Section B: Grading Plans

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B1	B130

Plotting Date: 09/02/2015

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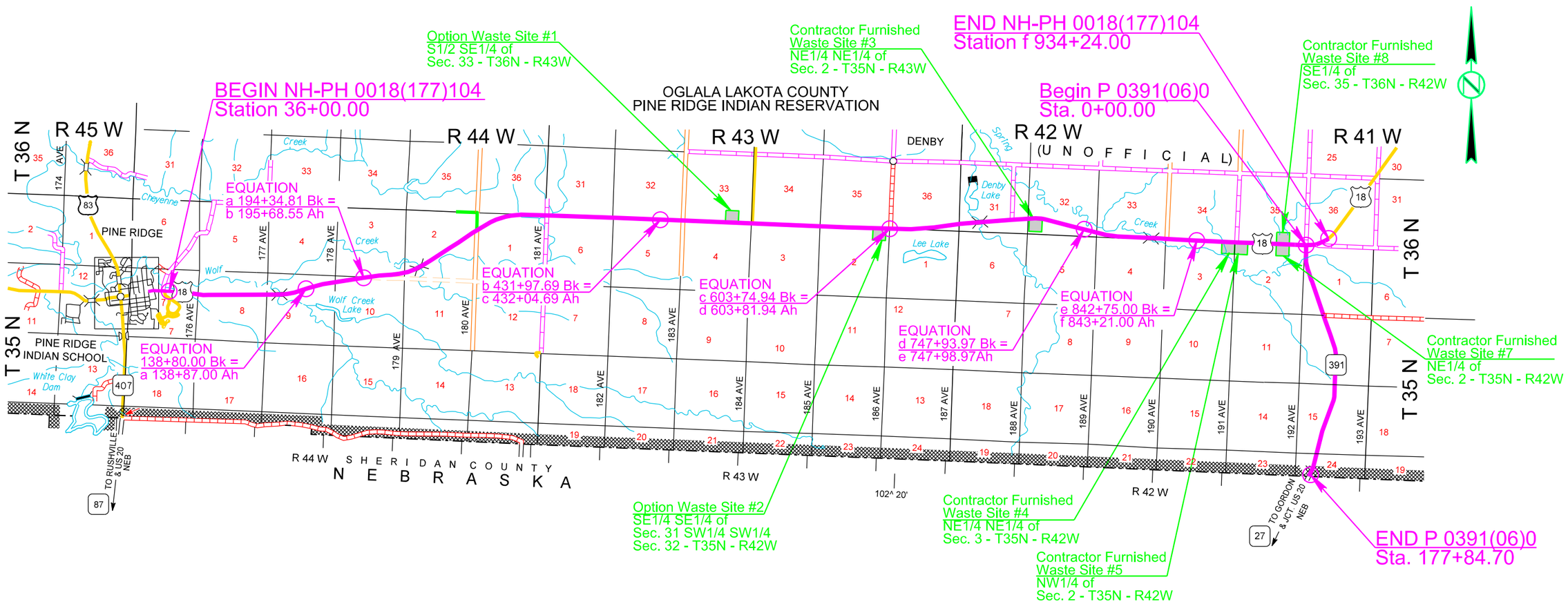

SECTION B ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
004E0030	Maintenance of Traffic Diversion(s)	Lump Sum	LS
004E0050	Remove Traffic Diversion(s)	Lump Sum	LS
009E0010	Mobilization	Lump Sum	LS
009E3230	Grade Staking	22.369	Mile
009E3245	Final Cross Section Survey	17.823	Mile
009E3250	Miscellaneous Staking	17.823	Mile
009E3280	Slope Staking	17.823	Mile
009E3290	Structure Staking	5	Each
009E3300	Three Man Survey Crew	40.0	Hour
009E4200	Construction Schedule, Category II	Lump Sum	LS
100E0100	Clearing	Lump Sum	LS
110E0550	Remove Cattle Guard	3	Each
110E0600	Remove Fence	93,705	Ft
110E0605	Remove Chain Link Fence	100	Ft
110E0700	Remove 3 Cable Guardrail	1,573	Ft
110E1010	Remove Asphalt Concrete Pavement	43,838.7	SqYd
110E1140	Remove Concrete Sidewalk	285.0	SqYd
110E7040	Remove Gate for Reset	4	Each
120E0010	Unclassified Excavation	1,046,150	CuYd
120E0900	Contaminated Material Excavation	100	CuYd
120E1000	Muck Excavation	11,381	CuYd
120E2000	Undercutting	194,440	CuYd
120E6100	Water for Embankment	764.9	MGal
240E0010	Obliterate Old Road	12	Sta
250E0020	Incidental Work, Grading	Lump Sum	LS
270E0040	Salvage and Stockpile Asphalt Mix and Granular Base Material	4,018.7	Ton
420E0400	Structure Excavation, Miscellaneous	3	CuYd
421E0100	Pipe Culvert Undercut	2,759	CuYd
421E2060	6" Extruded Polystyrene Insulation Board	8	SqYd
450E0142	24" RCP Class 2, Furnish	2,906	Ft
450E0143	24" RCP Class 3, Furnish	30	Ft
450E0150	24" RCP, Install	2,936	Ft
450E0162	30" RCP Class 2, Furnish	732	Ft
450E0170	30" RCP, Install	732	Ft
450E0182	36" RCP Class 2, Furnish	296	Ft
450E0190	36" RCP, Install	296	Ft
450E0202	48" RCP Class 2, Furnish	102	Ft
450E0210	48" RCP, Install	102	Ft
450E0232	66" RCP Class 2, Furnish	476	Ft
450E0240	66" RCP, Install	476	Ft
450E0242	72" RCP Class 2, Furnish	148	Ft
450E0243	72" RCP Class 3, Furnish	40	Ft
450E0250	72" RCP, Install	188	Ft
450E0252	78" RCP Class 2, Furnish	168	Ft

SECTION B ESTIMATE OF QUANTITIES (CONTINUED)

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
450E0260	78" RCP, Install	168	Ft
450E0416	24" RCP Bend, Furnish	1	Each
450E0417	24" RCP Bend, Install	1	Each
450E2028	36" RCP Flared End, Furnish	6	Each
450E2029	36" RCP Flared End, Install	6	Each
450E2036	48" RCP Flared End, Furnish	2	Each
450E2037	48" RCP Flared End, Install	2	Each
450E2048	66" RCP Flared End, Furnish	8	Each
450E2049	66" RCP Flared End, Install	8	Each
450E2052	72" RCP Flared End, Furnish	2	Each
450E2053	72" RCP Flared End, Install	2	Each
450E2056	78" RCP Flared End, Furnish	2	Each
450E2057	78" RCP Flared End, Install	2	Each
450E2200	24" RCP Sloped End, Furnish	60	Each
450E2201	24" RCP Sloped End, Install	60	Each
450E2204	30" RCP Sloped End, Furnish	16	Each
450E2205	30" RCP Sloped End, Install	16	Each
450E3004	18" RCP Arch Class 4, Furnish	92	Ft
450E3010	18" RCP Arch, Install	92	Ft
450E3012	24" RCP Arch Class 2, Furnish	234	Ft
450E3014	24" RCP Arch Class 4, Furnish	318	Ft
450E3020	24" RCP Arch, Install	552	Ft
450E3022	30" RCP Arch Class 2, Furnish	598	Ft
450E3030	30" RCP Arch, Install	598	Ft
450E3032	36" RCP Arch Class 2, Furnish	240	Ft
450E3040	36" RCP Arch, Install	240	Ft
450E3042	42" RCP Arch Class 2, Furnish	242	Ft
450E3050	42" RCP Arch, Install	242	Ft
450E3062	54" RCP Arch Class 2, Furnish	180	Ft
450E3070	54" RCP Arch, Install	180	Ft
450E4500	18" RCP Arch Flared End, Furnish	4	Each
450E4501	18" RCP Arch Flared End, Install	4	Each
450E4512	36" RCP Arch Flared End, Furnish	6	Each
450E4513	36" RCP Arch Flared End, Install	6	Each
450E4516	42" RCP Arch Flared End, Furnish	6	Each
450E4517	42" RCP Arch Flared End, Install	6	Each
450E4524	54" RCP Arch Flared End, Furnish	4	Each
450E4525	54" RCP Arch Flared End, Install	4	Each
450E4600	24" RCP Arch Sloped End, Furnish	6	Each
450E4601	24" RCP Arch Sloped End, Install	6	Each
450E4604	30" RCP Arch Sloped End, Furnish	16	Each
450E4605	30" RCP Arch Sloped End, Install	16	Each
450E4650	18" RCP Arch Safety End, Furnish	3	Each
450E4653	18" RCP Arch Safety End, Install	3	Each

SECTION B ESTIMATE OF QUANTITIES (CONTINUED)

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
450E4759	18" CMP 16 Gauge, Furnish	2,354	Ft
450E4760	18" CMP, Install	2,354	Ft
450E4769	24" CMP 16 Gauge, Furnish	282	Ft
450E4770	24" CMP, Install	282	Ft
450E4799	42" CMP 16 Gauge, Furnish	88	Ft
450E4800	42" CMP, Install	88	Ft
450E5010	18" CMP Elbow, Furnish	1	Each
450E5011	18" CMP Elbow, Install	1	Each
450E5227	42" CMP Flared End, Furnish	4	Each
450E5228	42" CMP Flared End, Install	4	Each
450E5406	18" CMP Safety End, Furnish	73	Each
450E5407	18" CMP Safety End, Install	73	Each
450E5410	24" CMP Safety End, Furnish	10	Each
450E5411	24" CMP Safety End, Install	10	Each
450E5509	18" CMP Arch 16 Gauge, Furnish	252	Ft
450E5510	18" CMP Arch, Install	252	Ft
450E5519	24" CMP Arch 16 Gauge, Furnish	324	Ft
450E5520	24" CMP Arch, Install	324	Ft
450E5529	30" CMP Arch 16 Gauge, Furnish	54	Ft
450E5530	30" CMP Arch, Install	54	Ft
450E5802	18" CMP Arch Flared End, Furnish	2	Each
450E5803	18" CMP Arch Flared End, Install	2	Each
450E6006	18" CMP Arch Safety End, Furnish	8	Each
450E6007	18" CMP Arch Safety End, Install	8	Each
450E6010	24" CMP Arch Safety End, Furnish	14	Each
450E6011	24" CMP Arch Safety End, Install	14	Each
450E6015	30" CMP Arch Safety End with Bars, Furnish	2	Each
450E6017	30" CMP Arch Safety End, Install	2	Each
450E8013	24" CMP to RCP Transition, Furnish	1	Each
450E8014	24" RCP to CMP Transition, Furnish	1	Each
450E8015	24" Pipe Transition, Install	2	Each
* 450E8900	Cleanout Pipe Culvert	1	Each
462E0100	Class M6 Concrete	6.9	CuYd
464E0100	Controlled Density Fill	121.5	CuYd
480E0100	Reinforcing Steel	901	Lb
560E5003	5'x7' Reinforced Concrete Cattle Pass, Furnish	84.0	Ft
560E5004	5'x7' Reinforced Concrete Cattle Pass, Install	84.0	Ft
560E5053	5'x7' Reinforced Concrete Cattle Pass End Section, Furnish	2	Each
560E5054	5'x7' Reinforced Concrete Cattle Pass End Section, Install	2	Each
600E0300	Type III Field Laboratory	1	Each
610E0012	12' Cattle Guard	1	Each
610E0020	20' Cattle Guard	2	Each
620E0020	Type 2 Right-of-Way Fence	148,422	Ft
620E0030	Type 3 Right-of-Way Fence	3,098	Ft

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SECTION B ESTIMATE OF QUANTITIES (CONTINUED)

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
620E0220	Modified Type 2 Right-of-Way Fence	12,254	Ft
620E0510	Type 1 Temporary Fence	26,362	Ft
620E1020	2 Post Panel	347	Each
620E1030	3 Post Panel	294	Each
620E2012	12' Tubular Gate	2	Each
620E2100	Reset Gate	4	Each
621E0180	8' Chain Link Fence with Tension Wired Top	90	Ft
621E0185	10' Chain Link Fence with Tension Wired Top	834	Ft
632E2540	Flexible Object Marker Post	11	Each
635E7500	Remove and Reset Luminaire Pole	1	Each
651E0040	4" Concrete Sidewalk	1,876	SqFt
651E0060	6" Concrete Sidewalk	689	SqFt
671E6020	Type C Manhole Frame and Lid	2	Each
671E7010	Adjust Manhole	1	Each
671E8000	Reconstruct Manhole	4	Each
700E0210	Class B Riprap	308.0	Ton
700E0310	Class C Riprap	209.0	Ton
720E1015	Bank and Channel Protection Gabion	298.5	CuYd
831E0110	Type B Drainage Fabric	136	SqYd
831E0210	Non-woven Separator Fabric	6,115	SqYd
900E0010	Refurbish Single Mailbox	3	Each
900E0012	Refurbish Double Mailbox	1	Each
900E1080	Orange Plastic Safety Fence	50	Ft
900E1980	Storage Unit	1	Each

*** - Denotes Non-Participating**

UTILITIES

The Contractor shall be aware that the existing utilities shown in the plans were surveyed prior to the design of this project and might have been relocated or replaced by a new utility facility prior to construction of this project, might be relocated or replaced by a new utility facility during the construction of this project, or might not require adjustment and may remain in its current location. The Contractor shall contact each utility owner and confirm the status of all existing and new utility facilities. The utility contact information is provided elsewhere in the plans or bidding documents.

Subsurface utility explorations were done for this project. The findings can be found in the SUBSURFACE UTILITY LOCATIONS table elsewhere in the plans. The table is provided to aid the Contractor during construction. All information in the table is approximate and shall be verified by the Contractor prior to construction in those areas.

PROJECT COORDINATION

A utility project (PCN X03R) to adjust existing rural water lines is being let in combination with this highway project. The Contractor shall coordinate work activities between the projects to avoid conflicts.

GRADING OPERATIONS

Water for Embankment is estimated at the rate of 10 gallons of water per cubic yard of Embankment minus Waste.

The estimated cubic yards of excavation and/or embankment required to construct outlet ditches, ditch blocks, and approaches are included in the earthwork balance notes on the profile sheets.

Special ditch grades and other sections of the roadway different than the typical section(s) shall be constructed to the limits shown on the cross sections. If significant changes to the cross sections are necessary during construction, the Engineer shall contact the Designer for the proposed change.

Generally, all shallow inlet and outlet ditches as noted on the plan sheets shall be cut with a 10-foot wide bottom with 5:1 backslopes. However, the Engineer may direct the Contractor to adjust the ditch width for proper alignment with the drainage structure.

Two thirds of the samples taken from US 18, both from the grading cuts and in the present subgrade, had silt content above 40%. In most cases, these soils also don't have much clay content. This makes them very difficult to use as subgrade topping material. This type of soil can become unstable under construction traffic, even when placed with adequate moisture and density control. Please review the Soils Profile to determine the location of these soils. It would be best practice to avoid using high silt soil in the upper foot of the subgrade, where possible. Past experience with soils of this nature indicates that the moisture content is key to controlling embankment stability. The soil shall be at optimum moisture to 4% below optimum moisture at the time of compaction (+0% to –4%). A moisture content approximately 2% below optimum moisture has worked well on past projects.

Temporary fence and/or permanent fence shall be placed ahead of the grading operation unless otherwise directed by the Engineer.

A copy of the soils profile is available for review at the Rapid City Region and Custer Area offices.

PIPE FOR APPROACHES AND INTERSECTING ROADS

Class II reinforced concrete pipe, high density polyethylene pipe, corrugated polypropylene pipe, or steel reinforced polyethylene pipe may be substituted for corrugated metal pipe at approaches and intersecting roads at no additional cost to the State.

If corrugated metal pipes are provided, the pipes shall be as specified in the CORRUGATED METAL PIPE note.

If high density polyethylene pipe, corrugated polypropylene pipe, or steel reinforced polyethylene pipe are provided, then the end sections shall be metal, be compatible, and conform to the type of end section as shown in the plans.

TRAFFIC DIVERSION CONSTRUCTION REQUIREMENTS (DIV 122, DIV c502, DIV d673, DIV e805)

The Contractor shall utilize the following procedures (and as directed by the Engineer) for traffic diversion installation and removal within the limits of the channel crossings and wetland areas:

1) Remove as much organic material (grass and brush) as possible without disturbing the ground surface. Mowing is recommended, burning is prohibited. No topsoil or stream material shall be removed through this area except as noted below.
2) Place a layer of non-woven separator fabric over non-excavated ground surfaces. Pins or staples will be allowed to hold fabric in place. Overlap seams a minimum of 1 foot.
3) Install temporary drainage structure(s) as outlined in the "Table of Temporary Drainage Structures in Traffic Diversions".
4) Keep the separator fabric as taut a possible prior to placing riprap / embankment.
5) Place a layer of riprap up to the Ordinary Highwater Elevation as listed in the "Table of Temporary Drainage Structures in Traffic Diversions". Some areas of the sites will not require riprap since the ground elevation is above the Ordinary Highwater Elevation.
6) Place a layer of non-woven separator fabric on top of riprap.
7) Complete construction of traffic diversion as outlined in the plan / profile sheets with embankment and surfacing material.
8) After the completion of new structure construction and the roadway is reopened to traffic, the traffic diversion surfacing, embankment, riprap, separator fabric and temporary drainage structures shall be removed in association with the requirements outlined in the "Traffic Diversions" note.

It is anticipated that excavation will be required at DIV 122 and DIV d673 to allow for installation of the temporary drainage structure(s) and to avoid disturbance of the existing low flow channels. For these locations, the following additional steps will be required (Note – non-woven separator fabric will not be installed in excavated sections):

1A) Remove and stockpile stream topsoil from location where temporary drainage structure(s) will be installed.
1B) Excavate and stockpile stream material to allow for installation of the temporary drainage structure(s).
8A) Replace previously excavated stream material and topsoil to the original ground elevations as outlined in the "Wetland Survey" note.
8B) Class B (DIV 122) / Class C (DIV d673) Riprap shall be placed along the upstream side of the reconstructed stream embankment area as directed by the Engineer.
8C) Install type 3 turf reinforcement mat on the top of the newly reconstructed stream embankment as directed by the Engineer.

Step #5 for DIV c502 will only require riprap to be used to armor the outside of the traffic diversion embankment below the Ordinary Highwater Elevation as shown on the Typical Sections elsewhere in Section B.

Estimated quantities to complete this work for Non-woven Separator Fabric, Class B Riprap, Class C Riprap and Type 3 Turf Reinforcement Mat have been included in Sections B and D. All costs to excavate and stockpile stream material and topsoil as well as subsequent replacement of the stream material and topsoil in association with the installation and removal of temporary drainage structure(s) shall be incidental to the contract lump sum price for "Maintenance of Traffic Diversion(s)".

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SHALLOW MAINLINE PIPE INSTALLATION

Pipe culverts at depths of less than 10' (measured from the flow line to the lowest elevation of either the existing ground line, undercut line, or bottom of removed or salvaged surfacing) as shown in the "Table of Shallow Mainline Pipe Installation" shall be installed in accordance with the following note and as shown on the "Shallow Pipe Installation Detail".

This work shall be completed prior to the commencement of cold milling operations on the project.

After the existing pipe has been removed, the new pipe culvert shall be undercut to a minimum depth of 1 foot (2 feet for multiple pipe installations) and backfilled with base course. The depth of undercut is an estimate and the actual depth necessary shall be determined during construction. The Engineer will determine how much undercut shall be done in accordance with Section 421 of the Specifications, but will not reduce the undercut to less than 1 foot in depth. Compaction of the undercut backfill will be in accordance with Section 421.3.A.

The culvert bedding shall be base course material placed to form a bed that is at least 15 percent of the pipe height above the lower face (invert) of the pipe. The material shall be thoroughly compacted to provide a firm uniform foundation. The foundation shall then be shaped (cradled) to fit the lower part of the pipe, and the pipe shall be laid on a three inch thick layer of sand. The Contractor shall ensure that the cradle is constructed at an elevation such that after placing the three inches of sand in the cradle, the flowline elevation of the pipe is correct. Base course shall then be placed in 6 inch layers and compacted with mechanical tampers, to at least 30 percent of the overall pipe height.

The remainder of the pipe culvert excavation shall be backfilled with soils taken from the pipe removal excavation or other suitable material as approved by the Engineer. The backfill will be benched into the 2:1 excavation slope. Compaction of the backfill material shall be governed by the Specified Density Method.

The minimum testing as shown in M.S.T.R. Section 4.1.E.3.a.1 will be required.

After the new pipe has been backfilled to the top of the subgrade, surfacing shall be placed as detailed in Section F.

All costs to remove the asphalt concrete pavement, including full depth saw cutting of the asphalt concrete pavement shall be incidental to the contract unit price per square yard for "Remove Asphalt Concrete Pavement". Base Course for pipe undercut backfill and bedding shall be paid for at the contract unit price per ton for "Base Course" in Section F. Pipe Culvert Undercut shall be paid for at the contract unit price per cubic yard for "Pipe Culvert Undercut". Excavation necessary for shallow mainline pipe installation and the bedding sand shall be incidental to the contract unit price per foot for the corresponding pipe installation bid items. See estimated quantity tables for "Remove Asphalt Concrete Pavement" and "Pipe Culvert Undercut" elsewhere in Section B.

TABLE OF SHALLOW MAINLINE PIPE INSTALLATION

Station
64+27
a155+00
a170+50
b251+60
b257+49
b264+98
b298+98
b312+97
b319+79
b328+97
b339+72
b342+67
b356+95
b365+75
b392+75
b408+94
b421+48
c438+70
c450+81
c467+76
c520+80
c534+50
c555+67
c570+76
c579+51
c587+96
c600+31
d605+22
d613+26
d634+50
d640+99
d649+85
d651+50
d656+63
d709+83
d720+97
d730+48
e750+01
e755+68
e759+46
e770+83
e773+50
e776+99
e820+97
e832+12
f870+55
f875+00
f893+00
f903+33
f924+83
f931+99

INSLOPE TRANSITIONS

Inslope transitions will be required at various drainage structures and pipe locations. Refer to Standard Plate 120.05 for details.

TABLE OF INSLOPE TRANSITIONS AT PIPE CULVERTS OR REINFORCED CONCRETE BOX CULVERTS

Station	L/R	Type
b319+79	R	2
b342+67	L&R	2
b438+70	L&R	2
c502+00	L&R	2
c520+80	L&R	2
c534+50	L&R	2
d651+50	L&R	2
d656+63	L&R	2
e805+43	L&R	2
f875+00	L&R	2
f903+33	L&R	2
f912+45	L&R	2
f924+83	L&R	2

OBLITERATING OLD ROAD

The Contractor shall obliterate the existing roadway at the locations listed in the Table of Obliterating Old Road.

The Contractor shall obliterate the existing roadway in accordance with Section 240 of the Specifications when the existing roadway is not being removed in accordance with the template section.

The earthwork necessary for obliterating the existing road shall be accomplished to such an extent that placing topsoil and seeding can be done in a satisfactory manner. Quantities of topsoil, fertilizing, mulching, and seeding for the obliterated sections of the old road are included in the Section D - Erosion and Sediment Control Plans Estimate of Quantities.

TABLE OF OBLITERATING OLD ROAD

Station	to	Station	L/R	Length (Sta)
b280+00		b284+03	R	7.0
f930+71		f934+93	R	4.7
			Total:	11.7

STATION C 495+30 TO C 501+70

There is a shoulder widening exception from Sta. c 495+30 to c 501+70. The Contractor shall construct a 6:1 inslope on each side of this roadway section as directed by the Engineer. All costs associated with this work shall be incidental to the contract unit price per cubic yard for "Unclassified Excavation".

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PIPE CULVERT CLEANOUT

Material in existing culverts as listed in the table below shall be cleaned out by water flushing or other methods approved by the Engineer. Depending on field conditions at the time of construction, the Engineer may add additional culverts or remove culverts that need to be cleaned out.

The Contractor shall implement appropriate sediment control measures prior to water flushing in order to prevent discharges from project boundaries and to comply with the Storm Water Permit.

Station	Offset	Quantity (Each)
d730+52	147'L	1
Total:		1

SURFACING WEDGE REMOVAL AND DISPOSAL

After the existing surfacing is saw cut 13 feet from centerline there will be a wedge of surfacing material containing asphalt concrete and granular material which needs to be removed. Refer to the Typical Surfacing Sections in Section F for additional details and dimensions of this wedge.

The asphalt concrete material contained in this wedge will become the property of the Contractor and may not be disposed of in the roadway embankment. Removal of the asphalt concrete wedge will be paid for at the contract unit price per square yard for "Remove Asphalt Concrete Pavement". The quantity for this item is based on a typical width of 2 feet for each side of the roadway. This 2 foot width includes the width of the asphalt concrete bevel. The plans quantity of 43,838.7 square yards will be the basis of payment unless field conditions differ significantly from the assumed in-place conditions and ordered by the Engineer.

The granular material contained in this wedge will become the property of the Contractor and may be disposed of in the roadway embankment. The granular base material portion is not included in the Excavation quantity for the individual balance notes. But, it is included in the Unclassified Excavation quantity. All cost for removal of the granular material will be incidental to the contract unit price per cubic yard for "Unclassified Excavation".

REINFORCED CONCRETE PIPE

High sulfate levels are likely to be encountered in two locations on this project. The soil between Sta. 470+00 and Sta. 530+00 and between Sta. 655+00 and Sta. 673+00 is rated as being highly corrosive to concrete. The type of cement used for the reinforced concrete pipes shall be either a type II with 20% class F modified fly ash substituted for cement in accordance with Specifications Section 605 or a type V. The water/cementitious material ratio shall not exceed 0.45 as defined in Specifications Section 460.3 C. The mix shall be as per the fabricator's design; however, minimum compressive strength shall not be less than 4500 psi at 28 days. The pipe must be marked in an acceptable way to designate meeting requirements for sulfate resistance.

Standard concrete products may be used on the remainder of the project.

