						R/W		Clear to Phase																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	2	3	4	5	6	7	8	3	4	5	6	7	8	1	4	5	6	7	8	1	2	5	6	7	8	1	2	3	6	7	8	1	2	3	4	7	8	1	2	3	4	5	6	1	2	3	4	5	6	7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
1	←G	↔	↔	↔	(A)	(A)	↔	↔	(B)	(C)	(C)	(A)	(A)	(C)	(C)	(B)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

Blank Squares denote Red Indication

(A) = When one phase is on alone a nonconflicting phase may start timing concurrently without a clearance interval (See Chart A).  
(B) = Flashing yellow left turn arrow (protected/permissive mode and permissive only mode) or red turn arrow (protected only mode).  
(C) = Solid yellow left turn arrow (protected/permissive mode and permissive only mode) or red turn arrow (protected only mode).

- Protected Movement
- Permitted Movement

Chart A  
Non-Conflicting Phases

On Phase	Non-Conflicting Phase Allowed to Time Concurrently
1	5 or 6
2	5 or 6
3	7 or 8
4	7 or 8
5	1 or 2
6	1 or 2
7	3 or 4
8	3 or 4

Chart B  
Overlaps

Overlap	Included Phases
A	Eastbound approach Advance Warning Flasher shall operate via a timed overlap. Include last 4.5 seconds of green and clearance for phase 8 plus phases 5, 6, and 7.
B	Westbound approach Advance Warning Flasher shall operate via a timed overlap. Include last 4.5 seconds of green and clearance for phase 4 plus phases 1, 2, and 3.

Emergency Vehicle Preemption Phasing

Direction	Southbound	Northbound	Eastbound	Westbound
Dwell Phases	Phase 1,6	Phase 2,5	Phase 3,8	Phase 4,7
Dwell Overlaps	-	-	-	-

Chart C  
Special Overlaps  
(Flashing Yellow Left Turn Arrows)

Overlap	Protected Phase	Permissive Phase
E	1	2
F	3	4
G	5	6
H	7	8

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Traffic Signal System

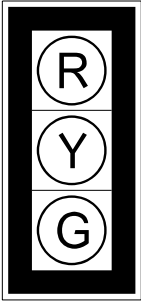
US Hwy 2 & 42nd St SE  
Intersection Improvements

Signal Controller Phasing

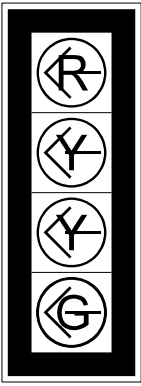
Conductor			Cable 1 (12 No.12 AWG)		Cable 2 (12 No.12 AWG)		Cable 3 (5 No.12 AWG)		Cable 4 (12 No.12 AWG)		Cable 5 (12 No.12 AWG)	
Run	Base	Tracer	Head	Indication	Head	Indication	Head	Indication	Head	Indication	Head	Indication
1	Black		2,3	Green	5	Green	P1③	Walk	6	Green Left Arrow	8,9,10	Green
2	White			Neutral		Neutral		Neutral		Neutral		Neutral
3	Red		2,3	Red	5	Red	P1③	Don't Walk	6	Red Left Arrow	8,9,10	Red
4	Green			Ground		Ground		Ground		Ground		Ground
5	Orange		2,3	Yellow	5	Yellow		Spare	6	Yellow Left Arrow	8,9,10	Yellow
6	Blue			Spare		Spare			6	Flashing Yellow Left Arrow		Spare
7	White	Black	1	Green Left Arrow	4	Green Left Arrow			7	Green Left Arrow		Spare
8	Red	Black	1	Red Left Arrow	4	Red Left Arrow			7	Red Left Arrow	P2③	Walk
9	Green	Black	3	Green Right Arrow	5	Green Right Arrow				Spare	10	Green Right Arrow
10	Orange	Black	1	Yellow Left Arrow	4	Yellow Left Arrow			7	Yellow Left Arrow	P2③	Don't Walk
11	Blue	Black	1	Flashing Yellow Left Arrow	4	Flashing Yellow Left Arrow			7	Flashing Yellow Left Arrow		Spare
12	Black	White	3	Yellow Right Arrow	5	Yellow Right Arrow				Spare	10	Yellow Right Arrow