TABLE OF ASPHALT CONCRETE PAVEMENT REMOVAL

Station to	Station	Type	Quantity (SqYd)
36+00	86+87	Asphalt Wedge	2260.9
94+50	110+00	Asphalt Wedge	688.9
a139+50	b235+75	Asphalt Wedge	4218.3
b245+00	c495+30	Asphalt Wedge	11121.3
c501+70	d693+50	Asphalt Wedge	8521.3
d705+25	e834+25	Asphalt Wedge	5731.1
f850+50	f934+24	Asphalt Wedge	3721.8
42+12		Pipe Installation	220.1
58+51		Pipe Removal	56.3
64+27		Pipe Installation	70.3
a155+00		Pipe Installation	82.8
a170+50		Pipe Installation	88.1
b251+60		Pipe Installation	120.9
b257+49		Pipe Installation	90.9
b264+98		Pipe Installation	83.6
b298+98		Pipe Installation	67.8
b312+97		Pipe Installation	68.2
b319+79		Pipe Installation	165.8
b328+97		Pipe Installation	79.0
b339+72		Pipe Installation	82.1
b342+67		Pipe Installation	212.5
b356+95		Pipe Installation	118.8
b365+75		Pipe Installation	69.8
b392+75		Pipe Installation	203.9
b408+94		Pipe Installation	66.0
b421+48		Pipe Installation	74.3
c438+70		Pipe Installation	85.9
c450+81		Pipe Installation	209.4
c467+76		Pipe Installation	74.9
c502+00		RCBC Installation	164.9
c520+80		Pipe Installation	96.2
c534+50		Pipe Installation	89.3
c555+67		Pipe Installation	95.2
c570+76		Pipe Installation	104.4
c579+51		Pipe Installation	80.4
c587+96		Pipe Installation	71.6
c600+31		Pipe Installation	89.4
d605+22		Pipe Installation	134.9
d610+74		Pipe Installation	196.2
d613+26		Pipe Installation	127.1
d634+50		Pipe Installation	115.0
d640+99		Pipe Installation	107.4
d649+85		Pipe Installation	87.9
d651+50		RCCP Installation	140.1
d656+63		Pipe Installation	109.3
d665+00		Pipe Installation	192.5
d673+25		RCBC Installation	282.5
d709+83		Pipe Installation	83.3
d720+97		Pipe Installation	112.9
d725+31		Pipe Installation	196.8
d730+48		Pipe Installation	109.5
e750+01		Pipe Installation	80.6
e755+68		Pipe Installation	75.3
e759+46		Pipe Installation	86.7

TABLE OF ASPHALT CONCRETE PAVEMENT REMOVAL (CONTINUED)

Station to	Station	Type	Quantity (SqYd)
e770+83		Pipe Installation	137.0
e773+50		Pipe Installation	122.1
e776+99		Pipe Installation	70.7
e795+06		Pipe Installation	292.1
e805+43		RCBC Installation	206.6
e820+97		Pipe Installation	80.2
e832+12		Pipe Installation	106.9
f859+66		Pipe Installation	266.8
f870+55		Pipe Installation	75.9
f875+00		Pipe Installation	89.4
f893+00		Pipe Installation	119.3
f903+33		Pipe Installation	125.4
f912+45		RCBC Installation	277.7
f924+83		Pipe Installation	88.0
f931+99		Pipe Installation	96.2
		Total:	43838.7

EXISTING SURFACING – SHOULDER WIDENING SECTIONS

The following is furnished for information only.

In the shoulder widening sections, the asphalt pavement thickness ranged from 5.5 to 10.0 inches with an average of 7.6 inches. The base course thickness varied between 3.0 and 7.0 inches with an average of 4.8 inches. The average pavement width was 24.1 feet.

STANDARD HEADWALL FOR RC PIPE

The Contractor shall install Standard Headwalls with 3'-0" Cutoff Walls at the locations shown in the table below. (See Standard Headwall Details sheet elsewhere in Section B.)

All costs to construct the Standard Headwalls shall be included in the contract unit prices for the bid items listed in the table.

TABLE OF STANDARD HEADWALLS

Station	L / R	RCP Size	Class M6 Concrete (CuYd)	Reinf. Steel (Lb)	Structure Excavation, Misc. (CuYd)
e795+06	R	72"	2.5	337	1.5
e795+06	L	72"	2.5	337	1.5
			5.0	674	3.0

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UNCLASSIFIED EXCAVATION WASTE SITES

Option Waste Agreements have been secured at the areas designated as "Option Waste Site". The only material allowed to be placed in these waste areas is excess excavation material consisting of rock and soil. The exact size and location of the Option Waste Sites will be determined in the field in coordination with the landowners and as approved by the Engineer. All costs associated with Option Waste Sites for Excess Excavation (except as outlined below) shall be incidental to the contract unit price per cubic yard for "Unclassified Excavation".

Prior to wasting material at Option Waste sites, the Contractor shall strip and stockpile the topsoil material as approved by the Engineer. The estimated topsoil quantities for the sites (based upon an estimated depth of 4") are listed in the "Table of Option Waste Sites". The estimate is based upon a material depth of 5'. The topsoil quantity of 1,600 cubic yards is included in the "Table of Unclassified Excavation" in Section B and in the bid item "Placing Topsoil" in Section D. Estimated quantities for seed, fertilizer and mulch for the Option Waste Sites are also included in Section D under their respective bid items.

Contractor Furnished Waste sites are those areas in which archeological clearance has been obtained but no option agreement secured. These areas are designated as "Contractor Furnished Waste". All costs associated with Contractor Furnished Waste Sites for Excess Excavation including topsoil, seed, fertilizer and mulch shall be incidental to the contract unit price per cubic yard for "Unclassified Excavation".

Archeological clearances have been obtained at the Option and Contractor Furnished Waste sites listed below. The quantities are approximations only. Some sites are estimated to have zero materials wasted at the site, but are included to indicate areas where archeological clearance has been obtained. Contact the Rapid City Region Materials Office (Matt Stone: 605-394-1630) for further information.

The estimated quantities and approximate waste site locations are the basis for the earthwork balance notes and haul calculations.

Option Waste Site #1A
Location: Sta. c475+00 L
Deadhaul: 450 feet
Approximate Quantity: 26,439 Cu. Yds.
Owner: Oglala Sioux Tribe

Option Waste Site #1B
Location: Sta. c485+00 L
Deadhaul: 250 feet
Approximate Quantity: 0 Cu. Yds.
Owner: Oglala Sioux Tribe

Option Waste Site #1C
Location: Sta. c485+00 L
Deadhaul: 750 feet
Approximate Quantity: 0 Cu. Yds.
Owner: Oglala Sioux Tribe

Option Waste Site #2
Location: Sta. c598+00 R
Deadhaul: 400 feet
Approximate Quantity: 0 Cu. Yds.
Owner: Roger Latshaw

UNCLASSIFIED EXCAVATION WASTE SITES (CONTINUED)

Contractor Furnished Waste Site #3
Location: Sta. d710+00 R
Deadhaul: 250 feet
Approximate Quantity: 28,000 Cu. Yds.
Owner: Samuel E. Overmass Trust

Contractor Furnished Waste Site #4
Location: Sta. f867+00 R
Deadhaul: 350 feet
Approximate Quantity: 22,127 Cu. Yds.
Owner: Samuel E. Overmass Trust

Contractor Furnished Waste Site #5A
Location: Sta. f875+00 R
Deadhaul: 400 feet
Approximate Quantity: 0 Cu. Yds.
Owner: Archie N. Nelson Family Trust

Contractor Furnished Waste Site #5B
Location: Sta. f889+00 R
Deadhaul: 250 feet
Approximate Quantity: 0 Cu. Yds.
Owner: Archie N. Nelson Family Trust

Contractor Furnished Waste Site #7A
Location: Sta. f900+00 R
Deadhaul: 200 feet
Approximate Quantity: 0 Cu. Yds.
Owner: Archie N. Nelson Family Trust

Contractor Furnished Waste Site #7B
Location: Sta. f908+00 R
Deadhaul: 300 feet
Approximate Quantity: 0 Cu. Yds.
Owner: Archie N. Nelson Family Trust

Contractor Furnished Waste Site #7C
Location: Sta. f913+00 R
Deadhaul: 400 feet
Approximate Quantity: 0 Cu. Yds.
Owner: Archie N. Nelson Family Trust

Contractor Furnished Waste Site #8
Location: Sta. f910+00 L
Deadhaul: 300 feet
Approximate Quantity: 13394 Cu. Yds.
Owner: Archie N. Nelson Family Trust

TEMPORARY FENCE

If wood posts are used for temporary fence, the Contractor shall backfill the post holes and compact the material as approved by the Engineer after the fence posts have been removed. All costs associated with this work shall be incidental to the contract unit price per foot for "Type 1 Temporary Fence".

TABLE OF OPTION WASTE SITES

Site	Station	L/R	Dead Haul Distance (Sta)	Exc. Waste (CuYd)	Topsoil (CuYd)	Dead Haul (CuYdSta)
1A	475+00	450'L	4.5	26439	1600	132200
1B	485+00	250'L	2.5	0	0	0
1C	485+00	750'L	7.5	0	0	0
2	598+00	400'R	4	0	0	0
			Totals:	26439	1600	132200

TABLE OF CONTRACTOR FURNISHED WASTE SITES

Site	Station	L/R	Dead Haul Distance (Sta)	Exc. Waste (CuYd)	Dead Haul (CuYdSta)
3	710+00	250'R	2.5	28000	89000
4	867+00	350'R	3.5	22127	582100
5A	875+00	400'R	4	0	0
5B	889+00	250'R	2.5	0	0
7A	900+00	200'R	2	0	0
7B	908+00	300'R	3	0	0
7C	913+00	400'R	4	0	0
8	910+00	300'L	3	13394	40200
			Totals:	63521	711300

AIRPORT CHAIN LINK FENCE INSTALLATION

The Contractor shall install new chain link fence from Sta. 104+65 to 112+89 Rt. prior to removal of the existing fence. Full enclosure of the airport property shall be maintained at all times. The Contractor's personnel that will be installing the new chain link fence shall be required to have training in working within the boundaries of the Pine Ridge Airport. For required training and other airport rules & regulations, the Contractor shall coordinate with Justin Pourier, Oglala Sioux Transit (605-867-5376) prior to the start of work activities on airport property.

Any additional costs associated with the chain link fence requirements listed above shall be incidental to the contract unit price per foot for "10' Chain Link Fence With Tensioned Wire Top".

STATION b 254+20 LEFT ENTRANCE

The Contractor shall construct V-Ditches 1' to 2' in depth on each side of the entrance at Sta. b 254+20 Lt. from the US18 ditch to the tie in to the existing entrance at approximate Sta. b 255+48-225' Lt. as directed by the Engineer. All costs associated with this work shall be incidental to the contract unit price per cubic yard for "Unclassified Excavation".

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TRAFFIC DIVERSIONS

Traffic diversions are located at Sta's. 122+10, b342+52, c502+00, d673+25, e805+43, f903+60 and f912+45. The traffic diversions shall be constructed according to Section 4.5 A. of the Specifications. Installation and removal of the traffic diversions shall meet all requirements as set forth in the South Dakota Surface Water Quality Standards.

The traffic diversion(s) located at Stations 122+10, c502+00, d673+25, e805+43 and f912+45 shall be constructed according to the geometric layouts shown in the plans with the temporary drainage structure provided in the following table. The temporary structure sizes are designed to pass the design flood frequency flows without overtopping the traffic diversion grade, to minimize potential upstream flooding, and are sized to meet FEMA (Federal Emergency Management Agency) requirements where applicable. The structure(s) shall be placed at the inlet flowline elevation, pipe slope and location as stated in the "Table of Temporary Drainage Structures in Traffic Diversions". If the Contractor proposes to use a different size drainage structure and/or a different geometric layout for the temporary diversion, the proposal must be submitted to the Engineer during the project preconstruction meeting. This information shall be forwarded to the DOT Hydraulics Office for review. Construction of the traffic diversion(s) will not be allowed until approval of the proposal is obtained from the Hydraulics Office.

Table of Temporary Drainage Structures in Traffic Diversions

Traffic Diversion Location	Design Flood Frequency	Inlet Flowline Elevation	Diversion Pipe Slope (ft / ft)	Temporary Structure	Ordinary High Water Elevation
122+10	10 year	3268.9	0.0045	2-60" CMP	3271.2
c502+00	5 year	3408.9	0.0011	4-30" CMP	3410.8
d673+25	5 year	3365.5	0.0060	1-60" CMP	3366.4
e805+43	5 year	3387.5	0.0007	3-48" CMP	3390.0
f912+45	5 year	3430.7	0.0057	2-30" CMP	3429.4

The traffic diversion(s) located at Stations b342+52 and f903+60 shall be constructed in accordance with the geometric layout shown in the plans with a temporary drainage structure size adequate to reduce the potential for upstream flooding. The Contractor will be responsible for sizing the temporary drainage structure for these crossings.

Costs to provide temporary drainage structures shall be incidental to the contract lump sum price for "Maintenance of Traffic Diversion(s)".

Traffic diversions in waterways at Sta's. 122+10 and e805+43 shall be constructed such that any material placed below the ordinary high water elevation as shown in the table above and listed in the 404 application shall conform to the requirements of Class B Riprap.

The traffic diversion in the waterway at Sta. d673+25 shall be constructed such that any material placed below the ordinary high water elevation as shown in the table above and listed in the 404 application shall conform to the requirements of Class C Riprap.

Traffic diversions in waterways at Sta's. c502+00 and f912+45 shall be constructed such that embankment material placed below the ordinary high water elevation as shown in the table above and listed in the 404 application shall be armored as shown in the typical sections with material that conforms to the requirements of Class B Riprap.

TRAFFIC DIVERSIONS (CONTINUED)

The quantity of riprap used in the traffic diversion is included in the quantity for "Class B Riprap" in the Section E-Structures estimate of quantities at Sta. f912+45. The quantity of riprap used for this traffic diversion shall be reused as riprap for the structure and all costs incurred to place and remove the riprap at the traffic diversion and subsequently place the riprap at the structure shall be incidental to the contract unit price per ton for "Class B Riprap".

A portion of the quantities of riprap used in the traffic diversions at Sta's. 122+10, c502+00, d673+25 and e805+43 is included in the quantities for "Class B Riprap" and "Class C Riprap" as shown in the Section E-Structures estimate of quantities. The quantities of riprap for the permanent installation at these structures are estimated to be less than the quantities needed at the traffic diversions. The additional quantities of riprap are included in the quantities for "Class B Riprap" and "Class C Riprap" in the Section B-Grading estimate of quantities. At the Contractor's discretion, the riprap used for the traffic diversions may be reused as riprap for the structures and all costs incurred to place and remove the riprap at the traffic diversions and subsequently place the riprap at the structures shall be incidental to the contract unit price per ton for "Class B Riprap" and "Class C Riprap". If the Contractor elects not to reuse the riprap from the traffic diversions or if there is surplus riprap after the traffic diversion riprap is reused, the Contractor can retain ownership of the riprap or waste the riprap at a site as approved by the Project Engineer.

If additions or reductions to the quantity of riprap are ordered by the Engineer, payment will be made at the contract unit price per ton for "Class B Riprap" and "Class C Riprap", respectively.

The traffic diversions shall be built in close conformity to the plan gradeline. Unless otherwise shown in the plans, the traffic diversions shall be removed such that the ground surface is restored to original elevations and the hydraulic capacity of the waterway is maintained. The removal shall be done in such a manner that there is minimal disturbance to the streambed. This includes wetlands that are impacted by the traffic diversions as identified in Section A. (Also, see "Traffic Diversion Construction Requirements" note.)

The removed traffic diversion embankment (including surfacing material) shall be used in the mainline embankment unless otherwise approved by the Engineer.

Traffic Diversion Excavation as shown on the plans profile sheets is the excavation required to construct the traffic diversion portion that is located inside the mainline cross section work limits. The Traffic Diversion Excavation quantity is included in the mainline excavation quantity in the Table of Excavation Quantities by Balances and in the Table of Unclassified Excavation.

Traffic Diversion Borrow as shown on the plans profile sheets is obtained from the mainline excavation from outside of the traffic diversion cross section work limits. The Traffic Diversion Borrow quantity is included in the mainline excavation quantity in the Table of Excavation Quantities by Balances and in the Table of Unclassified Excavation.

Added Traffic Diversion Excavation as shown on the plans profile sheets is the excavation required to construct the traffic diversion portion that is located outside the mainline cross section work limits. The Added Traffic Diversion Excavation quantity is added to the unclassified excavation quantity in the Table of Unclassified Excavation.

TABLE OF TEMPORARY TRAFFIC DIVERSION RIPRAP

Station	L/R	Traffic Diversion Riprap (Ton)	* Section E Class B Riprap (Ton)	* Section E Class C Riprap (Ton)	Section B Class B Riprap (Ton)	Section B Class C Riprap (Ton)
122+10	L	350.0	226.0		124.0	
c502+00	R	120.0	49.3		70.7	
d673+25	L	442.8		262.8		180.0
e805+43	R	240.0	126.7		113.3	
f912+45	L	20.0	50.2			
				Total:	308.0	180.0

* Quantities listed are for the Cast In Place options.

TABLE OF PERMANENT TRAFFIC DIVERSION / PIPE CULVERT RIPRAP AND DRAINAGE FABRIC

Station	L/R	Class B Riprap (Ton)	Class C Riprap (Ton	Type B Drainage Fabric (SqYd)
122+10	L	* 25.0		77.0
d673+25	L		* 10.0	26.0
e794+50	L		29.0	33.0
	Totals	25.0	39.0	136.0

*See "Traffic Diversion Construction Requirements" note. Permanent quantities listed above for 122+10 and d673+25 are assumed to be reused traffic diversion riprap.

DROP INLETS

The drop inlets shall be covered throughout construction operations as necessary with an Engineer approved cover to prevent materials from entering the storm sewer system. All costs involved with the coverings and removing debris from the drop inlets shall be incidental to the contract unit prices for the components of the drop inlets.

The plan shown quantities of the drop inlet components such as Class M6 Concrete, Reinforcing Steel and Type C Frame and Lid will be the basis of payment for these items.

If additions or reductions to the number of drop inlets are ordered by the Engineer, payment for the components required to construct the drop inlets will be made at the contract unit prices for the components of the drop inlets.

TABLE OF DROP INLETS AND QUANTITIES

Station	L / R	Drop Inlet Size	Drop Inlet Type	Class M6 Concrete (CuYd)	Reinf. Steel (Lb)	Manhole Frame and Lid Type
99+10	R	3'x4'	C	0.96	115	C
100+40	R	3'x4'	C	0.97	112	C
			Totals:	1.93	227	

Total Type C Manhole Frame and Lid 2

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SHRINKAGE FACTOR: Embankment +25% to +50%

TABLE OF EXCAVATION QUANTITIES BY BALANCES

Station to	Station	Side	Excavation (CuYd)	* Undercut (CuYd)	* Muck Exc. (CuYd)	Total Excavation (CuYd)	** Out-of-Balance Exc. (CuYd)	** Waste (CuYd)	** Out-of-Balance Waste (CuYd)	** Exc. Waste (CuYd)	** Haul (CuYdSta)	** Out-Of-Balance Exc. Haul (CuYdSta)	** Dead Haul (CuYdSta)
36+00	86+86	L	1433	5502	0	6935	4582	0	0	0	103800	718100	0
36+00	86+86	R	14551	6650	618	21819	4968	618	0	0	134900	755300	0
94+50	110+00	L	3216	1995	0	5211	431	0	0	0	5600	400	0
94+50	110+00	R	4057	2321	0	6378	0	0	587	0	9000	0	0
110+00	a139+50	L&R	32257	9732	1215	43204	9210	1215	0	0	316100	958700	0
a139+50	b207+21	L	20641	6181	0	26822	0	0	0	0	368200	0	0
a139+50	b217+10	R	25417	8093	0	33510	888	0	0	0	418000	900	0
b207+21	b235+75	L	24534	3303	0	27837	0	0	888	0	106200	0	0
b217+10	b235+75	R	4704	1850	0	6554	7953	0	0	0	143100	27500	0
b235+75	b245+00	L&R	10196	4619	0	14815	0	0	4984	0	31500	0	0
b245+00	b268+61	L	35740	2988	0	38728	0	0	28418	0	281800	0	0
b245+00	b352+76	R	28628	11202	0	39830	6845	0	0	0	693100	6800	0
b268+61	b291+46	L	7677	2192	0	9869	0	0	0	0	13800	0	0
b291+46	b337+00	L	14651	3957	0	18608	0	0	0	0	240800	0	0
b337+00	c495+30	L	36353	16525	0	52878	0	0	0	0	703000	0	0
b352+76	c495+30	R	62788	16042	0	78830	0	0	8279	26439	2869100	0	132200
c501+70	c595+07	L	32198	9048	0	41246	0	0	11821	0	194800	0	0
c501+70	c593+00	R	12170	8386	0	20556	11208	0	0	0	424200	55900	0
c593+00	d636+12	R	6662	3789	0	10451	8892	0	0	0	232300	8900	0
c595+07	d652+79	L	25908	5329	0	31237	0	0	0	0	578600	0	0
d636+12	d693+50	R	20661	5842	1692	28195	0	1692	0	0	339300	0	0
d652+79	d693+50	L	3088	3624	1671	8383	15016	1671	0	0	332800	0	0
d693+50	d705+25	L&R	30820	5562	0	36382	0	0	21941	4000	121300	0	29000
d705+25	d724+48	L	3773	1029	0	4802	6925	0	0	0	88700	0	0
d705+25	e765+00	R	38836	6782	0	45618	0	0	3196	24000	579100	0	60000
d724+48	e765+00	L	2923	3429	0	6352	14646	0	0	0	410200	14600	0
e765+00	e788+05	L	2012	2160	1290	5462	6613	1290	0	0	73600	6600	0
e765+00	e790+56	R	26603	2201	219	29023	0	219	18063	0	215100	0	0
e788+05	e834+25	L	26890	4359	2874	34123	0	2874	0	6000	424200	0	214700
e790+56	e834+25	R	19123	4155	1016	24294	0	1016	0	2842	160100	0	101700
e834+25	f850+50	L&R	33188	7568	0	40756	0	0	14480	13285	251200	0	265700
f850+50	f886+06	L	4845	3348	182	8375	5000	182	0	0	66700	0	0
f850+50	f896+63	R	7591	4341	604	12536	9480	604	0	0	170900	0	0
f886+06	f910+00	L	11756	2496	0	14252	0	0	0	4966	52600	0	14900
f896+63	f934+24	R	11162	4434	0	15596	0	0	0	0	90300	0	0
f910+00	f934+24	L	13363	3406	0	16769	0	0	0	8428	93200	0	25300
		Totals:	660415	194440	11381	866236	112657	11381	112657	89960	11337200	2553700	843500

* The quantities for these items are in the Estimate of Quantities under their respective bid items.
** The quantities for these items are for information only.

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TABLE OF UNCLASSIFIED EXCAVATION

Excavation	660415
Undercut	194440
Topsoil	162587
Exc. for RCBC Installation	1614
Exc. for Deep Pipe & RCBC Removal	14884
Added Traffic Diversion Excavation	2948
Granular Base Excavation in Shoulder Widening Sections	7136
Salvaged Asphalt Mix and Granular Base Material (from cut sections)	1902
Salvaged Asphalt Mix and Granular Base Material (from fill sections)	224
Total	1046150

PROCEDURES FOR DETERMINING UNCLASSIFIED EXCAVATION QUANTITY

When plan quantities are used for payment, the Unclassified Excavation quantity shall be used for final payment.

The following paragraphs are general earthwork information and information in regards to computing the Unclassified Excavation quantity when final cross sections are taken in the field:

The Unstable Material Excavation quantity is included in the Excavation quantity listed in the Table of Unclassified Excavation. When finaling a project, the Unstable Material Excavation quantity shall be added to the Excavation quantity to compute the Unclassified Excavation quantity.

Out-of-Balance Excavation is material obtained from waste generated from excavation from other balances. The quantity of Out-of-Balance Excavation is included in the Excavation quantity in the balance where it is excavated and is paid for once as Unclassified Excavation.

Excavation waste is excess material to be hauled and placed at option waste sites, contractor furnished waste sites or at alternative waste sites as approved by the Engineer. All costs to haul and waste excess excavation material shall be included in the contract unit price per cubic yard for "Unclassified Excavation".

The Topsoil quantity in the Table of Unclassified Excavation is an estimate. When finaling a project, the total quantity of field measured Topsoil shall be used in place of the estimated Topsoil quantity. The quantity of Topsoil from the cuts will be paid for twice as Unclassified Excavation, as it will be in both the Excavation and Topsoil quantities. This will be full compensation for Excavation, which includes necessary undercutting to provide space for placement of topsoil.

The Excavation quantities from individual balances and the Table of Unclassified Excavation have been reduced by the volume of in place surfacing that will be removed and/or salvaged.

PROCEDURES FOR DETERMINING UNCLASSIFIED EXCAVATION QUANTITY (CONTINUED)

Salvaged Asphalt Mix and Granular Base Material shall be paid for once as Unclassified Excavation. As shown in the Table of Unclassified Excavation, the estimated quantity of 224 cubic yards of Salvaged Asphalt Mix and Granular Base Material from fill sections shall be added to the Excavation quantity to determine the Unclassified Excavation quantity. When finaling a project, the quantities of Salvaged Asphalt Mix and Granular Base Material from fill sections will not be adjusted according to field measurements. The quantity of Salvaged Asphalt Mix and Granular Base Material from cut sections will not be added to the Excavation quantity as it is already in the cuts on the final cross sections.

UNSTABLE MATERIAL EXCAVATION

The areas of unstable material excavation are drawn on the cross sections with a normal depth of 2 feet. The estimated quantity of 13,369 cubic yards of unstable material excavation shall be paid for at the contract unit price per cubic yard for "Unclassified Excavation".

All areas designated as Unstable shall be excavated. The unstable material excavated on this project shall be placed outside the subgrade shoulder in fill sections or stockpiled and used as topsoil.

Field measurement of unstable material excavation shall not be made. However, if there are additional areas of unstable material excavation other than what is shown in the plans, the Engineer shall direct removal of these areas and the additional areas will be measured according to the Engineer.

TABLE OF UNSTABLE MATERIAL EXCAVATION

Station	to	Station	L/R	Depth (Ft)	Quantity (CuYd)
118+75		121+65	R	2	634
122+50		126+00	R	2	912
215+00		219+00	L	2	1791
215+00		219+00	R	2	1815
243+50		246+00	L	2	661
243+50		248+00	R	2	1567
342+32		345+00	L	2	467
390+00		391+80	L	2	321
392+75		397+00	R	2	540
392+75		399+00	L	2	880
434+00		439+00	L	2	839
534+00		535+00	L	2	157
605+00		605+50	L	2	110
605+00		605+50	R	2	103
663+00		665+50	R	2	457
664+80		665+15	L	2	134
724+80		725+50	L	2	386
807+00		814+00	R	2	975
892+50		893+50	L	2	202
892+50		893+50	R	2	249
912+45		913+00	L	2	91
912+45		913+00	R	2	78
				Total:	13369

MUCK EXCAVATION

The areas of muck excavation are drawn on the cross sections with a normal depth of 3 feet. The estimated quantity of 11,381 cubic yards of muck excavation shall be paid for at the contract unit price per cubic yard for "Muck Excavation".

Muck excavation consists of the removal of highly organic and/or highly saturated material from the designated areas shown on the cross sections. Highly organic muck material shall not be used in the embankment but may be used as topsoil. Non-organic muck material may be used as embankment outside of the fill subgrade shoulder if it is properly handled and dried prior to placement in the embankment.

Field measurement of muck excavation will not be made unless the Engineer orders additional excavation, or when the Engineer determines, in accordance with Section 120.3 A.1. of the Specifications, that the classification of excavation be changed.

If the areas designated as muck excavation can be removed with similar equipment and procedures as used for unclassified excavation, the material shall be measured and paid for as "Unclassified Excavation".

TABLE OF MUCK EXCAVATION

Station	to	Station	L/R	Depth (Ft)	Quantity (CuYd)
42+35		43+20	R	3	196
48+95		50+00	R	3	422
121+65		122+50	R	3	563
121+75		122+60	L	3	606
122+70		123+40	L	3	46
670+70		674+00	L	3	1671
670+70		674+65	R	3	1692
769+25		770+85	L	3	506
772+00		775+00	L	3	784
773+35		774+10	R	3	219
795+00		797+25	L	3	899
795+37		795+75	R	3	215
799+35		806+00	L	3	1975
803+50		807+00	R	3	801
859+10		859+50	L	3	182
859+70		860+50	R	3	604
				Total:	11381

WETLAND SURVEY

The Contractor shall survey cross sections across all wetlands and Other Waters (streams) at 20-foot intervals prior to temporary fill being placed within the following traffic diversion locations: Div 122, Div c502, Div d673 and Div e805. The Contractor shall conduct post-construction surveys after the removal of temporary fill to ensure removal of debris and restoration of aquatic resources (restoration of pre-construction ground elevations) is complete. Completed surveys shall be submitted to the Custer Area Office for the basis for acceptance. Surveys shall be submitted within two weeks after the removal of traffic diversions and before permanent erosion control installation. (See "Miscellaneous Staking" in the Special Provision for Contractor Staking.)

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SALVAGE AND STOCKPILE ASPHALT MIX AND GRANULAR BASE MATERIAL

An estimated 4,018.7 tons (2,126.3 Cubic Yards) of asphalt mix and granular base material shall be salvaged from the entire length of the grading segments listed below and pipe installation locations and stockpiled at a site furnished by the Contractor and satisfactory to the Engineer.

Station	to	Station	Avg. Asphalt Concrete Width (Ft)	Quantity (CuYd)
110+00		a139+50	24.6	945.0
b235+75		b245+00	24.2	297.0
d693+50		d705+25	24.3	377.3
e834+25		f850+50	24.0	507.0
			Total	2126.3

The quantity of salvage asphalt mix and granular base material may vary from the plans. No adjustment will be made to the contract unit price for variations of the quantity of "Salvage and Stockpile Asphalt Mix and Granular Base Material."

It is estimated that there are 32 cubic yards of salvageable material per station. This rate was used to compute the unclassified excavation quantities. The rate of salvageable material is based on a 26 foot width.

The estimated rate of salvageable material per station and quantities includes only granular base material. The asphalt mix will be removed under the bid item "Cold Milling Asphalt Concrete" in Section F.

It is estimated that there will be 743 cubic yards of waste material resulting from salvage operations within the grading segments. This quantity is included in the "Table of Excavation Quantities by Balances".
The following table is furnished for information only.

MRM	Distance from Centerline (Feet) Lt.	Rt.	Thickness of Asphalt Mix Material (Inches)	Thickness of Granular Material (Inches)
105.75	6.4		7.5	5.0
106.00		6.0	9.0	2.5
106.25	6.6		8.0	3.0
	Average	Thickness:	8.2	3.5
108.75	6.8		7.5	4.5
109.00		7.3	8.0	4.0
	Average	Thickness:	7.8	4.3
116.50		6.5	8.0	5.0
116.75	6.9		8.0	6.0
117.00		6.1	7.5	5.5
	Average	Thickness:	7.8	5.5
119.25	6.7		7.0	7.0
119.50		6.8	6.5	5.5
119.75	6.2		7.8	4.2
	Average	Thickness:	7.1	5.6

UNDERCUTTING

In all cut sections, the earthen subgrade shall be undercut 2 feet below the finished subgrade. The undercut material or other suitable material, as directed by the engineer, shall then be replaced and recompacted to the density specified for the section being constructed.

Shallow embankment sections, fills less than 2 feet in height measured at the finished subgrade shoulders, shall be undercut to assure a minimum 2 foot height of earth embankment for the entire width of the roadbed. The upper 6 inches of undercut material that consists of topsoil with a high humus content shall be used as topsoil, placed in the fillslopes outside the shoulders of the earthen subgrade, or placed in the lower portion (below 4 feet) of fills which are over 4 feet in height. The remaining undercut soil and soil obtained from adjacent excavation (excluding the upper 6 inches) shall then be replaced and compacted to the density specified for the section being constructed.

In the shoulder widening sections, the existing embankment will be undercut in a manner that allows 2 feet of new embankment to be constructed below the finished subgrade top. The remaining new embankment will be benched in to the existing inslope as per Section 120.3 B.1., Standard Specifications.

The plan shown quantity will be the basis of payment. However, if there are additional areas of undercut other than what is shown in the plans, the Engineer shall direct removal of these areas and the additional areas will be measured according to the Engineer.

TABLE OF UNDERCUTTING

Station	to	Station	Side	Quantity (CuYd)
36+00		60+00	L	2664
36+00		60+00	R	3212
60+00		86+67	L	2838
60+00		86+67	R	3438
94+50		110+00	L	1995
94+50		110+00	R	2321
110+00		a 139+50	L&R	9732
a 139+50		a 173+00	L	3140
a 139+50		a 178+00	R	4388
a 173+00		b 207+21	L	3041
a 178+00		b 217+10	R	3705
b 207+21		b 235+75	L	3303
b 217+10		b 235+75	R	1850
b 235+75		b 245+00	L&R	4619
b 245+00		b 268+61	L	2988
b 245+00		b 275+00	R	2876
b 268+61		b 291+46	L	2192
b 275+00		b 305+00	R	3420
b 291+46		b 314+00	L	1173
b 305+00		b 330+00	R	2744
b 314+00		b 337+00	L	2784
b 330+00		b 352+76	R	2162
b 352+76		b 383+00	R	3189

TABLE OF UNDERCUTTING (CONTINUED)

Station	to	Station	Side	Quantity (CuYd)
b 383+00		b 413+00	R	3563
b 413+00		c 443+00	R	3601
b 337+00		b 367+00	L	3209
b 367+00		b 397+00	L	2955
b 397+00		b 427+00	L	3518
b 427+00		c 461+00	L	3541
c 443+00		c 469+00	R	2746
c 461+00		c 495+30	L	3302
c 469+00		c 495+30	R	2943
c 501+70		c 533+00	L	2928
c 501+70		c 532+00	R	2628
c 532+00		c 562+00	R	2891
c 533+00		c 564+00	L	3043
c 562+00		c 593+00	R	2867
c 564+00		c 595+07	L	3077
c 593+00		d 615+00	R	2116
c 595+07		d 624+00	L	3241
d 615+00		d 636+12	R	1673
d 624+00		d 652+79	L	2088
d 636+12		d 664+00	R	3356
d 652+79		d 673+00	L	1927
d 664+00		d 693+50	R	2486
d 673+00		d 693+50	L	1697
d 693+50		d 705+25	L&R	5562
d 705+25		d 724+48	L	1029
d 705+25		d 735+00	R	3637
d 724+48		e 745+00	L	1679
d 735+00		e 765+00	R	3145
e 745+00		e 765+00	L	1750
e 765+00		e 788+05	L	2160
e 765+00		e 790+56	R	2201
e 788+05		e 811+00	L	2179
e 790+56		e 812+00	R	2288
e 811+00		e 834+25	L	2180
e 812+00		e 834+25	R	1867
e 834+25		f 850+50	L&R	7568
f 850+50		f 886+06	L	3348
f 850+50		f 873+00	R	2081
f 873+00		f 896+63	R	2260
f 886+06		f 910+00	L	2496
f 893+63		f 912+44	R	1849
f 910+00		f 934+24	L	3406
f 912+44		f 934+24	R	2605
			Total:	194440

Estimated undercut quantities for xr 191, xr b286 and xr f934 are included in the mainline quantities.

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HAUL

Included in the Table of Excavation Quantities by Balances are Dead Haul, Out-of-Balance Haul and Haul. They are not pay items and are for informational purposes only.

Dead Haul: Estimated quantity (CuYdSta) for moving excavation waste material from the centerline mainline station to the waste sites listed in the Table of Option Waste Sites and Table of Contractor Furnished Waste Sites.

Out-of-Balance Haul: Estimated quantity (CuYdSta) for moving material from an earthwork balance to another earthwork balance.

Haul: Estimated quantity (CuYdSta) for moving unclassified excavation material to the locations where it is needed throughout the earthwork balance.

For Purpose of Extra Haul Computations:

Average Haul = (Haul + Out-of-Balance Haul)/Unclassified Excavation = (11337200+2553700) / 1050020 = 13.2 Sta.

CONTROLLED DENSITY FILL FOR PIPE

Controlled density fill shall be in conformance with Section 464 of the Specifications.

The controlled density fill shall be placed between the pipes from the base of pipe elevation to the haunch of the pipes.

TABLE OF CONTROLLED DENSITY FILL FOR PIPE

Station	Quantity (CuYd)
b342+67	105.3
f903+33	16.2
Total:	121.5

CONCRETE PIPE CONNECTIONS

Pipe connections to existing pipes, manholes, junction boxes, and drop inlets shall be done by breaking a hole into the existing structure and inserting the pipe. A concrete collar shall then be poured around the pipe in the area of the connection.

When it is not possible to use a normal pipe joint (male-female ends), connections to existing pipe shall be made by placing a 2' wide by 6" thick M6 concrete collar around the outside of the connection. The concrete collar shall be reinforced with 6x6 W2.9 x W2.9 wire mesh.

All costs for constructing the concrete collars including materials and labor shall be incidental to the contract unit price per foot for the corresponding pipe bid item.

EXCAVATION FOR DEEP PIPE AND BOX CULVERT REMOVAL

Included in the quantity of "Unclassified Excavation" are 14884 cubic yards of excavation for removal of deep pipes and box culverts. Deep pipes and box culverts are existing mainline pipes or box culverts at depths of 10 feet or greater (measured from the flow line to the lowest elevation of either the existing ground line, undercut line, or bottom of removed or salvaged surfacing).

All work necessary to excavate and backfill the deep pipes and box culverts including labor, equipment, and incidentals shall be incidental to the contract unit price per cubic yard for "Unclassified Excavation". Payment for deep pipe and box culvert excavation shall be based only on plans quantity and measurement of these excavation quantities during construction shall not be performed.

The excavation quantities for deep pipes and box culverts are not included with the earthwork balance quantities on the plans profile sheets. The quantities computed for excavation of the deep pipes and box culverts are based on the limits shown in the drawing below. The drawing shows a box culvert for illustration purposes only; the limits are similar for a pipe.

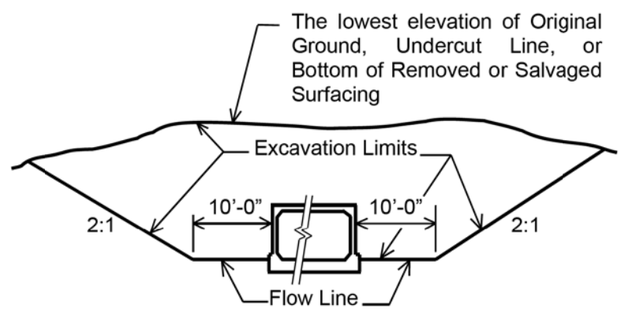

TABLE OF EXCAVATION FOR DEEP PIPE AND BOX CULVERT REMOVAL

Station	Type	Quantity (CuYd)
42+07	Pipe	1459
* 122+16	RCBC	3173
d610+71	Pipe	1121
d664+97	Pipe	1107
* d673+27	RCBC	1927
d725+31	Pipe	1195
e795+43	Pipe	2236
* e805+43	RCBC	659
f859+70	Pipe	2007
	Total:	14884

* The excavation quantity includes excavation for the installation of the new RCBC at Station 122+10, d673+25, and e805+43.

EXCAVATION FOR REINFORCED CONCRETE BOX CULVERT INSTALLATION

Included in the quantity of "Unclassified Excavation" are 1614 cubic yards of excavation for installation of reinforced concrete box culverts.

All work necessary to excavate a trench for installation of reinforced concrete box culverts including labor, equipment, and incidentals shall be incidental to the contract unit price per cubic yard for "Unclassified Excavation". Payment for excavation of reinforced concrete box culverts shall be based only on plans quantity and measurement of these excavation quantities during construction shall not be performed.

The excavation quantities for installation of reinforced concrete box culverts are not included with the earthwork balance quantities on the plans profile sheets. The quantities computed for excavation of the reinforced concrete box culverts are based on the limits shown in the drawing below.

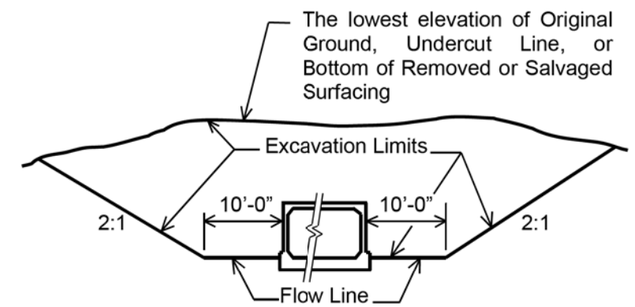

TABLE OF EXCAVATION FOR REINFORCED CONCRETE BOX CULVERT INSTALLATION

Station	Quantity (CuYd)
c502+00	360
* f912+45	1254
Total:	1614

* The excavation quantity includes excavation for the removal of the existing RCBC at Station f912+72.

CORRUGATED METAL PIPE

Corrugated metal pipes shall have 2 ⅔-inch X ½-inch corrugations for 42-inch and smaller round pipe and 48-inch and smaller arch pipe unless otherwise stated in the plans. Corrugated metal pipes shall have 3-inch X 1-inch or 5-inch X 1-inch corrugations for 48-inch and larger round pipe and 54-inch and larger arch pipe unless otherwise stated in the plans.

The gauge of the corrugated metal elbows and ends shall match the thickest gauge of corrugated metal pipe it is connected to.

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TABLE OF PIPE CULVERT UNDERCUT

The Table of Pipe Culvert Undercut is intended to be used to establish an estimated quantity of Pipe Culvert Undercut for bidding purposes only. The depth of undercut is an estimate and the actual depth necessary shall be determined during construction. Pipes shown may or may not require undercutting and pipes not shown may require undercutting. The Engineer will determine which pipe shall be undercut in accordance with Section 421 of the Specifications. All pipes shown in the "Table of Shallow Pipe Installation" shall be undercut and backfilled at a minimum as shown in the "Shallow Pipe Replacement Detail" found elsewhere in the plans.

Station	Undercut Depth (Ft)	Quantity (CuYd)
42+12	1	77
64+27	1	24
a155+00	1	23
a170+50	1	25
b251+60	1	34
b257+49	1	27
b264+98	1	23
b298+98	1	23
b312+97	1	23
b319+79	1	244
b328+97	1	24
b339+72	1	24
b342+67	1	196
b356+95	1	33
b365+75	1	21
b392+75	1	194
b408+94	1	20
b421+48	1	22
c438+70	1	29
c450+81	1	330
c467+76	1	24
c520+80	1	27
c534+50	1	29
c555+67	1	27
c570+76	1	28
c579+51	1	24
c587+96	1	21
c600+31	1	25
d605+22	1	37
d610+74	1	41
d613+26	1	34
d634+50	1	32
d640+99	1	32
d649+85	1	26
d651+50	1	43
d656+63	1	36
d665+00	1	43
d709+83	1	27
d720+97	1	34
d725+31	1	44
d730+48	1	30
e750+01	1	24
e755+68	1	23
e759+46	1	24
e770+83	1	41

TABLE OF PIPE CULVERT UNDERCUT (CONTINUED)

Station	Undercut Depth (Ft)	Quantity (CuYd)
e773+50	1	35
e776+99	1	21
e795+06	1	84
e820+97	1	25
e832+12	1	30
f859+66	1	73
f870+55	1	21
f875+00	1	31
f893+00	1	34
f903+33	1	148
f924+83	1	33
f931+99	1	32
	Total:	2759

The table contains the rate of pipe culvert undercut per foot of pipe length and should be used as an aid in determining the actual amount of undercut to be performed during construction. The table is derived from the drawing below and conforms to the Specifications. When calculating pipe culvert undercut, the length of pipe ends should be included in the overall pipe length.

Storm sewer and approach pipes do not require undercutting unless specified otherwise in these plans.

Pipe Diameter (In)	Round Pipe Undercut Rate for 1' Depth (CuYd/Ft)	Arch Pipe Undercut Rate for 1' Depth (CuYd/Ft)
24	0.2407	0.2577
30	0.2623	0.2847
36	0.2840	0.3110
42	0.3056	0.3337
48	0.3272	0.3596
54	0.3488	0.3827
60	0.3704	0.4105
66	0.3920	---
72	0.4136	0.4630
78	0.4352	---

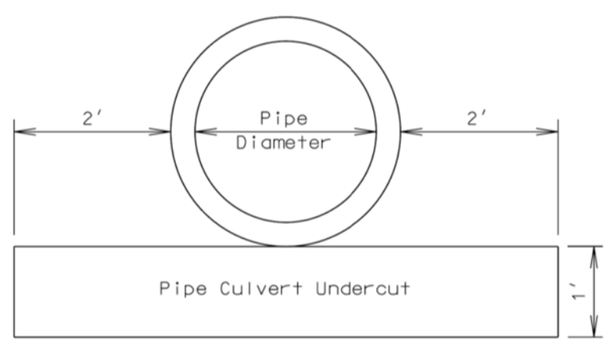

TABLE OF SIDEWALK REMOVAL

Station	to	Station	L/R	Quantity (SqYd)
41+35		42+41	L	116.1
48+13		49+22	L	122.9
83+22		83+64	L	46.0
			Total:	285.0

TABLE OF CATTLE GUARD REMOVAL

Station	L/R	Quantity (Each)
79+58	L	1
131+84	L	1
b404+99	R	1
	Total:	3

TABLE 3 CABLE GUARDRAIL REMOVAL

Station	to	Station	L/R	Quantity (Ft)
d670+13		d674+13	R	400
d672+41		d676+41	L	400
e802+40		e806+36	R	396
e804+58		e808+35	L	377
			Total:	1573

TABLE OF 4" CONCRETE SIDEWALK

Station	to	Station	L/R	Quantity (SqFt)
41+35		42+41	L	1045.0
48+13		48+62	L	503.0
48+90		49+22	L	328.0
			Total:	1876.0

TABLE OF 6" CONCRETE SIDEWALK

Station	to	Station	L/R	Quantity (SqFt)
48+62		48+90	L	275.0
83+22		83+64	L	414.0
			Total:	689.0

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RECONSTRUCT MANHOLES

The Contractor shall reconstruct manholes in accordance with Section 671 of the Specifications at the locations listed in the table below. Before preparing his/her bid, the Contractor shall make a visual inspection of the project to verify the extent of the work and material involved. The existing manhole frame and lids shall be salvaged and reset. The elevation of the lid shall be set at the same elevation of the adjacent new pavement or surrounding ground.

All manhole frames, lids, and rings that are cracked or broken due to carelessness of the Contractor shall be replaced with new manhole frames, lids, and rings that conform with the Specifications at the Contractor's expense. Manholes shall be reconstructed to the satisfaction of the Engineer. All costs involved in reconstructing the manholes shall be incidental to the contract unit price per each for "Reconstruct Manhole".

The Engineer may direct reconstruction of manholes that were not included in these plans. Payment for reconstructing manholes that were not included in the plans will be at the contract unit price per each for "Reconstruct Manhole".

TABLE OF RECONSTRUCT MANHOLES

Station	Offset	Existing Elevation	(ft) Adjustment	(Each) Quantity
47+93.5	43.4'R	3252.1	Raise 1.2	1
51+95.9	40.6'R	3253.5	Raise 4.7	1
55+93.4	39.5'R	3261.6	Raise 1.0	1
59+97.2	38.5'R	3267.5	Raise 2.2	1
			Total:	4

ADJUSTMENT OF MANHOLES

The Contractor shall adjust manholes to the extent necessary on this project. Adjusting the manholes may consist of removing the upper course of brick or removing the concrete walls, replacing the removed materials with brick or Class M6 concrete, placing adjusting rings if necessary, and resetting the manhole frame and lid. The elevation of the lid shall be set at the same elevation of the adjacent new pavement or surrounding ground. All manhole frames, lids, and rings that are cracked or broken due to carelessness of the Contractor shall be replaced with new manhole frames, lids, and rings that conform with the Specifications at the Contractor's expense. Manholes shall be adjusted to the satisfaction of the Engineer. All costs involved in adjusting the manholes shall be incidental to the contract unit price per each for "Adjust Manhole".

The Engineer may direct adjustment of manholes that were not included in these plans. Payment for adjusting manholes that were not included in the plans will be at the contract unit price per each for "Adjust Manhole".

TABLE OF ADJUST MANHOLES

Station	Offset	Existing Elevation	(ft) Adjustment	(Each) Quantity
63+95.8	62.8'R	3270.8	Raise 0.5	1
			Total:	1

INCIDENTAL WORK, GRADING

Station	L/R	Remarks
36+42	R	Take Out 18" CMP End Section
42+07		Take Out 72"-124' CMP
44+58	33'L	Take Out 18"-31' CMP
48+77	95'R	Take Out 18"-34' CMP
48+87	111'R	Take Out 30"-50' CMP
53+82	34'L	Take Out 18"-30' CMP
58+51		Take Out 18"-87' CMP
64+27		Take Out 18"-58' CMP
67+03	39'L	Take Out 24"-40' CMP
69+11	38'R	Take Out 18"-47' CMP
70+78	39'R	Take Out 18"-66' CMP
74+15	42'L	Take Out 18"-30' CMP
76+73	47'R	Take Out 18"-50' CMP
79+57	50'L	Take Out 18"-24' CMP
83+47	55'R	Take Out 24"-60' CMP
85+58	49'R	Take Out 12"-70' RCP
98+31	76'R	Take Out 12"-22' CMP
97+90	117'L	Take Out 18"-56' CMP
98+74	38'R	Take Out 18"-120' CMP
103+92	37'R	Take Out 18"-54' CMP
111+69	37'R	Take Out 18"-54' CMP
111+76	39'L	Take Out 15"-38' CMP
132+01		Take Out 15"-70' CMP
135+55	33'R	Take Out 18"-56' CMP
a155+00		Take Out 18"-60' CMP
a150+29	35'R	Take Out 18"-54' CMP
a157+70	52'R	Take Out 18"-68' CMP
a163+06	37'R	Take Out 18"-60' CMP
a170+50		Take Out 18"-70' CMP
a178+75	30'L	Take Out 18"-48' CMP
b210+95	33'L	Take Out 18"-48' CMP
b251+60		Take Out 18"-76' CMP
b257+49		Take Out 24"-61' CMP
b264+98		Take Out 18"-54' CMP
b298+98		Take Out 24"-60' CMP
b312+97		Take Out 24"-56' CMP
b319+79		Take Out 42"-65' CMP
b328+97		Take Out 24"-56' CMP
b340+07		Take Out 18"-58' CMP
b342+52		Take Out 2-6'x6'-48' RCBC
b343+38	43'R	Take Out 18"-42' CMP
b356+95		Take Out 18"-96' CMP
b365+75		Take Out 18"-52' CMP
b392+10	39'L	Take Out 24"-42' CMP
b392+09	40'R	Take Out 18"-44' CMP
b392+42		Take Out 18"-58' CMP
b392+45		Take Out 18"-56' CMP
b404+74	32'R	Take Out 18"-50' CMP
b408+94		Take Out 18"-54' CMP
b421+46		Take Out 24"-60' CMP
c432+60	49'R	Take Out 18"-45' CMP
c438+70		Take Out 36"-63' CMP
c450+81		Take Out 30"-55' CMP
c463+40	40'R	Take Out 18"-58' CMP
c465+71	38'R	Take Out 24"-58' CMP
c467+76		Take Out 18"-60' CMP

INCIDENTAL WORK, GRADING (CONTINUED)

Station	L/R	Remarks
c501+97		Take Out 30"-72' CMP
c502+00		Take Out 30"-72' CMP
c520+70		Take Out 24"-68' CMP
c534+50		Take Out 36"-58' CMP
c550+50		Take Out 18"-28' CMP
c555+67	71'R	Take Out 18"-76' CMP
c570+76		Take Out 18"-79' CMP
c579+51		Take Out 24"-62' CMP
c587+96		Take Out 18"-56' CMP
c600+31		Take Out 18"-82' CMP
d605+31		Take Out 30"-96' CMP
d609+45		Take Out 18"-121' CMP
d610+71	84'L	Take Out 18"-114' CMP
d613+26		Take Out 18"-94' CMP
d634+50		Take Out 18"-90' CMP
d640+99		Take Out 18"-72' CMP
d649+98		Take Out 30"-54' CMP
d651+50		Take Out 5'x7'-66' RCCP
d653+71		Take Out 18"-60' CMP
d656+73	41'R	Take Out 30"-86' CMP
d664+97		Take Out 30"-110' CMP
d696+82		Take Out 18"-54' CMP
d709+83		Take Out 24"-48' CMP
d709+50		Take Out 18"-48' CMP
d720+97	38'R	Take Out 24"-76' CMP
d725+31		Take Out 18"-118' CMP
d730+48		Take Out 18"-86' CMP
d740+98		Take Out 24"RCP Flared End
e750+01	L & R	Take Out 18"-53' CMP
e755+68		Take Out 24"-51' CMP
e759+46		Take Out 18"-62' CMP
e770+81		Take Out 36"-104' CMP
e773+50		Take Out 36"-104' CMP
e776+99		Take Out 18"-60' CMP
e795+43		Take Out 48"-126' CMP
e816+59		Take Out 24"-46' CMP
e820+97	60'L	Take Out 30"-52' CMP
e831+96		Take Out 18"-80' CMP
e839+20		Take Out 18"-80' CMP
f859+70		Take Out 60"-101' CMP
f861+65		Take Out 18"-41' CMP
f862+70	40'L	Take Out 18"-48' CMP
f870+54	39'R	Take Out 18"-54' CMP
f875+00		Take Out 30"-62' CMP
f893+00		Take Out 18"-87' CMP
f903+60		Take Out 5'x4'-42' RCBC
f912+72		Take Out 6'x6'-40' RCBC
f919+98		Take Out 12"-50' CMP
f924+83	37'L	Take Out 24"-56' CMP
f931+99		Take Out 24"-54' CMP

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TABLE OF BANK AND CHANNEL PROTECTION GABIONS

Station	L/R	Quantity (CuYd)
41+57.4	L	26.0
48+62	R	20.0
b251+60	R	4.5
14+30.7 (xrb286)	R	4.5
b319+79	R	20.0
b342+43.9	R	42.0
c555+67	L	4.5
c570+76	R	4.5
d610+74	R	4.5
d613+26	R	4.5
d634+50	L	4.5
d640+99	L	4.5
d649+85	L	4.5
d657+01	L	6.0
d664+83.6	L	6.0
d709+83	L	6.0
d720+97	L	4.5
d725+31	L	4.5
d730+48	L	4.5
d740+98	L	4.5
e750+01	L	6.0
e759+46	L	4.5
e770+56.1	L	12.0
e773+50	L	6.0
e776+99	L	4.5
2+12 (xre816)	R	4.5
e832+12	R	4.5
f860+07.4	R	17.0
0+96.6 (xrf869)	L	4.5
0+95.2 (xrf869)	R	4.5
f875+00	R	10.0
f893+00	R	6.0
f903+53.7	R	21.0
1+00.9 (xrf922)	L	4.5
1+25 (xrf934)	R	4.5
	Total:	298.5

MAILBOXES

The Contractor shall reset the existing mailboxes on new posts with the necessary support hardware for single or double mailbox assemblies. The local Postmaster will determine the recommended mounting height of the mailboxes throughout the project. The Contractor shall coordinate with the Engineer on the proper postal representative to contact.