Conductor			Cable 6 (12 No.12 AWG)		Cable 7 (12 No.12 AWG)		Cable 8 (12 No.12 AWG)		Cable 9 (12 No.12 AWG)		Cable 10 (12 No.12 AWG)	
Run	Base	Tracer	Head	Indication	Head	Indication	Head	Indication	Head	Indication	Head	Indication
1	Black		12	Green	14,15	Green	17	Green	18	Green Left Arrow	20,21,22	Green
2	White			Neutral		Neutral		Neutral		Neutral		Neutral
3	Red		12	Red	14,15	Red	17	Red	18	Red Left Arrow	20,21,22	Red
4	Green			Ground		Ground		Ground		Ground		Ground
5	Orange		12	Yellow	14,15	Yellow	17	Yellow	18	Yellow Left Arrow	20,21,22	Yellow
6	Blue			Spare		Spare		Spare	18	Flashing Yellow Left Arrow		Spare
7	White	Black	11	Green Left Arrow	13	Green Left Arrow	16	Green Left Arrow	19	Green Left Arrow		Spare
8	Red	Black	11	Red Left Arrow	13	Red Left Arrow	16	Red Left Arrow	19	Red Left Arrow		Spare
9	Green	Black	12	Green Right Arrow	15	Green Right Arrow	17	Green Right Arrow		Spare	22	Green Right Arrow
10	Orange	Black	11	Yellow Left Arrow	13	Yellow Left Arrow	16	Yellow Left Arrow	19	Yellow Left Arrow		Spare
11	Blue	Black	11	Flashing Yellow Left Arrow	13	Flashing Yellow Left Arrow	16	Flashing Yellow Left Arrow	19	Flashing Yellow Left Arrow		Spare
12	Black	White	12	Yellow Right Arrow	15	Yellow Right Arrow	17	Yellow Right Arrow		Spare	22	Yellow Right Arrow

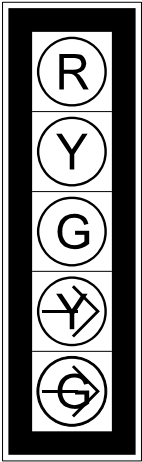
Conductor			Cable 11 (12 No.12 AWG)	
Run	Base	Tracer	Head	Indication
1	Black		24	Green
2	White			Neutral
3	Red		24	Red
4	Green			Ground
5	Orange		24	Yellow
6	Blue			Spare
7	White	Black	23	Green Left Arrow
8	Red	Black	23	Red Left Arrow
9	Green	Black	24	Green Right Arrow
10	Orange	Black	23	Yellow Left Arrow
11	Blue	Black	23	Flashing Yellow Left Arrow
12	Black	White	24	Yellow Right Arrow



(12" Lenses)  
Heads 2, 8,  
9, 14, 20, 21



(12" Lenses)  
Heads 1, 4, 6, 7,  
11, 13, 16, 18, 19, 23



(12" Lenses)  
Heads 3, 5, 10,  
12, 15, 17, 22, 24



(16" Indication)  
Future Heads  
P1, P2

Note:

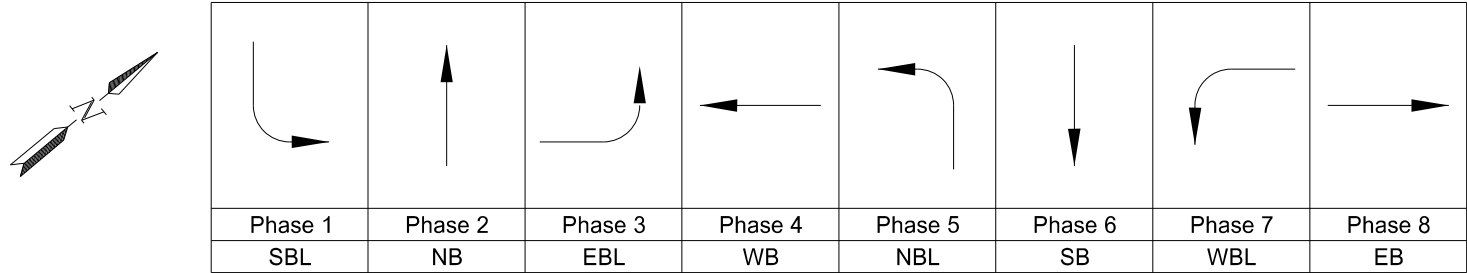
1. Use LED indications for all heads.
2. Use 5" louvered black plates with Type XI yellow reflective border on all heads.
- ③ Install cable as part of this project. The pedestrian heads will be installed at a later date by others.

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Traffic Signal System

US Hwy 2 & 42nd St SE  
Intersection Improvements

Signal Heads & Conductor Schedule



BASIC INTERVALS (OR FUNCTIONS)

Minimum Initial	5	10	5	15	5	10	5	15
Vehicle Extension	1.5	2.5	1.5	4.0	1.5	2.5	1.5	4.0
Maximum Green (Max 1)	30	50	40	60	40	40	30	60
Yellow Change	3.5	3.5	3.5	5.0	3.5	3.5	3.5	5.0
Red Clearance	3.0	3.0	3.0	1.5	3.0	3.0	3.0	1.5
Walk	-	-	-	-	-	-	-	-
Pedestrian Clearance	-	-	-	-	-	-	-	-

VOLUME DENSITY TIMING FUNCTIONS

VARIABLE INITIAL TIMING OPTIONS

Actuations Before Added Initial	-	-	-	0	-	-	-	0
Added Initial per Actuation	-	-	-	0.0	-	-	-	0.0
Maximum Initial	-	-	-	0.0	-	-	-	0.0

GAP REDUCTION OPTIONS

Time Before Reduction	-	-	-	20	-	-	-	20
Time to Reduce to Minimum Gap	-	-	-	20	-	-	-	20
Minimum Gap	-	-	-	2.5	-	-	-	2.5

OTHER CONTROLLER FUNCTIONS

Locking Memory	-	-	-	-	-	-	-	-
Non-Locking Memory	x	x	x	x	x	x	x	x
Phase recall	-	-	-	x	-	-	-	x
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Backup Prevent Phases	-	-	-	-	-	-	-	-
No Serve Phases	-	-	-	-	-	-	-	-
Flashing-Normal & Conflict Monitor	R	R	Y	Y	R	R	Y	Y

- Notes:
1. All left turn phases may operate as leading or lagging phases.
  2. All left turn phases may operate in protected, protected/permisive, or permisive mode.
  3. Calling detectors shall place one call into the controller on the yellow or red interval. Calling detectors shall be disconnected during the green interval.

TOD Operation:

Day Plan	Days In Effect	Event	Action Plan	Start Time	Left-Turn FYA Operation			
					US Hwy 2 EBL (Phase 3)	US Hwy 2 WBL (Phase 7)	14th Ave SE NBL (Phase 5)	42nd St SE SBL (Phase 1)
Day Plan 1	(Monday - Friday)	1	52	000	Permissive-Only	Permissive-Only	Permissive-Only	Permissive-Only
		2	56	600	Protected-Permissive	Protected-Permissive	Permissive-Only	Permissive-Only
		3	52	1900	Permissive-Only	Permissive-Only	Permissive-Only	Permissive-Only
Day Plan 2	(Saturday - Sunday)	1	52	000	Permissive-Only	Permissive-Only	Permissive-Only	Permissive-Only
		2	56	900	Protected-Permissive	Protected-Permissive	Permissive-Only	Permissive-Only
		3	52	1700	Permissive-Only	Permissive-Only	Permissive-Only	Permissive-Only