If large mailboxes are located at double mailbox installations, a single post may need to be used for the large mailbox.

All costs for removing existing mailboxes, providing temporary mailboxes, and resetting mailboxes with new posts and necessary support hardware shall be incidental to the contract unit price per each for “Refurbish Single Mailbox” or “Refurbish Double Mailbox”.

TABLE OF REFURBISH MAILBOX

Station	L/R	Single (Each)	Double (Each)
c603+32	R		1
d653+45	R	1	
f869+88	R	1	
f862+30	R	1	
	Totals:	3	1

BRACE PANELS FOR ROW FENCE

The E-Z Brace or an approved equal may be utilized as an alternate horizontal brace in the brace panels if approved by the Engineer. The E-Z Brace shall be attached to each wood post utilizing two 5/16” x 3” lag screws. Holes of appropriate diameter, based on wood post condition, shall be drilled before placement of lag screws. The following are contacts regarding the E-Z Brace:

Roger Papka
E-Z Brace
1160 Karen St.
Watertown, SD 57201
605-881-6142

Dennis Mack
E-Z Brace
108 18th St. NE
Watertown, SD 57201
605-881-4990

TABLE OF SUPERELEVATION

Station	to	Station		
36+00.00		44+84.62	-	Normal Crown Section
44+84.62		46+57.62	-	Superelevation Transition
46+57.62		50+68.17	-	3820’ Radius Curve Right 0.0420’/’ Superelevation Rate Point of Rotation at Centerline
50+68.17		52+41.17	-	Superelevation Transition
52+41.17		58+05.34	-	Normal Crown Section
58+05.34		59+78.34	-	Superelevation Transition
59+78.34		67+07.53	-	3820’ Radius Curve Left 0.0420’/’ Superelevation Rate Point of Rotation at Centerline
67+07.53		68+80.53	-	Superelevation Transition
68+80.53		121+73.94	-	Normal Crown Section
121+73.94		123+46.94	-	Superelevation Transition
123+46.94		135+72.52	-	3725’ Radius Curve Left 0.0420’/’ Superelevation Rate Point of Rotation at Centerline

TABLE OF SUPERELEVATION (CONTINUED)

135+72.52	137+45.52	-	Superelevation Transition
137+45.52	b216+29.57	-	Normal Crown Section
b216+29.57	b218+02.57	-	Superelevation Transition
b218+02.57	b235+01.05	-	3820’ Radius Curve Left 0.0420’/’ Superelevation Rate Point of Rotation at Centerline
b235+01.05	b236+74.05	-	Superelevation Transition
b236+74.05	b287+63.59	-	Normal Crown Section
b287+63.59	b289+03.59	-	Superelevation Transition
b289+03.59	b324+05.16	-	5715’ Radius Curve Right 0.0300’/’ Superelevation Rate Point of Rotation at Centerline
b324+05.16	b325+45.16	-	Superelevation Transition
b325+45.16	d614+95.66	-	Normal Crown Section
d614+95.66	d616+35.66	-	Superelevation Transition
d616+35.66	d628+62.95	-	5780’ Radius Curve Left 0.0300’/’ Superelevation Rate Point of Rotation at Centerline
d628+62.95	d630+02.95	-	Superelevation Transition
d630+02.95	d636+00.98	-	Normal Crown Section
d636+00.98	d637+12.98	-	Superelevation Transition
d637+12.98	d650+09.37	-	11420’ Radius Curve Right 0.0200’/’ Superelevation Rate Point of Rotation at Centerline
d650+09.37	d651+21.37	-	Superelevation Transition
d651+21.37	d708+22.40	-	Normal Crown Section
d708+22.40	d709+67.40	-	Superelevation Transition
d709+67.40	d727+64.56	-	5695’ Radius Curve Right 0.0320’/’ Superelevation Rate Point of Rotation at Centerline
d727+64.56	d729+09.56	-	Superelevation Transition
d729+09.56	e766+95.69	-	Normal Crown Section
e766+95.69	e768+40.69	-	Superelevation Transition
e768+40.69	e780+65.35	-	5620’ Radius Curve Left 0.0320’/’ Superelevation Rate Point of Rotation at Centerline
e780+65.35	e782+10.35	-	Superelevation Transition
e782+10.35	f923+60.94	-	Normal Crown Section
f923+60.94	f927+60.94	-	Superelevation Transition**
f927+60.94	f934+24.00	-	2279’ Radius Curve Left 0.0560’/’ Superelevation Rate Point of Rotation at Centerline

** 400’ Spiral Curve – See Horizontal Alignment Data Sheet.

TABLE OF CATTLE GUARDS

Station	L/R	Size
79+54	102’L	12’ Cattle Guard without Wings
131+83	130’L	20’ Cattle Guard without Wings
b404+86	81’R	20’ Cattle Guard without Wings

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STORAGE UNIT

The Contractor shall provide a storage unit such as a portable storage container or a semi-trailer meeting the minimum size requirements from the table below:

Project Total Asphalt Concrete Tonnage	Minimum Internal Size (Cu Ft)	Minimum External Size (L x W x H)
Less than 50,000 ton	1,166	20' x 8' x 8.6' std
More than 50,000 ton	2,360	40' x 8' x 8.6' std
All Gyratory Controlled QC/QA Projects	2,360	40' x 8' x 8.6' std

The storage unit is intended for use only by the Engineer for the duration of the project. The QC lab personnel or the Contractor will not be allowed to use the storage container while it is on the project, without permission of the Engineer.

The storage unit shall be on site and operational prior to asphalt concrete production. Upon completion of asphalt concrete production, the Engineer will notify the Contractor when the storage unit can be removed from the project. The storage unit use will not exceed 30 calendar days from the completion of asphalt concrete production. The storage unit will remain the property of the Contractor.

The storage unit shall be weather proof and shall be set in a level position. The storage unit shall be able to be locked with a padlock.

The storage unit shall be placed adjacent to the QA lab, as approved by the Engineer.

The following shall apply when the storage unit provided on the project is a portable storage container:

1. The portable storage container shall be constructed of steel.
2. The portable storage container shall be set such that it is raised above the surrounding ground level to keep water from ponding under or around the storage container.

The following shall apply when the storage unit provided on the project is a semi-trailer:

1. A set of steps and hand railings shall be provided at the exterior door.
2. If the floor of the semi-trailer is 18 inches or more above the ground, a landing shall be constructed at the exterior door. The minimum dimensions for the landing shall be 4 feet by 5 feet. The top of the landing shall be level with the threshold or opening of the doorway.
3. The semi-trailer may be connected to the QA lab by a stable elevated walkway. The walkway shall be a minimum of 48 inches wide and contain handrails installed at 32 inches above the deck of the walkway. The walkway shall be constructed such that it is stable and the deck does not deform during use and allows for proper door operation. Walkway construction shall be approved by the Engineer.

STORAGE UNIT (CONTINUED)

All cost for furnishing, maintaining, and removing the storage unit including labor, equipment, and materials including any necessary walkways, landings, stairways, and handrails shall be included in the contract unit price per each for "Storage Unit".

LUMINAIRE POLE

The Contractor shall remove & reset the existing luminaire pole adjacent to the pedestrian path at Sta. 41+75-37'L in association with the installation of the 72" RC Pipe at Sta. 42+12.

Before preparing his/her bid, the Contractor shall make a visual inspection of the project to verify the extent of the work and material involved. All costs associated with this work shall be incidental to the contract unit price per each for "Remove and Reset Luminaire Pole".

SANITARY SEWER LIFT STATION CHAIN LINK FENCE INSTALLATION

The Contractor shall install new chain link fence (Lift Station Perimeter) from Sta. 41+16 to 41+40 Rt. The Contractor shall install a barbed wire top in accordance with Standard Plate 621.04. All costs associated with the barbed wire top shall be incidental to the contract unit price per foot for "8' Chain Link Fence With Tensioned Wire Top".

SANITARY SEWER MANHOLE MARKERS

The Contractor shall install Berntsen 6' Carsonite Fiberglass Boundary Posts (CBM2072) or equivalent at the locations listed in the table below. The posts shall be green in color and installed according to the manufacturer's specifications with a finished height of 4' above ground. All costs to furnish and install these marker posts shall be included in the contract unit price per each for "Flexible Object Marker Post".

TABLE OF SANITARY SEWER MANHOLE MARKERS

Station	Offset	Quantity
43+97.9	55.6'R	1
63+95.8	62.8'R	1
67+07.9	65.2'R	1
74+95.4	60.5'R	1
75+08.4	56.3'L	1
78+67.0	55.9'L	1
82+68.0	56.1'L	1
86+65.5	55.0'L	1
90+66.8	55.6'L	1
94+66.5	55.4'L	1
98+64.5	56.1'L	1
		11

SANITARY SEWER INSULATION

The Contractor shall install 6" of Extruded Polystyrene Insulation Board at approximate Sta. 42+57-55' Rt. underneath the 78" RCP to provide insulation for the existing 8" PVC sanitary sewer located below as directed by the Engineer. The approximate location of the sewer line is shown in Section Z.

The Contractor shall determine the exact location of the sanitary line to determine the optimal location to place the insulation. The insulation shall extend approximately two feet in all directions from the edges of the two pipes. The approximate area of coverage is 8 Sq.Yd. The Contractor shall take care not to damage the existing sanitary sewer line. Any damage to the line shall be repaired at the Contractor's expense.

All costs to furnish and install the insulation shall be included in the contract unit price per square yard for "6" Extruded Polystyrene Insulation Board".

TIE BOLTS FOR RCP CULVERT EXTENSIONS

On RCP extensions, all new pipe sections shall be tied in accordance with standard plate 450.18. This includes ties between the existing pipe section and the new pipe extension. All costs for drilling tie bolt holes and furnishing and installing tie bolts shall be incidental to the contract unit price per foot for the installation of the appropriate size of RCP.

TYPE III FIELD LABORATORY

The lab shall be equipped with an internet connection such as DSL, cable modem, or other approved service. The internet connection shall be provided with a multi-port wireless router. The internet connection shall be a minimum speed of 512 Kb unless limited by job location and approved by the DOT. Prior to installing the wireless router the Contractor shall submit the wireless router's technical data to the Area Office to check for compatibility with the state's computer equipment. The internet connection is intended for state personnel usage only. The Contractor's personnel are prohibited from using the internet connection unless pre-approved by the Project Engineer.

The Contractor shall submit a copy of each monthly bill for calls charged to this phone at the end of each month. The Project Engineer will then audit the bills to ensure all calls are legitimate and then initiate a Construction Change Order (CCO) to reimburse the Contractor for the actual phone calls made, including local and long distance calls. Reimbursement will not be made for fees associated with the purchase, installation, disconnection, monthly line charges, and incidentals involved in the installation, maintenance, and disconnection of the phone (including attachments). These items shall be incidental to the contract unit price per each for "Type III Field Laboratory".

The Department will pay the Contractor for one Type III Field Laboratory. If the Contractor's sequence, operation, or plant location requires an additional laboratory or laboratories, the cost shall be incidental to the original bid price for Type III Field Laboratory. The Department will allow the option to relocate the original Type III Laboratory only if the Lab remains within the project limits. The cost of relocation shall be incidental to the original bid price for Type III Field Laboratory.

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TABLE OF CONSTRUCTION STAKING

(See Special Provision for Contractor Staking)

Roadway and Description	Begin Station	End Station	Number of Lanes	Length (Ft)	Grade Staking: Length (Mile)	Grade Staking: Lane Factor	Grade Staking: *Sets of Stakes	Grade Staking: **Grade Staking Quantity (Mile)	Miscellaneous Staking Quantity (Mile)	Slope Staking Quantity (Mile)	Final Cross Section Survey Quantity (Mile)	Structure Staking Quantity (Each)
US 18 (Transition from 2 to 3 Lanes - Shoulder Widening)	36+00	39+60	3	360	0.068	1.5	1	0.102	0.068	0.068	0.068	
US 18 (3 Lanes - Shoulder Widening)	39+60	86+87	3	4727	0.892	1.5	1	1.343	0.892	0.892	0.892	
US 18 (3 Lanes - Shoulder Widening)	94+50	106+44	3	1194	0.226	1.5	1	0.339	0.226	0.226	0.226	
US 18 (Transition from 3 to 2 Lanes - Shoulder Widening)	106+44	110+00	3	356	0.067	1.5	1	0.101	0.067	0.067	0.067	
US 18 (Transition from 3 Lanes to 2 Lanes AC Pavement)	110+00	110+34	3	34	0.006	1.5	1	0.009	0.006	0.006	0.006	
US 18 (2 Lanes AC Pavement)	110+34	a139+50	2	2909	0.551	1	1	0.551	0.551	0.551	0.551	
US 18 (2 Lanes - Shoulder Widening)	a139+50	b235+75	2	9491	1.798	1	1	1.798	1.798	1.798	1.798	
US 18 (2 Lanes AC Pavement)	b235+75	b245+00	2	925	0.175	1	1	0.175	0.175	0.175	0.175	
US 18 (2 Lanes - Shoulder Widening)	b245+00	b275+80	2	3080	0.583	1	1	0.583	0.583	0.583	0.583	
US 18 (Transition from 2 to 3 Lanes - Shoulder Widening)	b275+80	b279+70	3	390	0.074	1.5	1	0.111	0.074	0.074	0.074	
US 18 (3 Lanes - Shoulder Widening)	b279+70	b288+38	3	868	0.164	1.5	1	0.247	0.164	0.164	0.164	
US 18 (Transition from 3 to 2 Lanes - Shoulder Widening)	b288+38	b293+38	3	500	0.095	1.5	1	0.142	0.095	0.095	0.095	
US 18 (2 Lanes - Shoulder Widening)	b293+38	c487+58	2	19413	3.677	1	1	3.677	3.677	3.677	3.677	
US 18 (Transition from 2 to 3 Lanes - Shoulder Widening)	c487+58	c491+48	3	390	0.074	1.5	1	0.111	0.074	0.074	0.074	
US 18 (3 Lanes - Shoulder Widening)	c491+48	c495+30	3	382	0.072	1.5	1	0.108	0.072	0.072	0.072	
US 18 (Slope Flattening)	c495+30	c501+70		640	0.121				0.121	0.121	0.121	
US 18 (2 Lanes - Shoulder Widening)	c501+70	d693+50	2	19173	3.631	1	1	3.631	3.631	3.631	3.631	
US 18 (2 Lanes AC Pavement)	d693+50	d705+25	2	1175	0.223	1	1	0.223	0.223	0.223	0.223	
US 18 (2 Lanes - Shoulder Widening)	d705+25	e834+25	2	12895	2.442	1	1	2.442	2.442	2.442	2.442	
US 18 (2 Lanes AC Pavement)	e834+25	f850+50	2	1579	0.299	1	1	0.299	0.299	0.299	0.299	
US 18 (2 Lanes - Shoulder Widening)	f850+50	f916+60	2	6610	1.252	1	1	1.252	1.252	1.252	1.252	
US 18 (Transition from 2 to 3 Lanes - Shoulder Widening)	f916+60	f920+50	3	390	0.074	1.5	1	0.111	0.074	0.074	0.074	
US 18 (3 Lanes - Shoulder Widening)	f920+50	f929+24	3	874	0.166	1.5	1	0.249	0.166	0.166	0.166	
US 18 (Transition from 3 to 2 Lanes - Shoulder Widening)	f929+24	f934+24	3	500	0.095	1.5	1	0.142	0.095	0.095	0.095	
US 18 (3 Lanes – Superelevation AC Milling / Paving) ***	44+85	52+41	3	756	0.143	1.5	1	0.215				
US 18 (3 Lanes – Superelevation AC Milling / Paving) ***	58+05	68+81	3	1076	0.204	1.5	1	0.306				
US 18 (2 Lanes – Superelevation AC Milling / Paving) ***	121+74	137+46	2	1572	0.298	1	1	0.298				
US 18 (2 Lanes – Superelevation AC Milling / Paving) ***	b216+30	b236+74	2	2044	0.387	1	1	0.387				
US 18 (3 Lanes – Superelevation AC Milling / Paving) ***	b287+64	b293+38	3	574	0.109	1.5	1	0.164				
US 18 (2 Lanes – Superelevation AC Milling / Paving) ***	b293+38	b325+45	2	3207	0.607	1	1	0.607				
US 18 (2 Lanes – Superelevation AC Milling / Paving) ***	d614+96	d630+03	2	1507	0.285	1	1	0.285				
US 18 (2 Lanes – Superelevation AC Milling / Paving) ***	d636+01	d651+21	2	1520	0.288	1	1	0.288				
US 18 (2 Lanes – Superelevation AC Milling / Paving) ***	d708+22	d729+10	2	2088	0.396	1	1	0.396				
US 18 (2 Lanes – Superelevation AC Milling / Paving) ***	e766+96	e782+10	2	1514	0.287	1	1	0.287				
US 18 (3 Lanes – Superelevation AC Milling / Paving) ***	f923+61	f934+24	3	1063	0.201	1.5	1	0.302				
US 18 (RCBC)	122+10											1
US 18 (RCBC)	c502+00											1
US 18 (RCBC)	d673+25											1
US 18 (RCBC)	e805+43											1
US 18 (RCBC)	f912+45											1
xr191 (Int Rd at 191+60 R – 2 Lanes Gravel)	10+20	15+20	2	500	0.095	1	1	0.095	0.095	0.095	0.095	
xrb286 (Int Rd at 286+04 R – 2 Lanes Gravel)	10+00	23+41	2	1341	0.254	1	1	0.254	0.254	0.254	0.254	
xrb340 (Int Rd at 340+60 L – 2 Lanes Gravel)	0+60	1+83	2	123	0.023	1	1	0.023	0.023	0.023	0.023	
xrd696 (Int Rd at 696+26 L – 2 Lanes Gravel)	0+57	3+00	2	243	0.046	1	1	0.046	0.046	0.046	0.046	
xre816 (Int Rd at 816+56 L – 1 Lane Gravel)	0+60	3+15	1	255	0.024	0.5	1	0.024	0.024	0.024	0.024	
xrf869 (Int Rd at 869+98 L – 2 Lanes Gravel)	0+60	2+00	2	140	0.027	1	1	0.027	0.027	0.027	0.027	
xrf922 (Int Rd at 922+85 L – 2 Lanes Gravel)	0+63	2+40	2	177	0.034	1	1	0.034	0.034	0.034	0.034	
xrf934 (Int Rd at 934+75 R – 2 Lanes Gravel)	0+18	3+80	2	362	0.069	1	1	0.069	0.069	0.069	0.069	
fr111 (Frontage Road at 111+76 L - 2 Lanes Gravel)	4+00	7+24	2	324	0.061	1	1	0.061	0.061	0.061	0.061	
fra169 (Frontage Road at a169+18 L - 2 Lanes Gravel)	0+12	9+61	2	949	0.180	1	1	0.180	0.180	0.180	0.180	
drb392 (Drainage Channel at 392+42 R)	13+50	23+25		975	0.185			0	0.185	0.185	0.185	
							Totals:	22.369	17.823	17.823	17.823	5

* 1 = Blue Top Stakes Only (Asphalt Concrete Pavement)

** Grade Staking Quantity = (Length) x (Lane Factor) x (Sets of Stakes)

*** Additional Grade Staking Quantity for corrections to superelevated curves.

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TABLE OF PIPE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B17	B130

Plotting Date: 12/16/2015 Revised 8/18/15 AR

		Reinforced Concrete Pipe																RCP Bend	RCP Ends Circular							RCP Ends Arch							Transitions		Reinforced Concrete Cattle Pass		Corrugated Metal Pipe						CMP Elbow	CMP Ends Circular			CMP Ends Arch			
		Circular									Arch							Circular	Flared					Sloped		Sloped		Flared				Safety	RCP to CMP	CMP to RCP	Cattle Pass	End Section	Circular			Arch			Circular	Flared	Safety		Flared	Safety		
		24" Cl.2	24" Cl.3	30' Cl.2	36" Cl.2	48" Cl.2	66" Cl.2	72" Cl.2	72" Cl.3	78" Cl. 2	18" Cl.4	24" Cl.2	24" Cl.4	30" Cl.2	36" Cl.2	42" Cl.2	54" Cl.2	24" 7.5 Deg.	36"	48"	66"	72"	78"	24"	30"	24"	30"	18"	36"	42"	54"	18"	24"	24"	5'x7'	5'x7'	18" 16 Ga	24" 16 Ga	42" 16 Ga	18" 16 Ga	24" 16 Ga	30" 16 Ga	18" 2.5 Deg.	42"	18"	24"	18"	18"	24"	30" w/ Bars
Station	Offset (L/R)	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Ft	Each	Ft	Ft	Ft	Ft	Ft	Ft	Each	Each	Each	Each	Each	Each	Each	Each
36+42																																					16						1		1					
42+12										168													2																												
44+60	34' L																																							48									2		
48+89.5	141.1'R																																						88					4						
49+63	102' L																																							32							2				
58+30	69' R																																				70								2					
64+27												84														2																									
67+05	39' L																																								50									2	
70+76	45' L																																								48									2	
70+79	56' R																																								60									2	
73+97	73.4' L to 102.3' L										18																	2																							
74+37	73.4' L to 102.3' L										18																	2																							
83+46	48.5' L																																				60								2					
83+46	59' R																																								62									2	
98+30 - 58.8' R to 99+10 - 58.5' R													72																				1																	1	
99+10 - 58.5' R to 100+40 - 57.6' R													126																																						
99+10	46.7' R to 58.5' R										4																					1																			
100+40 - 57.6' R to 101+69.3 - 56.8' R													120																					1																	1	
104+12	57' R																																				52								2					
106+51	63' L																																				60								2					
111+76	57' L																																				66								2					
111+76	57' R																																				66								2					
131+35	57' L																																				78								2					
135+53	57' L																																				60								2					
a 150+30	57' R																																				60								2					
a 155+00		82																						2																											
a 157+70	57' R																																				66								2					
a 163+12	57' R																																				60								2					
a 170+50		88																						2																											
a 170+50	64.6' L to 112.2' L	34																						2																											
a 176+00	53.5' R																																				54								2					
a 177+80	53' R																																				52								2					
a 178+78	57' L																																				60								2					
a 183+50	57' L																																				60								2					
b 210+95	65' L																																				74								2					
b 251+60		128																						2																											
b 257+49				86																					2																										
b 264+98		82																						2																											
14+70	**xr b 286**																																				120								2					
19+15	**xr b 286**																																				54								2					
b 298+98		84																						2																											
b 312+97												80														2																									
b 319+79																164														4																					
	Subtotal:	498	0	86	0	0	0	0	0	168	40	164	318	0	0	164	0	0	0	0	0	0	2	12	2	4	0	4	0	4	0	1	1	1	0	0	1188	0	88	80	220	0	1	4	37	0	2	2	10	0

Plot Scale - 1:200

Plotted From - TRSF12141

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TABLE OF PIPE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B18	B130

Plotting Date: 12/16/2015 Revised 8/18/15 AR

		Reinforced Concrete Pipe																RCP Bend	RCP Ends Circular							RCP Ends Arch							Transitions		Reinforced Concrete Cattle Pass		Corrugated Metal Pipe						CMP Elbow	CMP Ends Circular			CMP Ends Arch			
		Circular									Arch							Circular	Flared					Sloped		Sloped		Flared				Safety	RCP to CMP	CMP to RCP	Cattle Pass	End Section	Circular			Arch			Circular	Flared	Safety		Flared	Safety		
		24" Cl.2	24" Cl.3	30' Cl.2	36" Cl.2	48" Cl.2	66" Cl.2	72" Cl.2	72" Cl.3	78" Cl. 2	18" Cl.4	24" Cl.2	24" Cl.4	30" Cl.2	36" Cl.2	42" Cl.2	54" Cl.2	24" 7.5 Deg.	36"	48"	66"	72"	78"	24"	30"	24"	30"	18"	36"	42"	54"	18"	24"	24"	5'x7'	5'x7'	18" 16 Ga	24" 16 Ga	42" 16 Ga	18" 16 Ga	24" 16 Ga	30" 16 Ga	18" 2.5 Deg.	42"	18"	24"	18"	18"	24"	30" w/ Bars
Station	Offset (L/R)	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Ft	Each	Ft	Ft	Ft	Ft	Ft	Ft	Each	Each	Each	Each	Each	Each	Each	Each
b 328+97				76																					2																										
b 339+72		86																						2																										
b 342+67							306														6																														
b 342+91.6-72' R to b 343+75.3-66.3' R																																					76								2						
b 356+95		122																						2																										
b 365+75		72																						2																										
b 392+05	54.5' L																																								56									2	
b 392+10	55.5' R																																									54									2
b 392+82														144													4																								
b 404+40	51' L																																				62								2						
b 404+86	51' R																																				64								2						
b 408+94		68																						2																											
b 421+48		76																						2																											
c 432+62	57' R																																				60								2						
c 438+70															78													2																							
c 450+81														204													6																								
c 461+00	52' R																																								48									2	
c 465+72	54' R																																					54								2					
c 465+72	59.5' L																																				56								2						
c 467+76														72													2																								
c 471+36	52.3' L																																				64								2						
c 520+00	64' L																																				68								2						
c 520+80					78														2																																
c 534+50															78													2																							
c 550+51	57' R																																				64								2						
c 550+53	57' L																																				60								2						
c 555+67		98																						2																											
c 570+76		104																						2																											
c 579+51				76																					2																											
c 587+96		72																						2																											
c 600+31		90																						2																											
d 605+22		140																						2																											
d 609+03.4-61.1'L to d 609+94.9-70.5'L																																					84								2						
d 610+74		156																						2																											
d 613+26		128																						2																											
d 634+50		118																						2																											
d 640+99		120																						2																											
d 649+85		96																						2																											
d651+50																																			84	2														
d 653+65	57' R																																				60								2						
d 656+63					110														2																																
d 665+00				148																					2																											
d 679+83	57' R																																				62								2						
d 696+85												70														2																									
0+92.3-43.6'R to 1+59.8-33.7'R	**xr d 696**																																					48								2						
	Subtotal:	1546	0	300	188	0	306	0	0	0	0	70	0	420	156	0	0	0	4	0	6	0	0	30	6	2	12	0	4	0	0	0	0	0	84	2	780	102	0	0	104	54	0	0	24	4	0	0	4	2

Plot Scale - 1:200

Plotted From - TRSF12141

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TABLE OF PIPE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B19	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR

		Reinforced Concrete Pipe																RCP Bend	RCP Ends Circular							RCP Ends Arch							Transitions		Reinforced Concrete Cattle Pass		Corrugated Metal Pipe						CMP Elbow	CMP Ends Circular			CMP Ends Arch			
		Circular									Arch							Circular	Flared					Sloped		Sloped		Flared				Safety	RCP to CMP	CMP to RCP	Cattle Pass	End Section	Circular			Arch			Circular	Flared	Safety		Flared	Safety		
		24" Cl.2	24" Cl.3	30' Cl.2	36" Cl.2	48" Cl.2	66" Cl.2	72" Cl.2	72" Cl.3	78" Cl. 2	18" Cl.4	24" Cl.2	24" Cl.4	30" Cl.2	36" Cl.2	42" Cl.2	54" Cl.2	24" 7.5 Deg.	36"	48"	66"	72"	78"	24"	30"	24"	30"	18"	36"	42"	54"	18"	24"	24"	5'x7'	5'x7'	18" 16 Ga	24" 16 Ga	42" 16 Ga	18" 16 Ga	24" 16 Ga	30" 16 Ga	18" 2.5 Deg.	42"	18"	24"	18"	18"	24"	30" w/ Bars
Station	Offset (L/R)	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Ft	Each	Ft	Ft	Ft	Ft	Ft	Ft	Each	Each	Each	Each	Each	Each	Each	Each
d 709+83				86																					2																									
d 720+97		130																						2																										
d 725+31		142	30																					2																										
d 730+48		112																						2																										
d 740+98		50																1						2																										
e 750+01				74																					2																									
e 755+68				70																					2																									
e 759+46		86																						2																										
e 770+83						102														2																														
e 773+50					108														2																															
e 776+99		76																						2																										
e 795+06								148	40													2																												
e 801+48	57' R																																				60								2					
e 816+55	57' L																																					58								2				
e 820+97														76													2																							
2+12.0-22.3'R to 2+74.7-22.1'R	xr e 816																																							58								2		
e 832+12		110																						2																										
e 839+20		80																						2																										
f 853+00	57' R																																				60								2					
f 857+61.0-68.1'L to f 858+43.0-71.1'L																																					74								2					
f 859+66							170														2																													
f 860+91.0-63.5'L to f 861+66.5-58.5'L																																					68								2					
0+96.6-26.6'L to 1+57.4-22.0'L	xr f 869																																							56								2		
0+95.2-26.0'R to 1+58.4-21.7'R	xr f 869																																							58								2		
f 870+55		76																						2																										
f 875+00																78														2																				
f 883+32	57' L																																					68								2				
f 883+32	57' R																																				66								2					
f 893+00				116																					2																										
f 903+33																	180														4																				
f 924+83															84														2																						
1+00.9-29.0'L to 1+68.3-24.4'L	xr f 922																																				60								2					
1+04.2-23.2'R to 1+68.0-22.8'R	xr f 922										52																					2																		
f931+99														102													2																							
1+25	xr f 934																																					54								2				
Note - See Reinforced Concrete Pipe note on High Sulfate levels elsewhere in Section B.																																																		
Subtotal:		862	30	346	108	102	170	148	40	0	52	0	0	178	84	78	180	1	2	2	2	2	0	18	8	0	4	0	2	2	4	2	0	0	0	0	388	180	0	172	0	0	0	0	12	6	0	6	0	0
Total:		2906	30	732	296	102	476	148	40	168	92	234	318	598	240	242	180	1	6	2	8	2	2	60	16	6	16	4	6	6	4	3	1	1	84	2	2356	282	88	252	324	54	1	4	73	10	2	8	14	2

Plot Scale - 1:200

Plotted From - TRSF12141

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TABLE OF FENCE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B20	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR

Station to Station		Side (L/R)	Right-of-Way Fence: Type 2 (Ft)	Type 3 (Ft)	*Modified Type 2 (Ft)	Chain Link Fence (With Tension Wired Top): 8' (Ft)	10' (Ft)	Remove Fence (Ft)	Temporary Fence: Type 1 (Ft)	Post Panels: 2 Post Panel (Each)	3 Post Panel (Each)	N.A.B.I. Stream Crossing (Ft)	Gates: N.A.B.I. 16' Barbed Wire Gate (Each)	N.A.B.I. 20' Barbed Wire Gate (Each)	N.A.B.I. 24' Barbed Wire Gate (Each)	N.A.B.I. 28 Barbed Wire Gate (Each)	N.A.B.I. 30' Barbed Wire Gate (Each)	N.A.B.I. 32' Barbed Wire Gate (Each)	12' Tubular Gate (Each)	Remove Gate for Reset (Each)	Reset Gate (Each)	Fence: Remove Chain Link Fence (Ft)
46+64	48+53	L	196					445		2	1											
48+97	52+48	L	472					340		5	2				1							
60+96	62+38	L	164					0		2	1											
62+76	63+06	L	30					0		2	0											
67+53	70+60	L	331					0		3	1											
71+18	83+00	L	1390					1455		4	4											
83+92	91+85	L	914					100		5	2				1							
92+58	111+60	L	1973					1990		2	7				1							
112+08	137+01	L	2695					825		18	8	70	1	1					2			
a 143+16	a 147+85	L	534					715		3	2											
a 152+03	a 155+88	L	441					351		3	2				1							
a 156+12	a 164+20	L	886					1625		3	5											
a 164+44	a 169+06	L	530					342		3	4									1	1	
a 169+43	a 178+52	L	913					1044		0	2											
a 190+45	b 210+75	L	2025					2110		8	3				2							
b 211+32	b 254+40	L	4396					4520		10	7				3							
b 254+42	b 285+30	L	3401					1195		6	4											
b 286+80	b 299+78	L	1354					1350		2	2				1							
b 300+02	b 312+53	L	1309					875		0	4											
b 314+21	b 340+26	L	2875					2555		7	4											
b 340+93	b 391+83	L	5173					5238		5	6				1							
b 392+38	c 444+76	L	5271					5170		5	4			1	2							
c 445+28	c 497+07	L	5215					3125	2607	6	7				2							
c 498+56	c 603+15	L	10501					1440		10	12				5							
d 604+08	d 696+08	L	9377					3656		28	7	82			2		1	1				
d 696+82	e 816+36	L	11835					2960		22	17	135			3							
f 870+28	e 895+52	L			2708			230		7	4				2			1				
f 897+54	f 922+18	L			2438			2368		3	8	64			2							
XRB 286																						
9+80	22+87	L	1289							1	7				1							
		Subtotal:	75490	0	5146	0	0	37836	2607	175	137	351	1	2	30	0	1	2	2	1	1	0

Post Type and Sequence:

Right-of-way fence shall be constructed using alternate wood and steel posts except as noted.

* Modified Type 2 fence shall be constructed with all wood posts.

Plot Scale - 1:200

Plotted From - TRSF12141

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TABLE OF FENCE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B21	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR

			Right-of-Way Fence						Temporary Fence	Post Panels		N.A.B.I.	Gates									Fence
						Chain Link Fence (With Tension Wired Top)							N.A.B.I.	N.A.B.I.	N.A.B.I.	N.A.B.I.	N.A.B.I.	N.A.B.I.				
Station to Station		Side (L/R)	Type 2 (Ft)	Type 3 (Ft)	*Modified Type 2 (Ft)	8' (Ft)	10' (Ft)	Remove Fence (Ft)	Type 1 (Ft)	2 Post Panel (Each)	3 Post Panel (Each)	Stream Crossing (Ft)	16' Barbed Wire Gate (Each)	20' Barbed Wire Gate (Each)	24' Barbed Wire Gate (Each)	28 Barbed Wire Gate (Each)	30' Barbed Wire Gate (Each)	32' Barbed Wire Gate (Each)	12' Tubular Gate (Each)	Remove Gate for Reset (Each)	Reset Gate (Each)	Remove Chain Link Fence (Ft)
36+17	48+62	R	1269			90		1665		5	4											100
58+58	59+42	R	135					195		1	2											
104+65	112+89	R					834	1030		0	2				1							
112+89	130+87	R	1890					1945		4	5									2	2	
131+21	a 143+89	R	1405					3015		6	7											
a 144+92	a 157+28	R	1300					1315		6	2				2							
a 157+92	a 162+96	R	539					380		3	1											
a 163+28	a 169+06	R	626					180		2	4											
a 169+30	a 191+28	R	2266					2420		8	8				3							
a 192+03	b 285+71	R	9375					13494		13	16				2					1	1	
b 286+37	b 339+88	R	4765					5635		7	6						2					
b 342+13	c 444+66	R	10560					11490		10	15			1	2	1						
c 445+28	c 465+49	R		2110				2165	2101	7	5				2							
c 489+00	c 497+55	R		988				1027		7	5											
c 497+54	c 603+13	R	10720					325	5320	22	11			2	3							
d 603+92	d 651+53	R	4958					1770	2588	11	9				3							
d 657+02	d 695+78	R	3925					3915		12	5	80			1							
d 696+52	f 920+76	R	14779		7108			1990	13746	32	32	215			14							
f 923+90	2+52	R	1295					675		2	6											
XR 191																						
10+73	15+20	R	486					540		7	4		2									
XRB 286																						
9+80	22+87	R	1355					750		1	7				1							
dr b 392																						
12+80	25+40	R	1284							6	1											
		Subtotal:	72932	3098	7108	90	834	55921	23755	172	157	295	2	3	34	1	2	0	0	3	3	100
		Total:	148422	3098	12254	90	834	93757	26362	347	294	646	3	5	64	1	3	2	2	4	4	100

Post Type and Sequence:
Right-of-way fence shall be constructed using alternate wood and steel posts except as noted.

* Modified Type 2 fence shall be constructed with all wood posts at: f850+00 to f920+76 R.

Plot Scale - 1:200

Plotted From - TRSF12141

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TYPICAL GRADING SECTION

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B22	B130

Plotting Date: 09/02/2015

* Transition

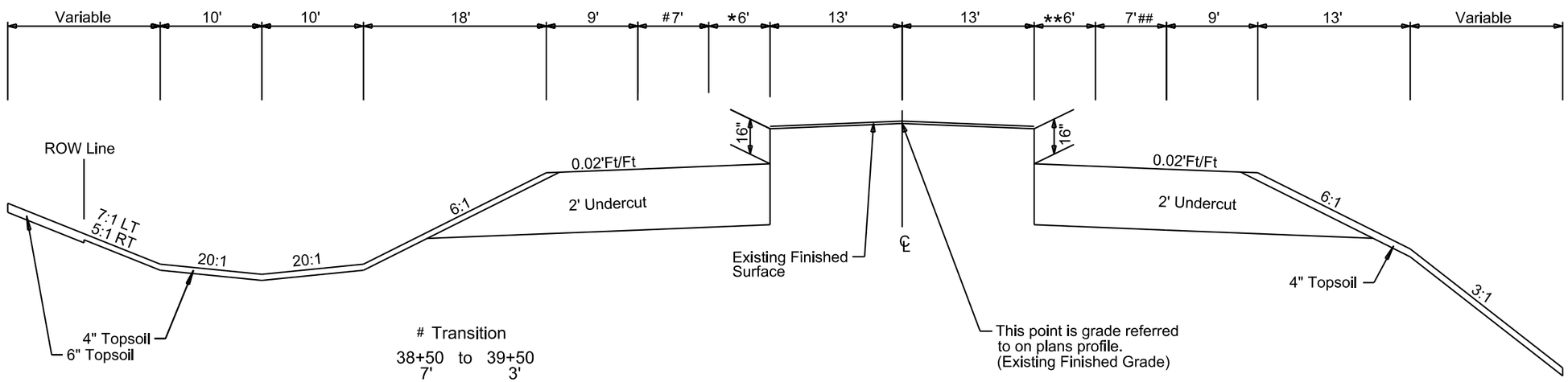
36+00 to 39+60
6' 0'
83+27 to 86+87
0' 6'
106+44 to 110+00
6' 0.52'
b 275+80 to b 279+70
0' 6'
b 288+38 to b 293+38
6' 0'
c 487+58 to c 491+48
0' 6'
f 916+60 to f 920+50
0' 6'
f 929+24 to f 934+24
6' 0'

** Transition

36+00 to 39+60
6' 12'
83+27 to 86+87
12' 6'
106+44 to 110+00
6' 0.52'
b 275+80 to b 279+70
0' 6'
b 288+38 to b 293+38
6' 0'
c 487+58 to c 491+48
0' 6'
f 916+60 to f 920+50
0' 6'
f 929+24 to f 934+24
6' 0'

36+00 to 39+60
83+27 to 86+87
94+50 to 110+00
b 275+80 to b 293+38
c 487+58 to c 495+30
f 916+60 to f 934+24

In Shoulder Widening Sections,
New Finished Grade is 0.08' Above
the Existing Finished Grade.



\# Transition

38+50 to 39+50
7' 3'

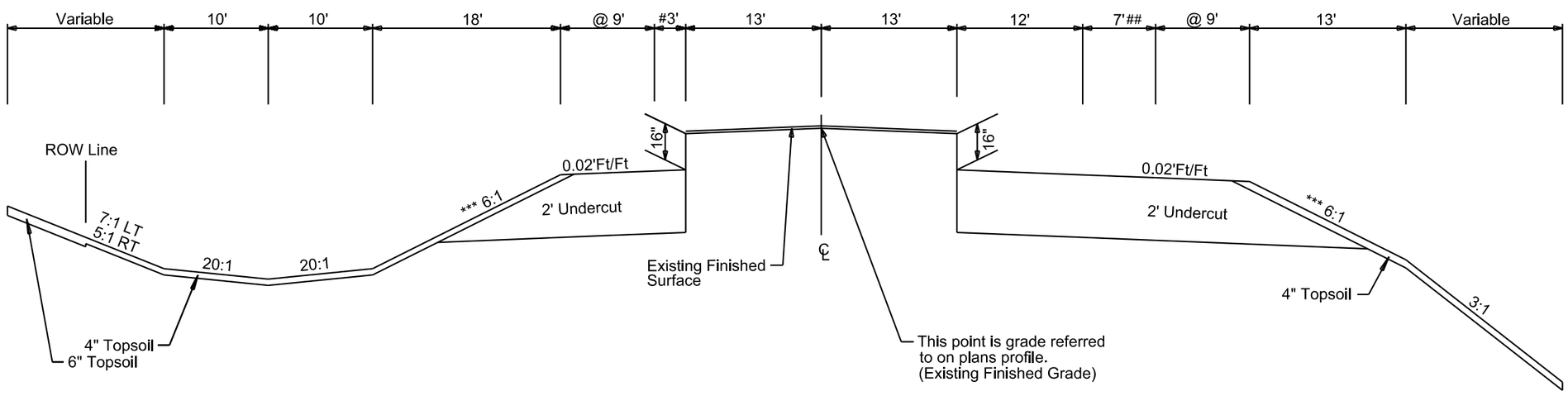
\# 39+50 to 39+60 - 3'
83+27 to 86+87 - 3'

\## 63+50 to 86+00 - 3'

\## Transition

86+00 to 86+87
3' 4.5'

39+60 to 83+27



*** 36+00 to 62+00 Lt - 4:1

@ 36+00 to 62+00 Lt - 7'

*** 40+87 to 41+50 Rt - 4:1

@ 40+87 to 41+50 Rt - 7'

*** Transition

41+50 to 42+50 Rt
4:1 6:1

@ Transition

41+50 to 42+50 Rt
7' 9'

Plot Scale - 1:200
Plotted From - TRSF12139
File - U:\rdp\jogla02\Ctyp.dgn

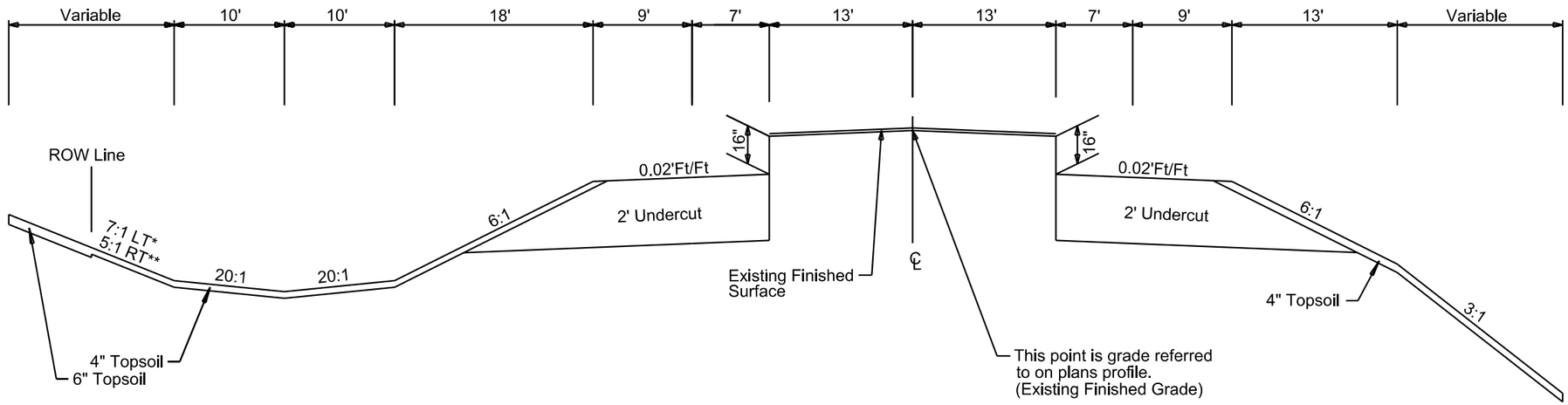
TYPICAL GRADING SECTION

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B23	B130

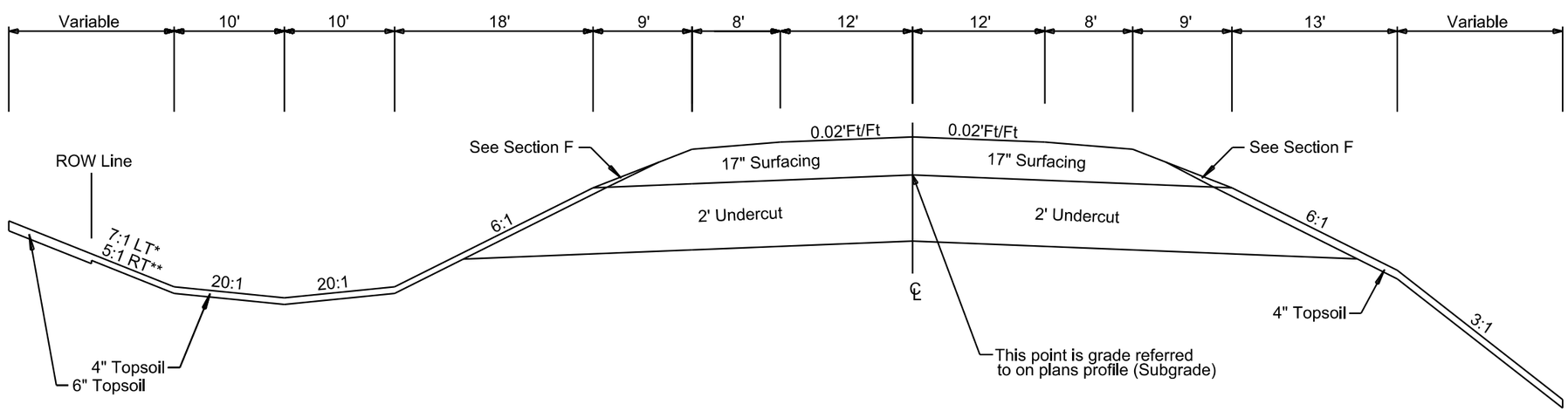
Plotting Date: 09/02/2015

In Shoulder Widening Sections,
New Finished Grade is 0.08' Above
the Existing Finished Grade.

b 139+50.00 to b 235+75.00
b 245+00.00 to b 275+80.00
b 293+38.00 to c 487+58.00
c 501+70.00 to d 693+50.00
d 705+25.00 to e 834+25.00
f 850+50.00 to f 916+60.00



110+34.00 to b 139+50.00
b 235+75.00 to b 245+00.00
d 693+50.00 to d 705+25.00
e 834+25.00 to f 850+50.00



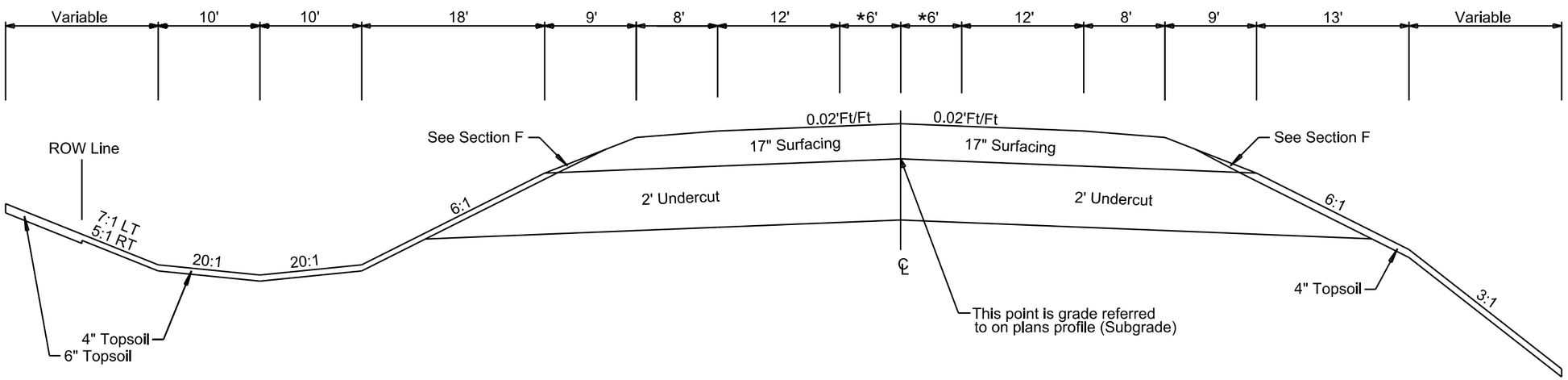
Plot Scale - 1:200
Plotted From - TRSF12139
File - U:\rdprj\ogla\02\0c\typ.dgn

TYPICAL GRADING SECTION

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B24	B130

Plotting Date: 09/02/2015

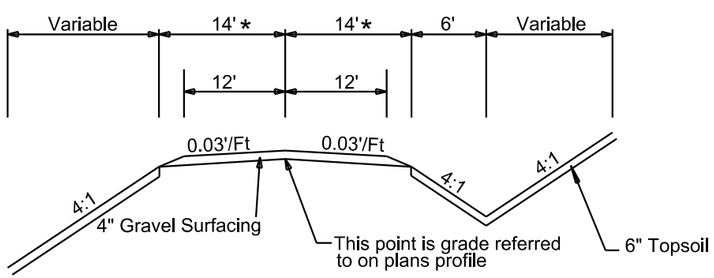
110+00.00 to 110+34.00



* Transition

110+00 to 110+34
0.52' 0'

xr b 340 0+60 to 1+83
xr d 696 0+57 to 3+00
xr e 816 0+60 to 3+15 Rt
xr f 869 0+60 to 2+00
xr f 922 0+63 to 2+40



Transition

xr b 340

* 0+60 to 0+65 - 18'
* 0+65 to 1+15
18' 14'

Transition

xr d 696

* 0+57 to 0+82
16' 14'