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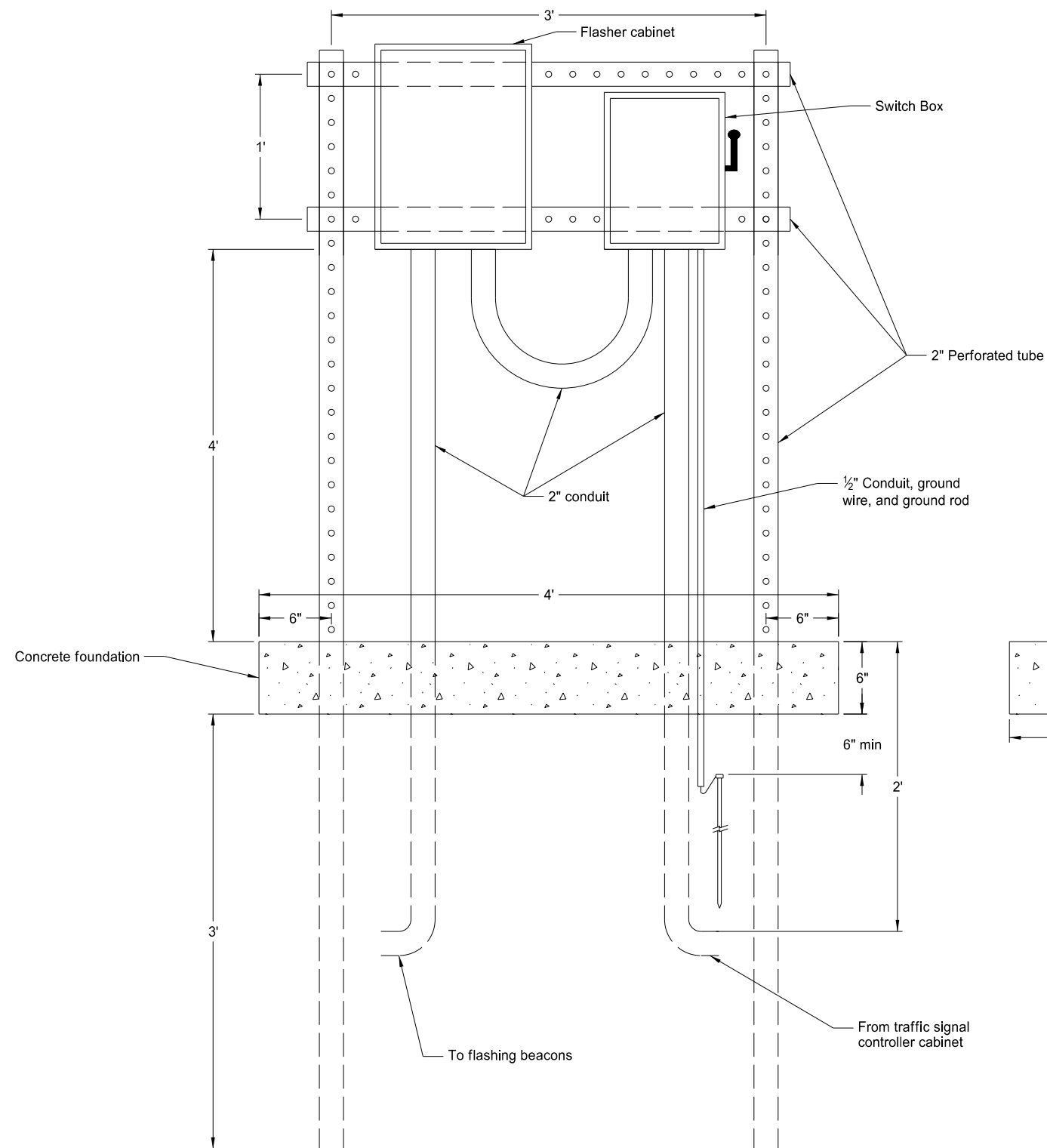
Traffic Signal System