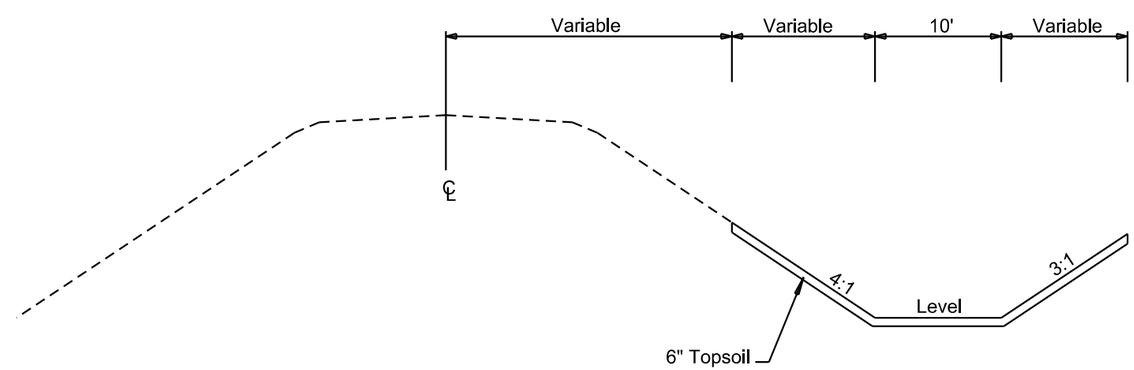
Transition

xr f 922

* 0+63 to 0+88
16' 14'

dr b 392

13+50 to 23+25



Plot Scale - 1:200

Plotted From - TRSF12139

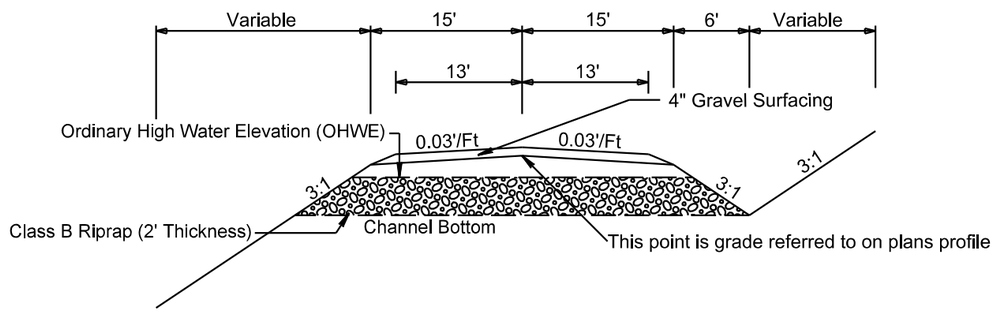
File - U:\rdprj\ogla\2\Qc\typ.dgn

TYPICAL GRADING SECTION

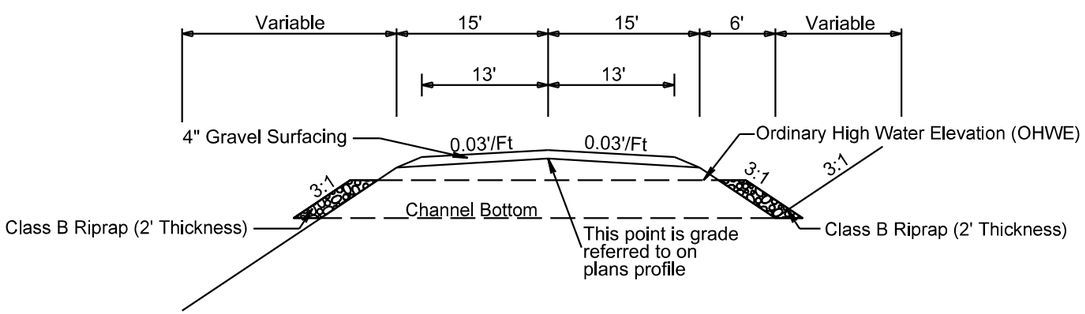
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B25	B130

Plotting Date: 09/02/2015

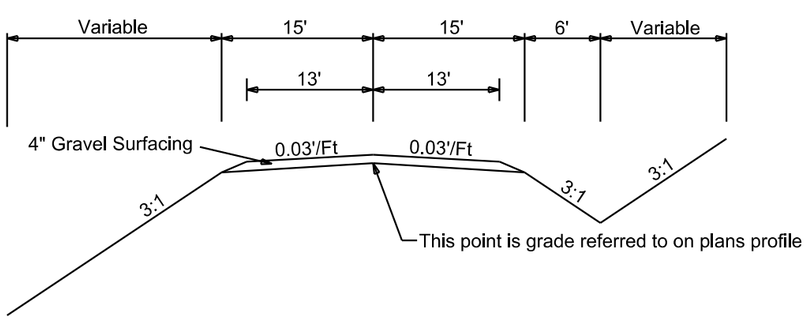
DIV 122 10+39.53 to 21+77.29
DIV d 673 1+00 to 8+00
DIV e 805 1+00 to 7+20



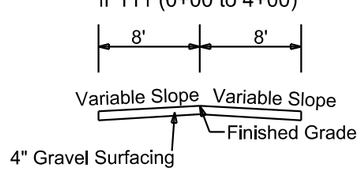
DIV c 502 11+37.12 to 17+64.60
DIV f 912 0+80 to 7+40



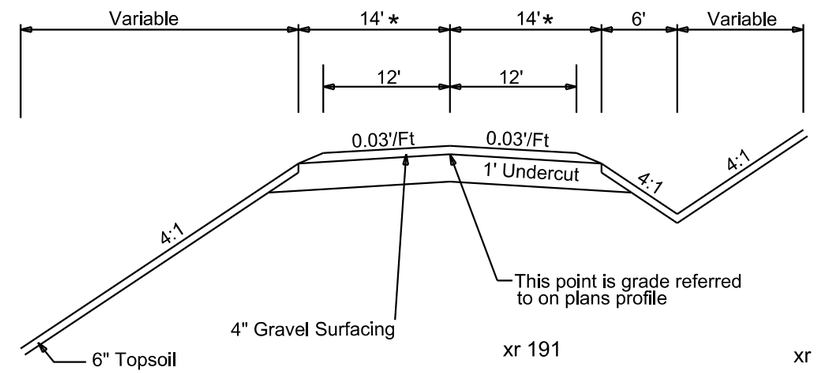
DIV b 342 1+90.13 to 6+05.77
DIV f 903 1+10.23 to 5+50.80



fr 70 (10+00 to 22+70)
fr 111 (0+00 to 4+00)



xr 191 10+20 to 15+20
xr f 934 0+18.15 to 3+80



xr 191
* 10+20 to 11+70 - 18'

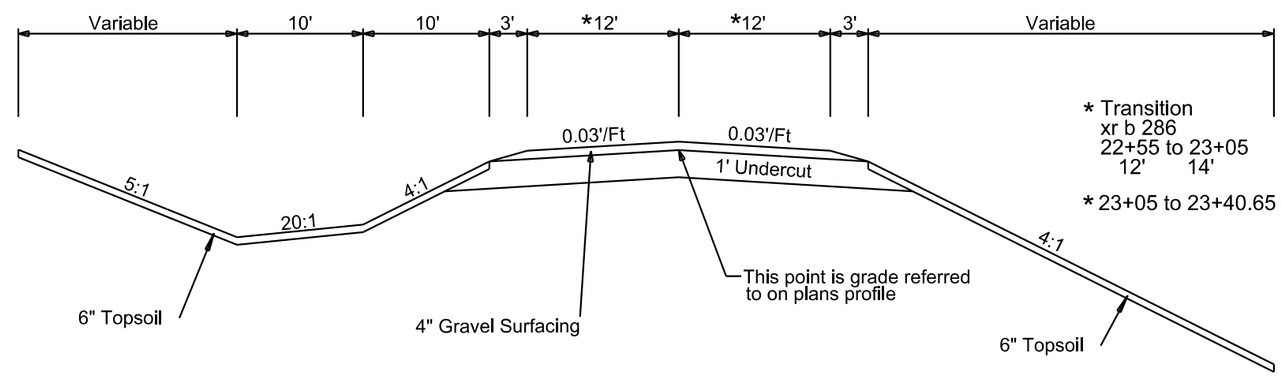
Transition
* 11+70 to 12+70
18' 14'

xr f 934

Transition

* 3+00 to 3+80
14' Match Existing

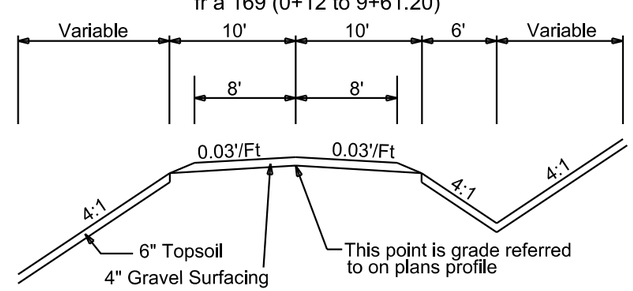
xr b 286 10+00.00 to 23+40.65



* Transition
xr b 286
22+55 to 23+05
12' 14'

* 23+05 to 23+40.65 - 14'

fr 111 (4+00 to 7+24)
fr a 169 (0+12 to 9+61.20)



Plot Scale - 1:200
Plotted From - TRSF12139
File - U:\rdtpr\jogla02\Qc\typ.dgn

HORIZONTAL ALIGNMENT DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B26	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

MAINLINE

Type	Station			Northing	Easting
POB	34+46.00			260807.095	1377550.566
		TL= 1177.02	S 86°42'10" E		
PC	46+23.02			260739.399	1378725.635
PI	48+63.21	R = 3820.00	Delta = 7°11'45" R	260725.584	1378965.430
PT	51+02.77			260681.842	1379201.606
		TL= 840.96	S 79°30'25" E		
PC	59+43.74			260528.690	1380028.507
PI	63+44.39	R = 3820.00	Delta = 11°58'30" L	260455.724	1380422.464
PT	67+42.13			260466.087	1380822.986
		TL= 2649.70	N 88°31'05" E		
PI	93+91.83			260534.619	1383471.803
		TL= 2920.51	N 88°33'44" E		
PC	123+12.34			260607.898	1386391.390
PI	129+66.33	R = 3725.00	Delta = 19°54'56" L	260624.308	1387045.173
PT	136+07.12			260862.438	1387654.268
EQNBK	138+80.00			260961.798	1387908.414
EQNAHD	a 138+87.00			260961.798	1387908.414
		TL= 283.07	N 68°38'48" E		
PC	a 138+97.19			260965.510	1387917.908
PI	a 155+61.60	R = 14175.00	Delta = 13°23'38" R	261571.551	1389468.056
PT	a 172+10.83			261802.028	1391116.427
		TL= 2223.98	N 82°02'26" E		
PI	a 194+34.81			262109.991	1393318.978
EQNBK	a 194+34.81			262109.991	1393318.979
EQNAHD	b 195+68.55			262109.991	1393318.979
		TL= 2199.42	N 82°05'26" E		
PC	b 217+67.97			262412.651	1395497.477
PI	b 226+67.93	R = 3820.00	Delta = 26°30'48" L	262536.493	1396388.873
PT	b 235+35.65			263045.235	1397131.239
		TL= 2668.07	N 55°34'38" E		
PI	b 262+03.73			264553.483	1399332.101
		TL= 2671.86	N 55°35'16" E		
PC	b 288+75.59			266063.468	1401536.370
PI	b 307+14.13	R = 5715.00	Delta = 35°39'59" R	267102.507	1403053.153
PT	b 324+33.16			267062.264	1404891.253
		TL= 1659.03	S 88°44'45" E		
PI	b 340+92.19			267025.951	1406549.884
		TL= 1258.68	S 88°39'04" E		
PI	b 353+50.86			266996.322	1407808.213
		TL= 1258.49	S 88°32'24" E		
PI	b 366+09.35			266964.257	1409066.295

MAINLINE (continued)

Type	Station			Northing	Easting
POB	34+46.00			260807.095	1377550.566
		TL= 1177.02	S 86°42'10" E		
PC	46+23.02			260739.399	1378725.635
PI	48+63.21	R = 3820.00	Delta = 7°11'45" R	260725.584	1378965.430
PT	51+02.77			260681.842	1379201.606
		TL= 840.96	S 79°30'25" E		
PC	59+43.74			260528.690	1380028.507
PI	63+44.39	R = 3820.00	Delta = 11°58'30" L	260455.724	1380422.464
PT	67+42.13			260466.087	1380822.986
		TL= 2649.70	N 88°31'05" E		
PI	93+91.83			260534.619	1383471.803
		TL= 2920.51	N 88°33'44" E		
PC	123+12.34			260607.898	1386391.390
PI	129+66.33	R = 3725.00	Delta = 19°54'56" L	260624.308	1387045.173
PT	136+07.12			260862.438	1387654.268
EQNBK	138+80.00			260961.798	1387908.414
EQNAHD	a 138+87.00			260961.798	1387908.414
		TL= 283.07	N 68°38'48" E		
PC	a 138+97.19			260965.510	1387917.908
PI	a 155+61.60	R = 14175.00	Delta = 13°23'38" R	261571.551	1389468.056
PT	a 172+10.83			261802.028	1391116.427
		TL= 2223.98	N 82°02'26" E		
PI	a 194+34.81			262109.991	1393318.978
EQNBK	a 194+34.81			262109.991	1393318.979
EQNAHD	b 195+68.55			262109.991	1393318.979
		TL= 2199.42	N 82°05'26" E		
PC	b 217+67.97			262412.651	1395497.477
PI	b 226+67.93	R = 3820.00	Delta = 26°30'48" L	262536.493	1396388.873
PT	b 235+35.65			263045.235	1397131.239
		TL= 2668.07	N 55°34'38" E		
PI	b 262+03.73			264553.483	1399332.101
		TL= 2671.86	N 55°35'16" E		
PC	b 288+75.59			266063.468	1401536.370
PI	b 307+14.13	R = 5715.00	Delta = 35°39'59" R	267102.507	1403053.153
PT	b 324+33.16			267062.264	1404891.253
		TL= 1659.03	S 88°44'45" E		
PI	b 340+92.19			267025.951	1406549.884
		TL= 1258.68	S 88°39'04" E		
PI	b 353+50.86			266996.322	1407808.213
		TL= 1258.49	S 88°32'24" E		

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. South Zone (NAD 83/2011) epoch 2010 Geoid 09, SF = 0.99984277

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\rdprjogla02QC\DataHoriz.dgn

HORIZONTAL ALIGNMENT DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B27	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

MAINLINE (continued)

Type	Station			Northing	Easting
PI	b 366+09.35			266964.257	1409066.295
		TL= 2639.40	S 88°34'12" E		
PI	b 392+48.75			266898.394	1411704.869
		TL= 2635.08	S 88°38'08" E		
PI	b 418+83.83			266835.653	1414339.200
EQNBK	b 431+97.69			266805.837	1415652.723
EQNAHD	c 432+04.69			266805.837	1415652.723
		TL= 1313.86	S 88°41'59" E		
PI	c 432+04.69			266805.837	1415652.725
		TL= 1321.28	S 88°35'05" E		
PI	c 445+25.98			266773.201	1416973.605
		TL= 2640.27	S 88°41'52" E		
PI	c 471+66.24			266713.195	1419613.190
		TL= 1321.59	S 88°44'51" E		
PI	c 484+87.83			266684.307	1420934.466
		TL= 635.46	S 88°34'11" E		
PI	c 491+23.30			266668.447	1421569.732
		TL= 686.70	S 88°49'02" E		
PI	c 498+10.00			266654.271	1422256.286
		TL= 1321.73	S 88°44'06" E		
PI	c 511+31.73			266625.093	1423577.699
		TL= 1319.78	S 88°47'41" E		
PI	c 524+51.51			266597.329	1424897.183
		TL= 1322.03	S 88°44'50" E		
PI	c 537+73.53			266568.427	1426218.892
		TL= 1321.13	S 88°46'40" E		
PI	c 550+94.66			266540.246	1427539.719
		TL= 1319.35	S 88°45'13" E		
PI	c 564+14.01			266511.549	1428858.757
		TL= 1319.93	S 88°47'56" E		
PI	c 577+33.94			266483.881	1430178.399
EQNBK	c 603+74.93			266427.944	1432818.793
EQNAHD	d 603+81.93			266427.944	1432818.793
		TL= 2640.99	S 88°47'11" E		
PI	d 603+81.93			266427.944	1432818.797
		TL= 1225.73	S 88°39'18" E		
PC	d 616+07.66			266399.170	1434044.186
PI	d 622+51.95	R = 5780.00	Delta = 12°43'15" L	266384.045	1434688.300

MAINLINE (continued)

Type	Station			Northing	Easting
		TL= 799.63	N 78°37'27" E		
PC	d 636+90.58			266668.848	1436103.856
PI	d 643+61.95	R = 11420.00	Delta = 6°43'44" R	266801.271	1436762.035
PT	d 650+31.77			266855.660	1437431.197
		TL= 673.28	N 85°21'12" E		
PI	d 657+05.05			266910.205	1438102.263
		TL= 876.74	N 85°06'14" E		
PI	d 665+81.79			266985.035	1438975.806
		TL= 873.15	N 85°02'53" E		
PI	d 674+54.95			267060.406	1439845.700
		TL= 872.80	N 85°07'40" E		
PI	d 683+27.74			267134.536	1440715.342
		TL= 948.67	N 85°04'25" E		
PI	d 692+76.42			267216.003	1441660.512
		TL= 744.50	N 84°58'48" E		
PI	d 700+20.92			267281.150	1442402.159
		TL= 917.48	N 85°12'10" E		
PC	d 709+38.40			267357.880	1443316.424
PI	d 718+74.27	R = 5695.00	Delta = 18°39'51" R	267436.149	1444249.017
PT	d 727+93.56			267211.851	1445157.614
EQNBK	d 747+93.97			266732.417	1447099.721
EQNAHD	e 747+98.97			266732.417	1447099.721
		TL= 2000.41	S 76°07'59" E		
PI	e 747+98.97			266732.417	1447099.721
		TL= 2012.72	S 76°09'48" E		
PC	e 768+11.69			266251.066	1449054.038
PI	e 774+55.82	R = 5620.00	Delta = 13°04'36" L	266097.020	1449679.471
PT	e 780+94.35			266088.476	1450323.539
		TL= 675.60	S 89°14'24" E		
PI	e 787+69.94			266079.515	1450999.076
		TL= 875.07	S 89°06'35" E		
PC	e 796+45.01			266065.917	1451874.038
PI	e 798+95.41	R = 14100.00	Delta = 2°02'05" R	266062.025	1452124.413

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. South Zone (NAD 83/2011) epoch 2010 Geoid 09, SF = 0.99984277

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\trdprjogla02QC\DataHoriz.dgn

HORIZONTAL ALIGNMENT DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B28	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

MAINLINE (continued)

Type	Station			Northing	Easting
PT	e 801+45.77			266049.246	1452374.492
		TL= 1103.39	S 87°04'29" E		
PI	e 812+49.16			265992.937	1453476.446
		TL= 1250.43	S 87°09'29" E		
PI	e 824+99.59			265930.941	1454725.340
		TL= 699.88	S 87°07'27" E		
PI	e 831+99.47			265895.826	1455424.342
PC	e 837+61.58			265868.121	1455985.764
PI	e 840+08.59	R = 19000.00	Delta = 1°29'23" L	265855.947	1456232.475
PT	e 842+55.57			265850.190	1456479.419
EQNBK	e 842+75.00			265849.737	1456498.840
EQNAHD	f 843+21.00			265849.737	1456498.840
		TL= 1382.90	S 88°39'52" E		
PI	f 856+84.48			265817.961	1457861.948
		TL= 1329.89	S 88°42'39" E		
PI	f 856+84.48			265817.961	1457861.948
		TL= 1329.89	S 88°42'39" E		
PI	f 870+14.37			265788.039	1459191.499
		TL= 1321.87	S 88°40'21" E		
PI	f 883+36.23			265757.417	1460513.012
		TL= 1323.85	S 88°43'19" E		
PI	f 896+60.08			265727.887	1461836.529
		TL= 1185.60	S 88°53'13" E		
PI	f 908+45.68			265704.857	1463021.902
		TL= 1254.32	S 88°58'36" E		
PI	f 921+00.00			265682.455	1464276.025
		TL= 260.94	S 88°45'27" E		

MAINLINE (continued)

Element: Clothoid

TS	f 923+60.94			265676.797	1464536.905
SPI	f 926+27.72			265671.012	1464803.616
SC	f 927+60.94	265679.822	1464936.756		

Entrance Radius:	0.00
Exit Radius:	2279.00
Length:	400.00
Angle:	5°01'41" Left
Constant:	954.78
Long Tangent:	266.77
Short Tangent:	133.43
Long Chord:	399.86
Xs:	399.69
Ys:	11.69
P:	2.92
K:	199.95
Tangent Direction:	S 88°45'27" E
Radial Direction:	S 1°14'33" W
Chord Direction:	N 89°33'59" E
Radial Direction:	S 3°47'08" E
Tangent Direction:	N 86°12'52" E

SC	f 927+60.94			265679.822	1464936.756
PI	f 937+28.72	R = 2279.00	Delta = 46°01'02" L	265743.720	1465902.428
CS	f 945+91.33			266482.941	1466527.053

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. South Zone (NAD 83/2011) epoch 2010 Geoid 09, SF = 0.99984277

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\rdprj\ogla02QC\DataHoriz.dgn

HORIZONTAL ALIGNMENT DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B29	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

Div122

Type	Station			Northing	Easting
POB	10+00.00			260590.849	1385679.254
		TL= 39.53	N 88°28'37" E		
PC	10+39.53			260591.900	1385718.772
PI	11+69.89	R =400.00	Delta = 36°06'08" L	260595.365	1385849.088
PT	12+91.57			260674.951	1385952.338
		TL= 6.97	N 52°22'28" E		
PC	12+98.54			260679.203	1385957.855
PI	16+31.82	R =475.00	Delta = 70°06'35" R	260882.668	1386221.816
PT	18+79.77			260703.675	1386502.948
		TL= 12.53	S 57°30'57" E		
PC	18+92.30			260696.946	1386513.518
PI	20+41.15	R =400.00	Delta = 40°49'21" L	260617.004	1386639.077
PT	21+77.29			260638.590	1386786.352
		TL= 91.34	N 81°39'42" E		
POE	22+68.64			260651.836	1386876.726

Div b 342

Type	Station			Northing	Easting
POB	0+00.00			267030.712	1406360.183
		TL= 84.19	S 88°38'25" E		
PC	0+84.19			267028.714	1406444.347
PI	1+54.16	R =400.00	Delta 19°50'43"L	267027.054	1406514.301
PT	2+22.73			267049.240	1406580.665
		TL= 32.04	N 71°30'52" E		
PC	2+54.77			267059.399	1406611.052
PI	3+99.95	R =400.00	Delta = 39°53'4R	267105.430	1406748.739
PT	5+33.30			267052.432	1406883.898
		TL= 27.20	S 68°35'21" E		
PC	5+60.50			267042.504	1406909.218
PI	6+31.18	R =400.00	Delta = 20°02'3L	267016.702	1406975.020
PT	7+00.42			267015.014	1407045.681
		TL= 46.69	S 88°37'51" E		
POE	7+47.10			267013.898	1407092.356

Div c 502

Type	Station			Northing	Easting
POB	10+00.00			266654.411	1422235.388
		TL= 39.43	S 88°44'44" E		
PC	10+39.43			266653.548	1422274.811
PI	11+29.55	R = 400.00	Delta = 25°23'32" R	266651.575	1422364.904
PT	12+16.70			266611.159	1422445.448
		TL= 34.85	S 63°21'12" E		
PC	12+51.55			266595.529	1422476.597
PI	14+38.86	R = 400.00	Delta = 50°11'03" L	266511.525	1422644.010
PT	16+01.91			266586.326	1422815.733
		TL= 44.29	N 66°27'44" E		
PC	16+46.20			266604.015	1422856.340
PI	17+34.08	R = 400.00	Delta = 24°46'52" R	266639.108	1422936.905
PT	18+19.20			266637.202	1423024.761
		TL= 43.71	S 88°45'24" E		
POE	18+62.92			266636.253	1423068.464

Div d 673

Type	Station			Northing	Easting
PC	0+00.00			267013.436	1439303.591
PI	1+16.71	R = 400.00	Delta = 32°31'53" L	267023.510	1439419.863
PRC	2+27.11			267094.531	1439512.475
PI	4+82.54	R = 400.00	Delta = 65°07'17" R	267249.964	1439715.162
PRC	6+81.74			267131.477	1439941.441
PI	7+98.37	R = 400.00	Delta = 32°30'37" L	267077.375	1440044.761
PT	9+08.71			267087.280	1440160.968

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Plot Scale - 1:200
Plotted From - TRSF12139
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HORIZONTAL ALIGNMENT DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B30	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

Div e 805

Type	Station			Northing	Easting
PC	0+00.00			266049.186	1452375.679
PI	1+05.95	R = 400.00	Delta=29°40'17"R	266043.770	1452481.491
PRC	2+07.14			265986.684	1452570.749
PI	4+35.08	R = 400.00	Delta = 59°21'0L	265863.875	1452762.770
PRC	6+21.50			265966.471	1452966.310
PI	7+27.47	R = 400.00	Delta = 29°40'3R	266014.169	1453060.938
PT	8+28.68			266008.761	1453166.769

Div f 903

Type	Station			Northing	Easting
POB	0+00.00			265722.239	1462154.903
		TL= 19.17	S 88°55'05" E		
PC	0+19.17			265721.877	1462174.068
PI	1+01.24	R = 550.00	Delta = 16°58'3L	265720.327	1462256.130
PT	1+82.12			265742.803	1462335.069
		TL= 34.36	N 74°06'25" E		
PC	2+16.48			265752.213	1462368.116
PI	3+37.35	R = 400.00	Delta = 33°37'4R	265785.313	1462484.370
PT	4+51.25			265748.493	1462599.500
		TL= 42.13	S 72°15'54" E		
PC	4+93.38			265735.658	1462639.631
PI	5+70.44	R = 550.00	Delta = 15°57'0L	265712.187	1462713.023
PT	6+46.49			265709.787	1462790.039
		TL= 28.24	S 88°12'54" E		
POE	6+74.73			265708.907	1462818.261