US Hwy 2 & 42nd St SE Intersection Improvements

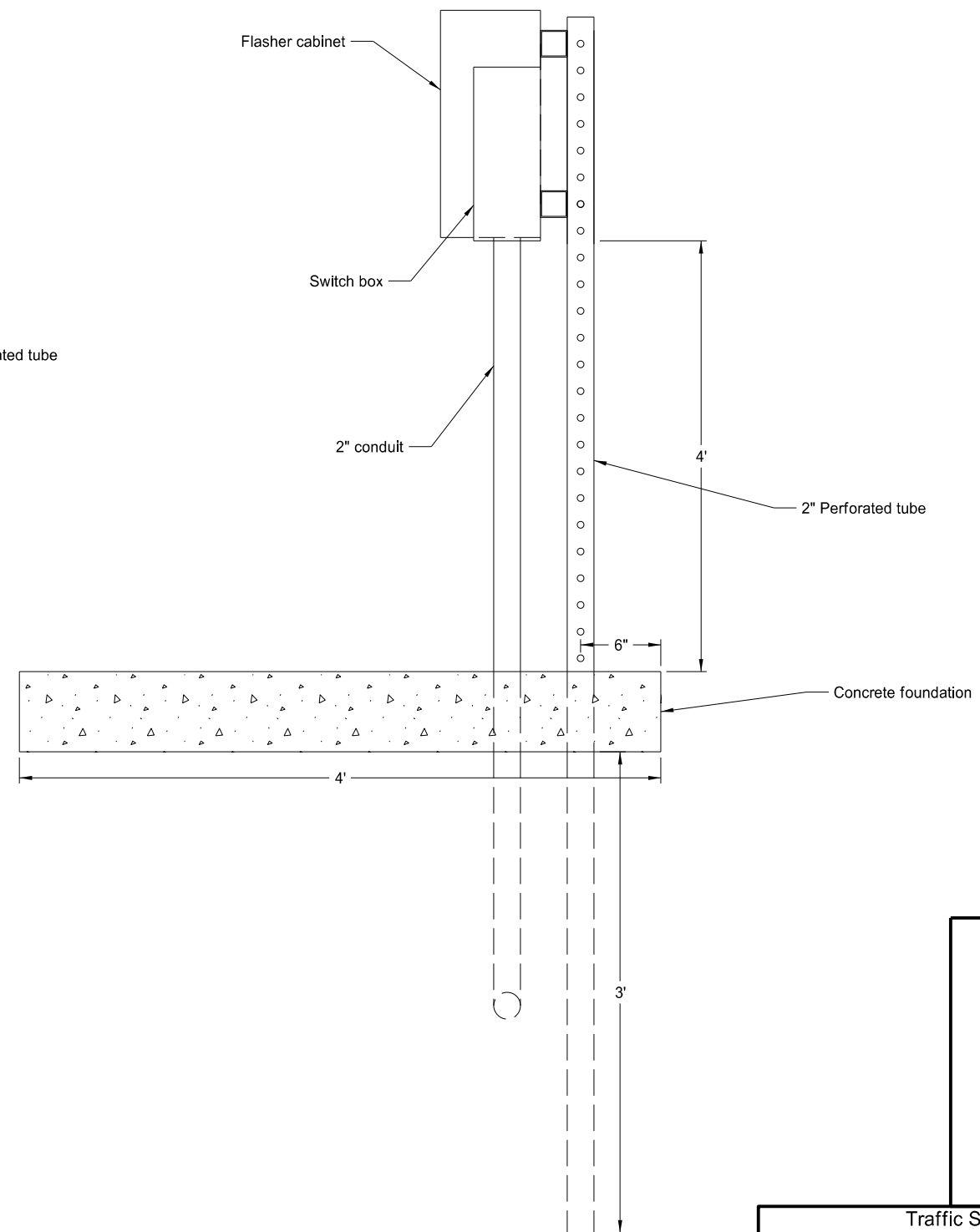
Signal Timing Settings



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-002(116)149	150	17



Pipe Stand Feed Point Detail  
Sta 7909+29.04 - 85.5' RT  
Sta 7922+28.96 - 85.5' LT



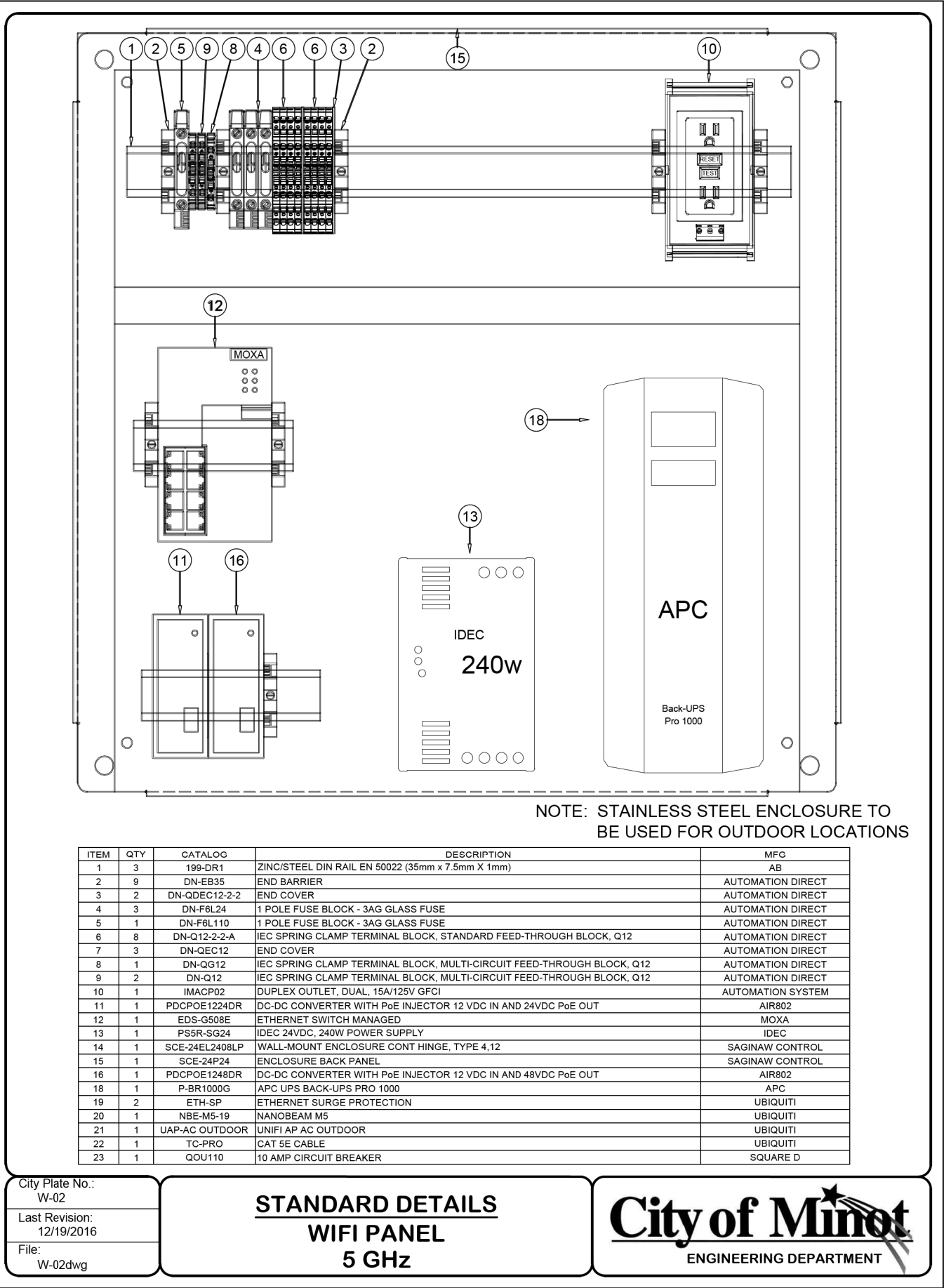
Side View

Drawing not to scale

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Traffic Signal System  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
Pipe Stand Feed Detail





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Traffic Signal System  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
Wi-Fi Panel Detail

SPEC	CODE	ITEM DESCRIPTION	UNIT	TOTAL
770	0445	MULTIPLE UNDERGROUND CABLE 3NO6 STYLE USE	LF	1630
772	0020	CONCRETE FOUNDATION-TRAFFIC SIGNALS	EA	10
772	0100	PULL BOX	EA	6
772	0200	1IN DIAMETER RIGID CONDUIT	LF	60
772	0240	2IN DIAMETER RIGID CONDUIT	LF	1370
772	0270	3IN DIAMETER RIGID CONDUIT	LF	175
772	0290	4IN DIAMETER RIGID CONDUIT	LF	600
772	0375	EMERGENCY VEHICLE DETECTOR CABLE	LF	1300
772	0400	NO12 AWG 2 CONDUCTOR CABLE	LF	630
772	0401	NO12 AWG 3 CONDUCTOR CABLE	LF	1300
772	0403	NO12 AWG 5 CONDUCTOR CABLE	LF	535
772	0410	NO12 AWG 12 CONDUCTOR CABLE	LF	2845
772	0551	FEED POINT-COMBO LIGHTING & SIGNAL-PAD MOUNT	EA	1
772	0700	TYPE VI SIGNAL STANDARD	EA	4
772	0842	COMBO 14FT MA SIG & LIGHT STD-TYPE C	EA	1
772	0852	COMBO 15FT MA SIG & LT STD-TYPE C	EA	1