Div f 912

Type	Station			Northing	Easting
PC	0+00.00			265704.815	1463024.253
PI	1+06.24	R = 400.00	Delta = 29°45'00" L	265702.917	1463130.480
PRC	2+07.69			265753.981	1463223.648
PI	4+36.31	R = 400.00	Delta = 59°29'59" R	265863.862	1463424.129
PRC	6+23.08			265746.892	1463620.557
PI	7+29.32	R = 400.00	Delta = 29°45'00" L	265692.533	1463711.842
PT	8+30.77			265690.635	1463818.069

fr 111

Type	Station			Northing	Easting
POB	0+00.00			260670.357	1385253.125
		TL=724.00	N 88°33'44" E		
POE	7+24.00			260688.524	1385976.897

fr a 169

Type	Station			Northing	Easting
POB	0+00.00			261845.350	1390812.761
		TL=294.76	N 81°26'54" E		
PI	2+94.76			261889.180	1391104.241
		TL= 667.17	N 82°02'26" E		
POE	9+61.92			261981.566	1391764.981

xr 191

Type	Station			Northing	Easting
POB	10+00.00			262071.937	1393046.816
		TL= 54.75	S 7°57'34" E		
PC	10+54.75			262017.718	1393054.397
PI	11+32.21	R = 65.00	Delta = 100°00'00" L	261941.000	1393065.124
PT	11+68.19			261964.885	1393138.814
		TL= 95.90	N 72°02'26" E		
PC	12+64.10			261994.456	1393230.043
PI	13+91.21	R = 750.00	Delta = 19°14'19" R	262033.651	1393350.962
PT	15+15.93			262030.814	1393478.043
		TL= 4.07	S 88°43'16" E		
POE	15+20.00			262030.723	1393482.112

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Plot Scale - 1:200
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HORIZONTAL ALIGNMENT DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B31	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

xr b 340

Type	Station			Northing	Easting
POB	0+00.00			267026.656	1406517.705
		TL= 66.35	N 1°15'15" E		
PC	0+66.35			267092.994	1406519.158
PI	0+90.44	R = 900.00	Delta = 3°03'59" L	267117.078	1406519.685
PT	1+14.52			267141.156	1406518.923
		TL= 2.32	N 1°48'44" W		
PC	1+16.84			267143.477	1406518.850
PI	1+44.06	R = 900.00	Delta = 3°27'51" R	267170.679	1406517.989
PT	1+71.26			267197.883	1406518.774
		TL= 20.15	N 1°39'07" E		
POE	1+91.41			267218.030	1406519.355

xr d 696

Type	Station			Northing	Easting
POB	0+00.00			267246.569	1442008.483
		TL= 106.55	N 1°10'30" E		
PC	1+06.55			267353.097	1442010.668
PI	1+28.12	R = 250.00	Delta = 9°51'41" R	267374.660	1442011.110
PT	1+49.58			267395.828	1442015.239
		TL= 32.77	N 11°02'11" E		
PC	1+82.35			267427.993	1442021.513
PI	2+03.92	R = 250.00	Delta = 9°51'41" L	267449.162	1442025.641
PT	2+25.38			267470.725	1442026.084
		TL= 574.37	N 1°10'30" E		
POE	7+99.75			268044.976	1442037.863

xr e 816

Type	Station			Northing	Easting
POB	0+00.00			265972.623	1453885.661
		TL= 320.00	N 1°34'38" E		
POE	3+20.00			266292.502	1453894.468

xr f 869

Type	Station			Northing	Easting
POB	0+00.00			265788.435	1459173.865
		TL= 250.01	N 1°51'04" E		
POE	2+50.01			266038.317	1459181.941

xr f 922

Type	Station			Northing	Easting
POB	0+00.00			265678.458	1464459.875
		TL= 240.16	N 1°22'20" E		
POE	2+40.16			265918.548	1464465.627

xr f 934

Type	Station			Northing	Easting
POB	0+00.00			265836.911	1465630.331
		TL= 68.61	S 21°44'16" E		
PC	0+68.61			265773.180	1465655.741
PI	2+00.90	R = 200.00	Delta = 66°57'59" L	265650.295	1465704.736
PT	3+02.37			265647.303	1465836.995
		TL= 77.64	S 88°42'14" E		
POE	3+80.00			265645.547	1465914.613

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Plot Scale - 1:200
Plotted From - TRSF12139
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HORIZONTAL ALIGNMENT DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B32	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

dr b 392

Type	Station			Northing	Easting
POB	0+00.00			264262.683	1411628.707
		TL= 49.98	N 1°05'13" W		
PI	0+49.98			264312.651	1411627.759
		TL= 41.34	N 3°44'40" E		
PI	0+91.32			264353.906	1411630.459
		TL= 42.61	N 4°49'56" W		
PI	1+33.93			264396.360	1411626.870
		TL= 39.02	N 8°19'14" E		
PI	1+72.94			264434.965	1411632.516
		TL= 19.43	N 18°21'27" W		
PI	1+92.37			264453.408	1411626.396
		TL= 38.70	N 0°03'23" W		
PI	2+31.07			264492.106	1411626.358
		TL= 47.62	N 6°24'07" E		
PI	2+78.69			264539.432	1411631.668
		TL= 35.99	N 2°25'13" E		
PI	3+14.69			264575.392	1411633.188
		TL= 62.72	N 0°02'15" W		
PI	3+77.41			264638.112	1411633.147
		TL= 26.59	N 4°03'49" E		
PI	4+03.99			264664.632	1411635.031
		TL= 26.34	N 3°23'36" E		
PI	4+30.33			264690.924	1411636.590
		TL= 15.12	N 0°07'30" W		
PI	4+45.45			264706.044	1411636.557
		TL= 6.72	N 5°04'29" E		
PI	4+52.17			264712.733	1411637.151
		TL= 11.22	N 2°36'16" E		
PI	4+63.39			264723.945	1411637.661
		TL= 91.84	N 2°36'18" E		
PI	5+55.23			264815.687	1411641.835
		TL= 73.90	N 0°12'00" E		
PI	6+29.12			264889.584	1411642.093
		TL= 81.27	N 1°15'00" E		
PI	7+10.40			264970.839	1411643.866
		TL= 96.38	N 0°43'48" E		
PI	8+06.78			265067.210	1411645.094
		TL= 97.85	N 2°42'52" E		
PI	9+04.63			265164.952	1411649.728
		TL= 48.90	N 1°00'36" E		

dr b 392(continued)

Type	Station			Northing	Easting
PI	9+53.53			265213.844	1411650.590
		TL= 130.64	N 0°51'49" E		
PI	10+84.17			265344.470	1411652.559
		TL= 37.87	N 1°35'57" E		
PI	11+22.04			265382.330	1411653.616
		TL= 93.63	N 2°00'53" E		
PI	12+15.68			265475.907	1411656.908
		TL= 71.91	N 1°05'10" E		
PI	12+87.59			265547.801	1411658.271
		TL= 52.95	N 2°07'17" E		
PI	13+40.54			265600.715	1411660.231
		TL= 92.94	N 1°23'03" E		
PI	14+33.48			265693.631	1411662.476
		TL= 96.03	N 0°33'24" E		
PI	15+29.51			265789.656	1411663.409
		TL= 66.21	N 1°52'23" E		
PI	15+95.72			265855.830	1411665.573
		TL= 67.25	N 0°23'28" E		
PI	16+62.96			265923.074	1411666.032
		TL= 83.60	N 1°34'58" E		
PI	17+46.57			266006.644	1411668.341
		TL= 84.49	N 1°59'39" E		
PI	18+31.05			266091.078	1411671.281
		TL= 57.56	N 1°43'45" E		
PI	18+88.61			266148.615	1411673.018
		TL= 59.85	N 3°40'57" E		
PI	19+48.46			266208.341	1411676.862
		TL= 51.32	N 4°43'22" E		
PI	19+99.78			266259.482	1411681.087
		TL= 49.21	N 3°16'03" E		
PI	20+48.99			266308.613	1411683.892
		TL= 49.02	N 1°21'42" E		
PI	20+98.02			266357.624	1411685.057
		TL= 46.13	N 1°37'16" E		
PI	21+44.14			266403.735	1411686.362
		TL= 42.33	N 2°34'35" E		
PI	21+86.48			266446.025	1411688.265
		TL= 45.11	N 0°38'34" E		
PI	22+31.59			266491.131	1411688.771
		TL= 51.40	N 0°47'13" W		

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Plot Scale - 1:200
Plotted From - TRSF12139
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HORIZONTAL ALIGNMENT DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B33	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

dr b 392(continued)

Type	Station			Northing	Easting
PI	22+82.98			266542.522	1411688.065
		TL= 45.23	N 3°14'55" E		
PI	23+28.21			266587.676	1411690.628
		TL= 47.04	N 0°34'03" W		
PI	23+75.25			266634.712	1411690.162
		TL= 50.28	N 1°58'05" E		
PI	24+25.53			266684.967	1411691.889
		TL= 50.27	N 0°03'05" E		
PI	24+75.81			266735.241	1411691.934
		TL= 32.12	N 3°05'34" E		
PI	25+07.93			266767.314	1411693.667
		TL= 30.79	N 1°31'20" E		
PI	25+38.72			266798.095	1411694.485
		TL= 32.54	N 3°15'52" E		
PI	25+71.26			266830.584	1411696.338
		TL= 38.13	N 0°36'47" E		
POE	26+09.39			266868.716	1411696.746

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. South Zone (NAD 83/2011) epoch 2010 Geoid 09, SF = 0.99984277

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\rdrjobla02QC\DataHoriz.dgn

CONTROL DATA

HORIZONTAL AND VERTICAL CONTROL POINTS

POINT	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
18-104.00	N/A	N/A	NGS Survey Marker PID OT0925 Disk in Concrete	260689.694	1376278.605	3266.66
18-105.00	75+08.19	73.94' L	NGS Survey Marker PID OT0924 Steel Pipe in Sleeve	260559.817	1381586.876	3274.08
18-106.65	164+77.52	54.17' R	NGS Survey Marker PID OT0922 Disk in Concrete	261629.881	1390410.242	3337.61
18-107.70	220+23.29	47.26' L	NGS Survey Marker PID OT0921 Disk in Concrete	262533.256	1395874.931	3350.60
18-108.95	283+88.64	67.06' L	NGS Survey Marker PID OT0920 Disk in Concrete	265923.135	1401212.854	3416.15
18-111.00	390+33.23	97.30' L	NGS Survey Marker PID OT0918 Disk in Concrete	266997.527	1411632.536	3411.81
18-113.00	495+59.94	94.07' L	NGS Survey Marker PID OT0916 Disk in Concrete	266750.437	1422155.929	3409.26
18-114.00	548+87.41	78.70' L	NGS Survey Marker PID OT0914 Disk in Concrete	266620.198	1427481.896	3446.04
18-115.00	601+70.58	89.46' L	NGS Survey Marker PID OT0913 Pipe /Rod in Sleeve	266518.587	1432764.087	3483.80
2 T	602+37.24	125.40' R	NGS Survey Marker PID OT0915 Brass Disc in Concrete	266302.346	1432825.893	3494.46
18-117.00	708+19.61	47.08' R	NGS Survey Marker PID OT0911 Disk in Concrete	267313.837	1443355.898	3392.00
18-118.00	762+05.86	47.83' L	NGS Survey Marker PID OT0910 Disk in Concrete	266404.197	1448632.328	3396.47
18-119.00	812+60.96	48.46' L	NGS Survey Marker PID OT0909 Disk in Concrete	266032.831	1453650.175	3396.21
18-121.00	918+51.25	76.66' R	NGS Survey Marker PID OT0907 Disk in Concrete	265606.574	1464231.650	3437.91

VERTICAL CONTROL POINTS

POINT	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
BM1	37+95.26	77.98 R	Rebar and Yellow Cap	260709.156	1377894.761	3246.93
BM2	48+13.36	52.86 R	Rebar and Yellow Cap	260671.162	1378909.648	3251.69
BM3	58+77.49	50.54 R	Rebar and Yellow Cap	260491.056	1379954.169	3265.08
BM4	85+42.70	157.38 R	Rebar and Yellow Cap	260355.325	1382627.026	3280.98
BM5	96+10.05	156.28 R	Rebar and Yellow Cap	260383.868	1383693.869	3284.58
BM6	106+53.38	50.96 R	Rebar and Yellow Cap	260515.329	1384734.234	3291.64
BM7	122+99.65	48.91 R	Rebar and Yellow Cap	260558.688	1386379.935	3280.90
BM8	133+51.87	48.36 R	Rebar and Yellow Cap	260731.567	1387428.024	3320.36
BM9	143+84.90	49.32 R	Rebar with Yellow Cap	261091.032	1388398.051	3322.97
BM10	154+30.02	54.47 R	Rebar and Yellow Cap	261394.687	1389393.851	3320.10
BM11	175+44.57	58.01 R	Rebar and Yellow Cap	261791.758	1391461.919	3338.33
BM12	185+95.11	53.41 R	Rebar and Yellow Cap	261941.790	1392501.696	3348.76
BM13	196+45.41	51.06 R	Rebar and Yellow Cap	262089.362	1393541.532	3348.04
BM14	207+14.45	54.55 R	Rebar and Yellow Cap	262233.009	1394600.888	3348.05
BM15	230+58.58	63.51 R	Rebar and Yellow Cap	262812.216	1396876.952	3338.97
BM16	241+36.85	48.61 R	Rebar and Yellow Cap	263424.547	1397770.730	3364.27
BM17	251+90.36	49.81 R	Rebar and Yellow Cap	264019.106	1398640.436	3359.88
BM18	262+62.88	50.63 R	Rebar and Yellow Cap	264624.677	1399525.624	3383.36
BM19	273+05.06	49.92 R	Rebar and Yellow Cap	265214.250	1400385.009	3409.80

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System.
South Zone (NAD 83/2011) epoch 2010 Geoid 09, SF = 0.99984277
The elevations shown on this sheet are based on NAVD 88.

CONTROL DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B35	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

VERTICAL CONTROL POINTS (Continued)

POINT	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
BM20	294+66.65	53.55 R	Rebar and Yellow Cap	266389.627	1402189.267	3412.58
BM21	305+13.32	53.51 R	Rebar and Yellow Cap	266774.669	1403150.434	3409.10
BM22	315+88.38	59.49 R	Rebar and Yellow Cap	266975.150	1404194.232	3402.42
BM23	326+40.26	52.43 R	Rebar and Yellow Cap	267002.229	1405237.867	3394.78
BM28	400+84.40	52.68 R	Rebar and Yellow Cap	266822.480	1412679.723	3412.54
BM29	411+46.73	52.51 R	Rebar and Yellow Cap	266797.353	1413741.756	3421.05
BM30	421+94.49	54.53 R	Rebar and Yellow Cap	266770.895	1414789.245	3425.54
BM31	432+70.85	54.85 R	Rebar and Yellow Cap	266745.723	1415865.199	3411.38
BM33	464+70.67	49.35 R	Rebar and Yellow Cap	266676.304	1419064.377	3412.60
BM35	486+04.95	50.37 R	Rebar and Yellow Cap	266627.343	1421197.982	3410.53
BM36	506+19.23	48.65 R	Rebar and Yellow Cap	266584.504	1423211.949	3412.80
BM37	516+68.93	46.21 R	Rebar and Yellow Cap	266564.480	1424261.510	3418.13
BM38	527+38.96	47.70 R	Rebar and Yellow Cap	266540.124	1425331.224	3420.31
BM39	537+85.81	46.97 R	Rebar and Yellow Cap	266518.058	1426377.874	3429.78
BM40	559+50.02	48.64 R	Rebar and Yellow Cap	266469.796	1428541.522	3456.61
BM41	570+00.39	47.20 R	Rebar and Yellow Cap	266448.974	1429591.728	3451.20
BM42	580+64.12	46.14 R	Rebar and Yellow Cap	266427.626	1430655.235	3447.02
BM43	591+08.00	46.06 R	Rebar and Yellow Cap	266405.597	1431698.882	3458.51
BM44	612+39.81	50.50 R	Rebar and Yellow Cap	266353.686	1433829.945	3481.57
BM45	623+35.30	103.95 R	Rebar and Yellow Cap	266342.652	1434937.869	3482.93
BM46	633+89.50	48.33 R	Rebar and Yellow Cap	266592.604	1435969.925	3474.47
BM48	665+97.94	50.12 R	Rebar and Yellow Cap	266949.856	1439150.382	3376.77
BM49	676+83.18	49.65 R	Rebar and Yellow Cap	267043.466	1440231.504	3376.12
BM50	687+21.47	49.23 R	Rebar and Yellow Cap	267132.586	1441266.008	3381.43
BM51	697+07.03	46.64 R	Rebar and Yellow Cap	267220.759	1442247.698	3405.12
BM52	718+38.76	50.66 L	Rebar and Yellow Cap	267398.898	1444375.107	3405.56
BM53	730+15.33	48.76 L	Rebar and Yellow Cap	267168.952	1445534.837	3405.21
BM54	741+03.86	48.71 L	Rebar and Yellow Cap	266908.024	1446591.626	3394.57
BM56	769+78.24	48.15 L	Rebar and Yellow Cap	266229.608	1449381.729	3383.95
BM57	780+39.87	47.05 L	Rebar and Yellow Cap	266134.128	1450429.420	3405.64
BM58	791+07.10	45.76 R	Rebar and Yellow Cap	266026.041	1451495.207	3407.04
BM59	801+52.71	45.46 R	Rebar and Yellow Cap	265995.338	1452538.640	3392.53
BM60	824+97.23	45.71 R	Rebar and Yellow Cap	265877.397	1454880.225	3413.17
BM61	835+62.44	47.38 R	Rebar and Yellow Cap	265822.736	1455944.077	3441.36
BM62	845+74.94	43.88 R	Rebar and Yellow Cap	265795.154	1456957.368	3446.39
BM63	856+65.47	47.42 L	Rebar and Yellow Cap	265861.169	1458049.700	3419.11
BM64	876+25.87	46.78 R	Rebar and Yellow Cap	265722.340	1460007.444	3429.20
BM65	886+87.00	48.75 R	Rebar and Yellow Cap	265696.268	1461068.291	3436.59
BM66	897+41.65	49.54 R	Rebar and Yellow Cap	265672.775	1462122.824	3437.80
BM67	908+01.82	48.96 R	Rebar and Yellow Cap	265653.015	1463182.882	3433.45

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System.
South Zone (NAD 83/2011) epoch 2010 Geoid 09, SF = 0.99984277
The elevations shown on this sheet are based on NAVD 88.

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\prj\ogla02QC\DataControl.dgn

SUBSURFACE UTILITY LOCATIONS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B36	B130

Plotting Date: 09/02/2015 Revised 08/18/2015 AR

Subsurface utility explorations were done at the following locations. The information below states what was located in the specified areas. This table is provided to aid the Contractor during construction. All information is approximate and the Contractor shall verify all locations before construction in those areas.

SUBSURFACE UTILITY LOCATIONS

TEST HOLE	STATION	OFFSET	FINDING	NORTHING	EASTING	UTILITY ELEVATION
1	No Data	No Data	Unsuccessful Data, excavated 7.1' deep, found 12" PVC Waterline going e-w	No Data	No Data	No Data
2	137+52.3	99.4' R	Found 4" PVC Waterline at 6.05' deep, e-w	260822.70	1387825.71	3329.06
3	a152+52.7	91.6' R	Found 4" PVC Waterline at 6.4'deep, e-w	261309.93	1389227.07	3321.10
4	a164+94.7	88.5' R	Found 4" PVC Waterline at 5.9' deep, e-w	261598.11	1390426.67	3337.91
5	a174+02.2	78.5' L	Found 12" PVC Waterline at 6.9' deep, e-w	261906.31	1391295.10	3330.47
6	a185+71.9	103.7' L	Found 12" PVC Waterline at 7.7' deep, e-w	262093.24	1392449.98	3343.62
7	a189+35.1	68.6' R	Found 4" PVC Waterline at 6.2' deep, e-w	261972.90	1392833.54	3344.11
8	a192+32.5	64.4' R	Found 12" PVC Waterline at 7.6' deep, e-w	262018.22	1393127.51	3343.00
9	b253+62.8	99.6' R	Found 12" PVC Waterline at 7.6' deep, e-w	264160.24	1398582.13	3365.93
10	b256+51.0	99.1' L	Found 12" PVC Waterline at 7.5' deep, e-w	264322.77	1398820.10	3363.20
11	b282+51.4	69.6' L	Found 12" PVC Waterline at 7.1' deep, e-w	265768.14	1400982.05	3410.24
12	b285+32.6	48.2' L	Found 12" PVC Waterline at 7.0' deep, e-w	265909.40	1401226.19	3409.22
13	b288+54.2	44.9' L	Found 12" PVC Waterline at 6.8' deep, e-w	266088.41	1401493.35	3408.27
14	b313+03.7	50.5' L	Found 12" PVC Waterline at 7.5' deep, e-w	267025.36	1403758.11	3397.31
15	b315+28.9	56.9' L	Found 12" PVC Waterline at 7.05' deep, e-w	267067.00	1403981.66	3397.24
16	b341+89.4	36.8' R	Found 12" PVC Waterline at 6.3' deep, e-w	266986.92	1406646.19	3387.10
17	b344+30.0	100.9' L	Found 12" PVC Waterline at 7.0' deep, e-w	267118.86	1406889.99	3387.62
18	b391+99.5	105.0' L	Found 12" PVC Waterline at 7.25' deep, e-w	267004.61	1411658.22	3403.83
19	c532+32.4	98.4' L	Found 12" PVC Waterline at 7.5' deep, e-w	266678.63	1425680.03	3424.92
20	c593+12.9	105.9' L	Found 12" PVC Waterline at 7.25' deep, e-w	266556.32	1431759.29	3468.17
21	c595+87.2	146.4' L	Unsuccessful Data	266590.95	1432034.36	No Data
22	d698+77.9	97.4' L	Found 12" PVC Waterline at 6.35' deep, e-w	267365.69	1442251.17	3399.84
23	d718+06.8	100.8' L	Found 12" PVC Waterline at 5.6' deep, e-w	267464.89	1444190.83	3407.56
24	e827+35.4	99.9' L	Found 12" PVC Waterline at 6.1' deep, e-w	266018.92	1454965.90	3418.73
25	e830+68.1	100.1' L	Found 12" PVC Waterline at 6.3' deep, e-w	266002.40	1455298.20	3425.64
26	e837+52.1	96.7' L	Found 12" PVC Waterline at 6.8' deep, e-w	265965.18	1455981.03	3445.87
29	f903+67.1	100.6' L	Found 12" PVC Waterline at 7.3' deep, e-w	265814.76	1462545.32	3430.34
30	f911+51.3	104.6' L	Found 12" PVC Waterline at 7.3' deep, e-w	265803.98	1463329.38	3427.37
WV#1	128+82.8	106.3' L	Found Water Valve at 8.5' deep	260770.39	1386939.48	3311.21
WV#2	129+37.6	102.4' L	Found Water Valve at 7.5' deep	260776.37	1386992.53	3312.94
WV#3	a190+77.8	44.6' R	Found Water Valve at 8.9' deep	262016.38	1392971.54	3343.45

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System.
South Zone (NAD 83/2011) epoch 2010 Geoid 09, SF = 0.99984277
The elevations shown on this sheet are based on NAVD 88.