772	1152	COMBO 45FT MA SIG & LT STD-TYPE C	EA	1
722	1222	COMBO 51FT MA SIG & LT STD-TYPE C	EA	1
772		COMBO 65FT MA SIG & LT STD-TYPE C	EA	2
772	1812	1-WAY 3 SEC HEAD W/12IN LENS-MA MTD	EA	6
772	1820	1-WAY 4 SEC HEAD W/12IN LENS-POST MTD	EA	6
772	1822	1-WAY 4 SEC HEAD W/12IN LENS-MA MTD	EA	4
772	1830	1-WAY 5 SEC HEAD W/12IN LENS-POST MTD	EA	8
772	2160	FLASHING BEACON	EA	4
772	2260	VIDEO DETECTION CABLE	LF	1215
772	2265	VIDEO DETECTION SYSTEM	EA	1
772	2350	CONTROLLER TYPE 1	EA	1
772	2556	BATTERY BACKUP SYSTEM	EA	1
772	2610	EMERGENCY VEHICLE PREEMPTION UNIT	EA	4
772	2700	TYPE A CONTROLLER & CABINET	EA	1
772		WI-FI PANEL AND SYSTEM	EA	1
772	9811	TRAFFIC SIGNAL SYSTEM - SITE 1	EA	1
		Items shown above are for informational purposes; contractor shall provide all labor and equipment necessary for the signal system to be fully operational as shown in the Plans. Items shall be included in the corresponding price bid for "TRAFFIC SIGNAL SYSTEM - SITE 1"		

See section 140 for LED luminaires

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Traffic Signal System  
  
US Hwy 2 & 42nd St SE  
Intersection Improvements  
  
Estimated Traffic Signal Quantities