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\ogla02QC\DataSubSurface.dgn

EXISTING TOPOGRAPHY SYMBOLOGY AND LEGEND

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B37	B130

Plotting Date: 09/02/2015

Anchor
Antenna
Approach
Assumed Corner
Azimuth Marker
BBQ Grill/ Fireplace
Bearing Tree
Bench Mark
Box Culvert
Bridge
Brush
Buildings
Bulk Tank
Cattle Guard
Cemetery
Centerline
Cistern
Clothes Line
Commercial Sign Double Face
Commercial Sign One Post
Commercial Sign Overhead
Commercial Sign Two Post
Concrete Symbol
Creek Edge
Curb/Gutter
Curb
Dam Grade/Dike/Levee
Deck Edge
Ditch Block
Doorway Threshold
Drainage Profile
Drop Inlet
Edge Of Asphalt
Edge Of Concrete
Edge Of Gravel
Edge Of Other
Edge Of Shoulder
Elec. Trans./Power Jct. Box
Fence Barbwire
Fence Chainlink
Fence Electric
Fence Misc.
Fence Rock
Fence Snow
Fence Wood
Fence Woven
Fire Hydrant
Flag Pole
Flower Bed
Gas Valve Or Meter
Gas Pump Island
Grain Bin
Guardrail
Guide Sign One Post
Guide Sign Two Post
Gutter
Guy Pole
Haystack

Hedge
Highway R.O.W. Marker
Interstate Close Gate
Iron Pin
Irrigation Ditch
Lake Edge
Lawn Sprinkler
Mailbox
Manhole Electric
Manhole Gas
Manhole Misc
Manhole Sanitary Sewer
Manhole Storm Sewer
Manhole Telephone
Manhole Water
Merry-Go-Round
Microwave Radio Tower
Misc. Line
Misc. Property Corner
Misc. Post
Overhang Or Encroachment
Overhead Utility Line — OH —
Parking Meter
Pipe With End Section
Pipe With Headwall
Pipe Without End Section
Playground Slide
Playground Swing
Power And Light Pole
Power And Telephone Pole
Power Meter
Power Pole
Power Pole And Transformer
Power Tower Structure
Propane Tank
Property Pipe
Property Pipe With Cap
Property Stone
Public Telephone
Railroad Crossing Signal
Railroad Milepost Marker
Railroad Profile
Railroad R.O.W. Marker
Railroad Signs
Railroad Switch
Railroad Track
Railroad Trestle
Rebar
Rebar With Cap
Reference Mark
Regulatory Sign One Post
Regulatory Sign Two Post
Retaining Wall
Riprap
River Edge
Rock And Wire Baskets
Rockpiles
Satellite Dish
Septic Tank

Shrub Tree
Sidewalk
Sign Face
Sign Post
Slough Or Marsh
Spring
Stream Gauge
Street Marker
Subsurface Utility Exploration Test Hole
Telephone Fiber Optics — T/F —
Telephone Junction Box
Telephone Pole
Television Cable Jct Box
Television Tower
Test Wells/Bore Holes
Traffic Signal
Trash Barrel
Tree Belt
Tree Coniferous
Tree Deciduous
Tree Stumps
Triangulation Station
Underground Electric Line — P —
Underground Gas Line — G —
Underground High Pressure Gas Line — HG —
Underground Sanitary Sewer — S —
Underground Storm Sewer — S —
Underground Tank
Underground Telephone Line — T —
Underground Television Cable — TV —
Underground Water Line — W —
Warning Sign One Post
Warning Sign Two Post
Water Fountain
Water Hydrant
Water Meter
Water Tower
Water Valve
Water Well
Weir Rock
Windmill
Wingwall
Witness Corner

State and National Line
County Line
Section Line
Quarter Line
Sixteenth Line
Property Line
Construction Line
R. O. W. Line
New R. O. W. Line
Cut and Fill Limits
Control of Access
New Control of Access
Proposed ROW
(After Property Disposal)

PLOT SCALE - 1:200
PLOTTED FROM - TRSF12139
PLOT NAME - 37
FILE - U:\RD\PRJ\OGLA020C\TOPOSYMB.DGN

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B38	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

36+42
Retain 18"-86' CMP
& Lt End Section

36+42 R
Take Out 18" CMP End Section
(Incidental Work, Grading)

36+42
Install 18"-16' CMP
1-2.5° Elbow
& 1 Safety End

41+16 to 41+40 R
Take Out Chain Link Fence
(Lift Station Perimeter)

Take Out
Concrete Sidewalk
at the following
locations :
41+35 to 42+41 L
48+13 to 49+22 L

Install 4" Concrete
Sidewalk at the
following locations :
41+35 to 42+41 L
48+13 to 48+62 L
48+90 to 49+22 L

Install 6" Concrete
Sidewalk at the
following location :
48+62 to 48+90 L

42+07
Take Out 72"-124' CMP
(Incidental Work, Grading)

42+12-39° Skew RHF (901 ac)
Install 78" - 168' RCP
& 2 Flared Ends

42+57-55'R
Install 6" Extruded
Polystyrene Insulation Board

42+74.7-77.5'R to 43+80.0-118'R
Cut Inlet Ditch
(25 CY Exc Inc in Grading Est)

41+57.4-67.5'L
Install Bank and Channel
Protection Gabions
(26.0 CY)

41+57.4-67.5'L to 40+42-139'L
Cut Outlet Ditch
(30 CY Exc Inc in Grading Est)

42+91-44' L
Retain 18"-36' CMP

44+58-33' L
Take Out 18"-31' CMP
(Incidental Work, Grading)

41+75-37'L
Remove & Reset
Luminaire Pole

44+60-34'L
Install 18" - 48' CMP Arch
& 2 Safety Ends

48+77-95' R
Take Out 18"-34' CMP
(Incidental Work, Grading)

48+87-111' R
Take Out 30"-50' CMP
(Incidental Work, Grading)

48+89.5-141.1'R (884 ac)
Install Twin 42" - 44' CMP
& 4 Flared Ends
(Spaced 24' C to C)

48+62.0-148.9'R
Install Bank and Channel
Protection Gabions
(20.0 CY)

49+63-64' L
Retain 18" -36' CMP

49+63-102'L
Install 18"-32' CMP Arch
& 2 Flared Ends

53+82-34' L
Take Out 18"-30' CMP
(Incidental Work, Grading)

58+51
Take Out 18" -87' CMP
(Incidental Work, Grading)

58+30-69'R
Install 18"-70' CMP
& 2 Safety Ends

46+64 L
Begin Type 2

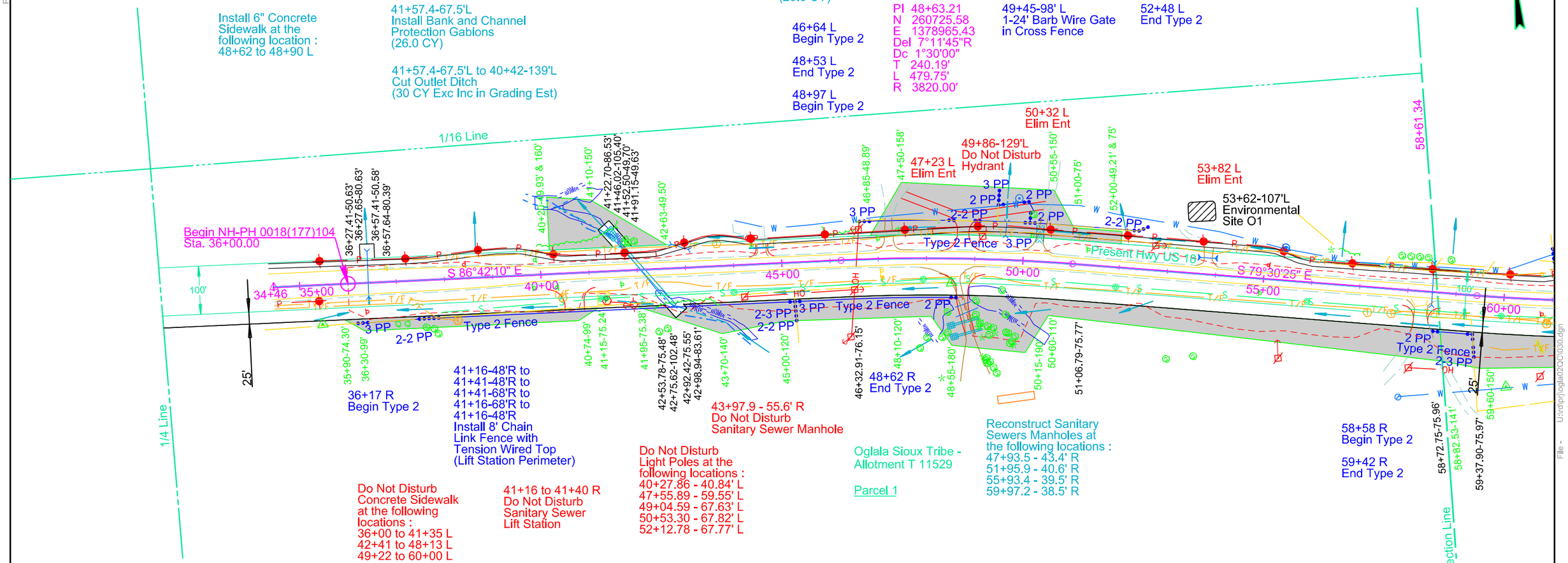
48+53 L
End Type 2

48+97 L
Begin Type 2

PI 48+63.21
N 260725.58
E 1378965.43
Del 7°11'45"R
Dc 1°30'00"
T 240.19'
L 479.75'
R 3820.00'

49+45-98' L
1-24' Barb Wire Gate
in Cross Fence

52+48 L
End Type 2



Parcel 1
40+20 to 42+63 L
Temporary Easement for
Pipe & Outlet Ditch containing
0.4 ac, more or less

Parcel 1
35+90 to 41+15 R
Temporary Easement for
Cut containing
0.3 ac, more or less

Parcel 1
46+85 to 52+00 L
Temporary Easement for
Entrances containing
0.9 ac, more or less

Parcel 1
41+95 to 58+82.53 R
Temporary Easement for
Cut, Fill, Inlet Ditch &
Entrance containing
2.1 ac, more or less

Parcel 2
58+72.75 to 85+40.64 R
Temporary Easement for
Cut & Fill containing
2.2 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\radpr\oglala02\QC\030.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B39	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

Station 36+00 to 86+87 Lt

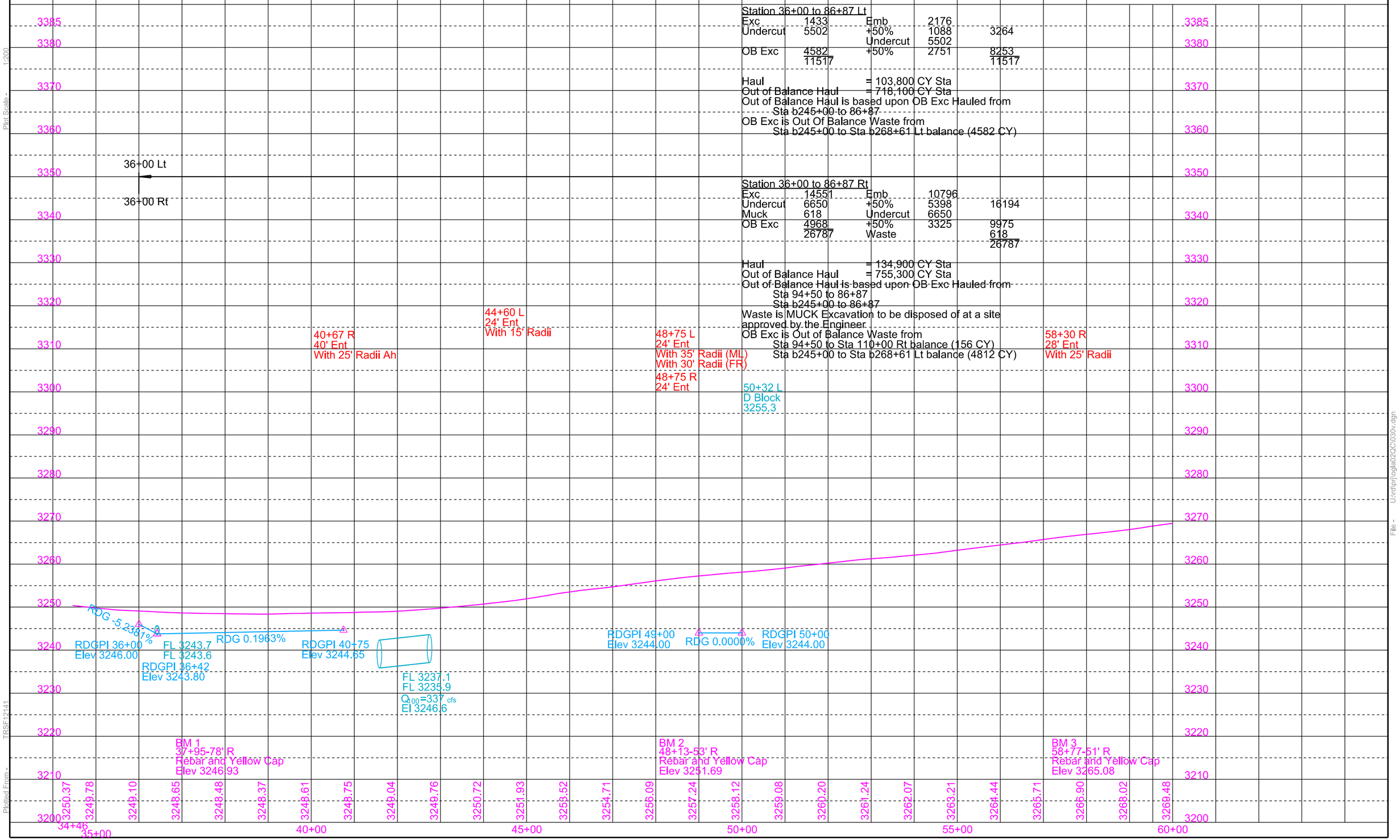
Exc	1433	Emb	2176	
Undercut	5502	+50%	1088	3264
		Undercut	5502	
OB Exc	4582	+50%	2751	8253
	11517			11517

Haul = 103,800 CY Sta
Out of Balance Haul = 718,100 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta b245+00 to 86+87
OB Exc is Out Of Balance Waste from
Sta b245+00 to Sta b268+61 Lt balance (4582 CY)

Station 36+00 to 86+87 Rt

Exc	14551	Emb	10796	
Undercut	6650	+50%	5398	16194
Muck	618	Undercut	6650	
OB Exc	4968	+50%	3325	9975
	26787	Waste		618
				26787

Haul = 134,900 CY Sta
Out of Balance Haul = 755,300 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta 94+50 to 86+87
Sta b245+00 to 86+87
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
OB Exc is Out of Balance Waste from
Sta 94+50 to Sta 110+00 Rt balance (156 CY)
Sta b245+00 to Sta b268+61 Lt balance (4812 CY)



Plot Scale - 1:200
Plotted From - TPSF12141
File - U:\rdip\hogla02\QC\030v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B40	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

64+27
Take Out 18"-58' CMP
(Incidental Work, Grading)

64+27 (33 ac)
Install 24" - 84' RCP Arch
& 2 Sloped Ends

67+03-39' L
Take Out 24"-40' CMP
(Incidental Work, Grading)

67+05-39'L (8 Ac)
Install 24" - 50' CMP Arch
& 2 Safety Ends

69+11-38' R
Take Out 18"-47' CMP
(Incidental Work, Grading)

70+78-39' R
Take Out 18"-66' CMP
(Incidental Work, Grading)

70+76-45'L (8 ac)
Install 24" - 48' CMP Arch
& 2 Safety Ends

70+79-56'R (18 ac)
Install 24" - 60' CMP Arch
& 2 Safety Ends

73+96-63' L
Retain 18"-16' CMP

74+37-62' L
Retain 18"-20 CMP

74+15-42' L
Take Out 18"-30' CMP
(Incidental Work, Grading)

73+97 - 73.4' L to 102.3' L
Install 18" - 18' RCP Arch
& 2 Flared Ends

74+37 - 73.4' L to 102.3' L
Install 18" - 18' RCP Arch
& 2 Flared Ends

76+74-140' R
Retain 18"-50' CMP

76+73-47' R
Take Out 18"-50' CMP
(Incidental Work, Grading)

79+57-50' L
Take Out 18"-24' CMP
(Incidental Work, Grading)

79+58-81' L
Take Out Cattle Guard

83+47-55' R
Take Out 24"-60' CMP
(Incidental Work, Grading)

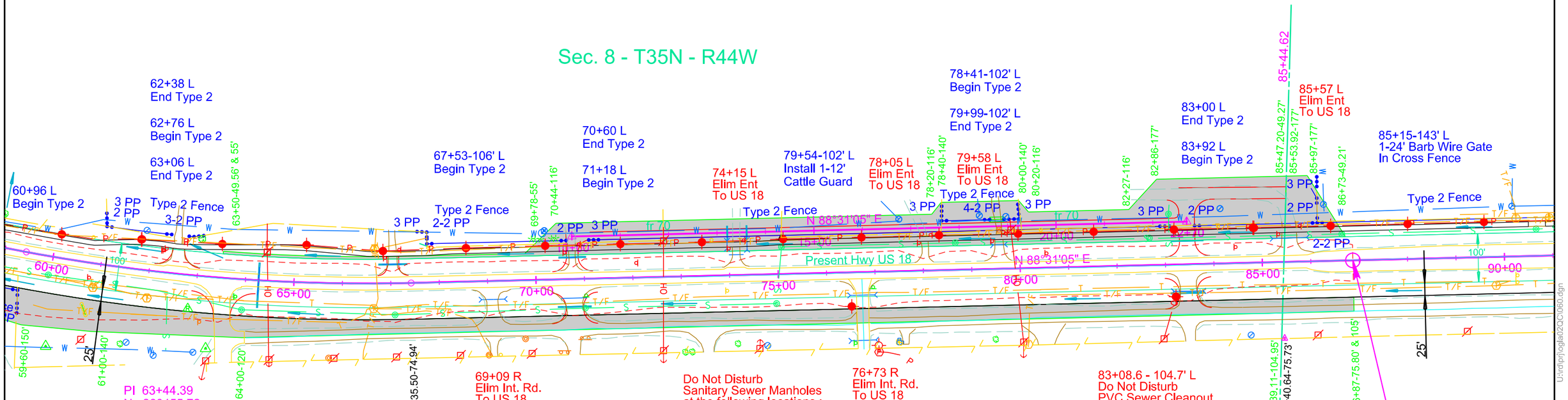
83+22 to 83+64 L
Take Out Concrete Sidewalk

85+58-49' R
Take Out 12"-70' RCP
(Incidental Work, Grading)

83+22 to 83+64 L
Install 6" Concrete Sidewalk

83+46-48.5' L (5 ac)
Install 18" - 60' CMP
& 2 Safety Ends

83+46-59' R (15 ac)
Install 24" - 62' CMP Arch
& 2 Safety Ends



PI 63+44.39
N 260455.72
E 1380422.46
Del 11°58'30" L
Dc 1°30'00"
T 400.66'
L 798.39'
R 3820.00'

Do Not Disturb
Concrete Sidewalk
at the following
locations :
60+00 to 83+22 L
83+64 to 90+00 L

Adjust Sanitary
Sewer Manhole
at the following location :
63+95.8 - 62.8' R

Do Not Disturb
Light Poles at the
following locations :
70+20.55 - 70.11' L
71+75.89 - 70.01' L
73+44.33 - 69.79' L
75+11.89 - 72.07' L
76+74.00 - 71.76' L
78+34.02 - 72.42' L
79+97.25 - 71.59' L
81+53.44 - 71.94' L
83+19.16 - 72.37' L
84+84.27 - 72.04' L
86+42.92 - 72.27' L

Do Not Disturb
Sanitary Sewer Manholes
at the following locations :
67+07.9 - 65.2' R
71+00.4 - 60.4' R
74+95.4 - 60.5' R
75+08.4 - 56.3' L
78+67.0 - 55.9' L
82+68.0 - 56.1' L
86+65.5 - 55.0' L

Oglala Sioux Tribe -
Allotment T 11183

Parcel 2

Parcel 2
63+50 to 85+53.92 L
Temporary Easement for
Fill & Access Road containing
2.9 ac, more or less

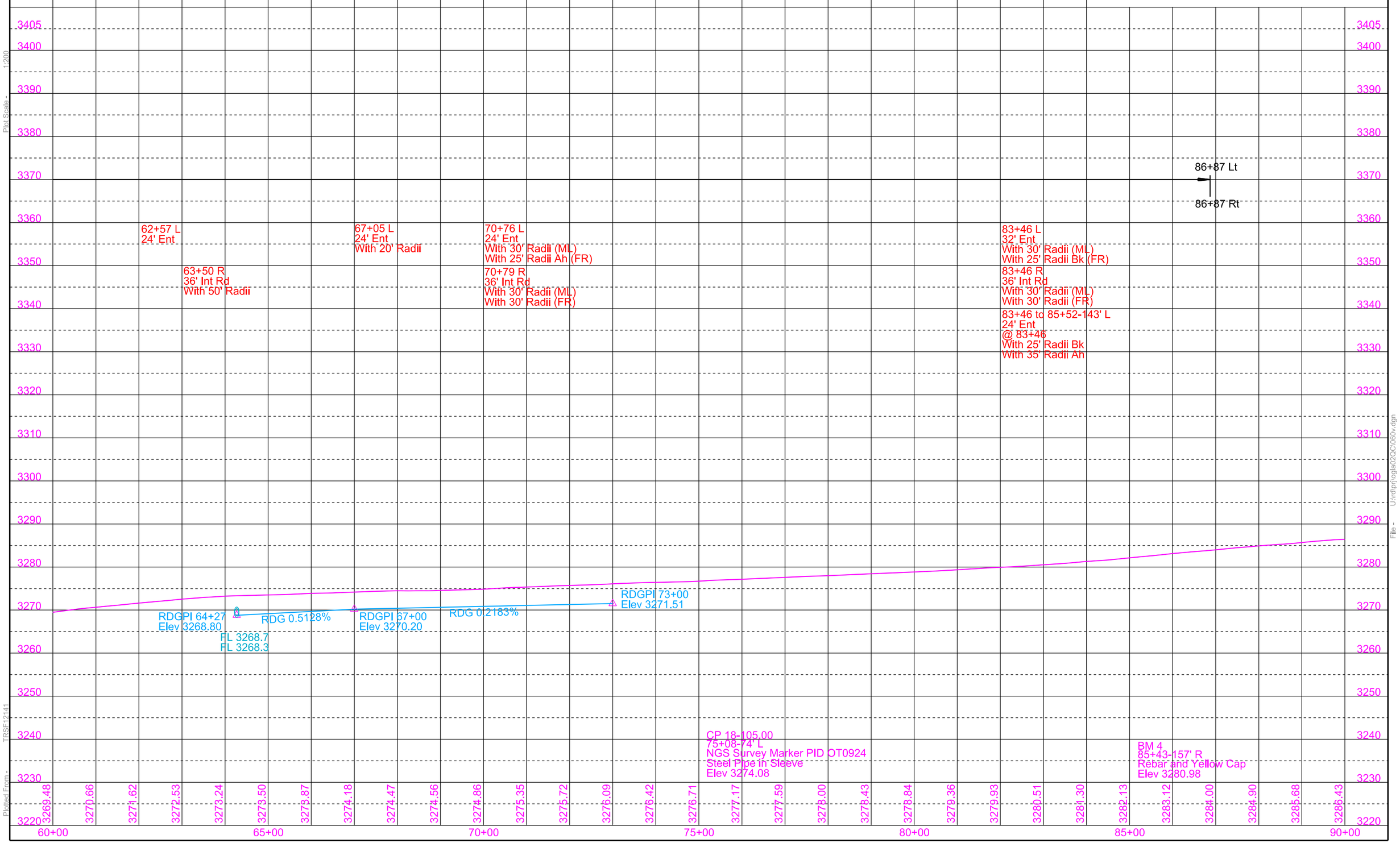
Parcel 3
85+39.11 to 86+87 R
Temporary Easement for
Fill containing
0.1 ac, more or less

Parcel 3
85+47.20 to 86+73 L
Temporary Easement for
Entrance containing
0.2 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdphlogla02\Ct060.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B41	B130

Plotting Date: 12/16/2015



Plot Scale - 1:200

Plotted From - TPSF12141

File - U:\rdip\hogla02\QC\06lv.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B42	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

92+45-49' L
Retain 18"-60' RCP

93+45-142' R
Retain 18"-40' CMP

94+62-145' L
Retain 18"-77' CMP

94+64-141' R
Retain 18"-40' CMP

97+90-117' L
Take Out 18"-56' CMP
(Incidental Work, Grading)

98+31-76' R
Take Out 12"-22' CMP
(Incidental Work, Grading)

98+74-38' R
Take Out 18"-120' CMP
(Incidental Work, Grading)

98+30.0-58.8' R to 99+10-58.5' R
Install 24"-72' RCP Arch (CI 4)
1-24" RCP Arch to CMP Arch Transition
& 1-24" CMP Arch Safety End

98+72 to 101+29 R
Retain 15' Ent Width
(Between ROW Line
& Gas Pump Islands)

99+10-58.5' R to 100+40-57.6' R
Install 24"-126' RCP Arch (CI 4)

99+10-46.7' R to 58.5' R
Install 18" - 4' RCP Arch (CI 4)
& 1 Safety End

100+40-57.6' R to 101+69.3-56.8' R
Install 24" - 120' RCP Arch (CL 4)
1-24" CMP Arch to RCP Arch Transistion
& 1-24" CMP Arch Safety End

103+92-37' R
Take Out 18"-54' CMP
(Incidental Work, Grading)

104+12-57' R
Install 18" - 52' CMP
& 2 Safety Ends

106+51-63' L
Install 18" - 60' CMP
& 2 Safety Ends

111+69-37' R
Take Out 18"-54' CMP
(Incidental Work, Grading)

111+76-39' L
Take Out 15"-38' CMP
(Incidental Work, Grading)

111+76-57' L
Install 18" - 66' CMP
& 2 Safety Ends

111+76-57' R
Install 18" - 66' CMP
& 2 Safety Ends

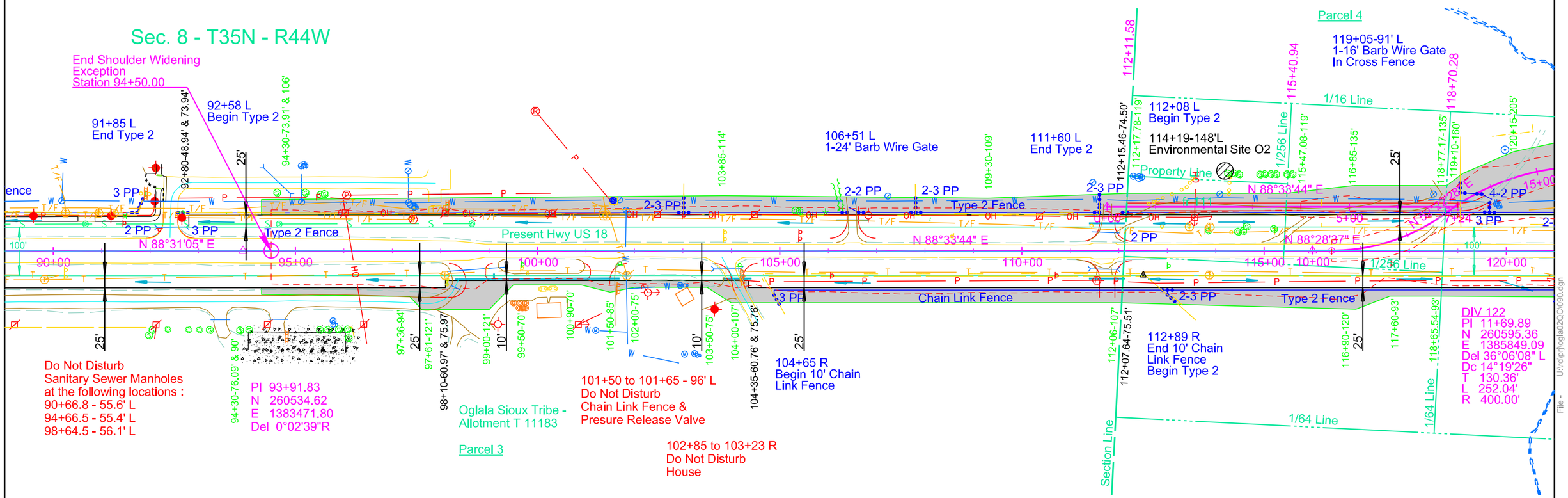
99+10-58.5' R
Install 3'x4' Type C Drop Inlet
& Type C Manhole Frame & Lid
Floor El 84.25
Top Wall El 86.41

100+40-57.6' R
Install 3'x4' Type C Drop Inlet
& Type C Manhole Frame & Lid
Floor El 84.94
Top Wall El 86.99

Oglala Sioux Tribe -
Allotment T 11184

Parcel 4

119+05-91' L
1-16' Barb Wire Gate
In Cross Fence



Parcel 3
94+30 to 112+17.78 L
Temporary Easement for
Cut containing
1.5 ac, more or less

Parcel 3
94+30 to 112+07.64 R
Temporary Easement for
Cut, Fill & Entrances containing
1.1 ac, more or less

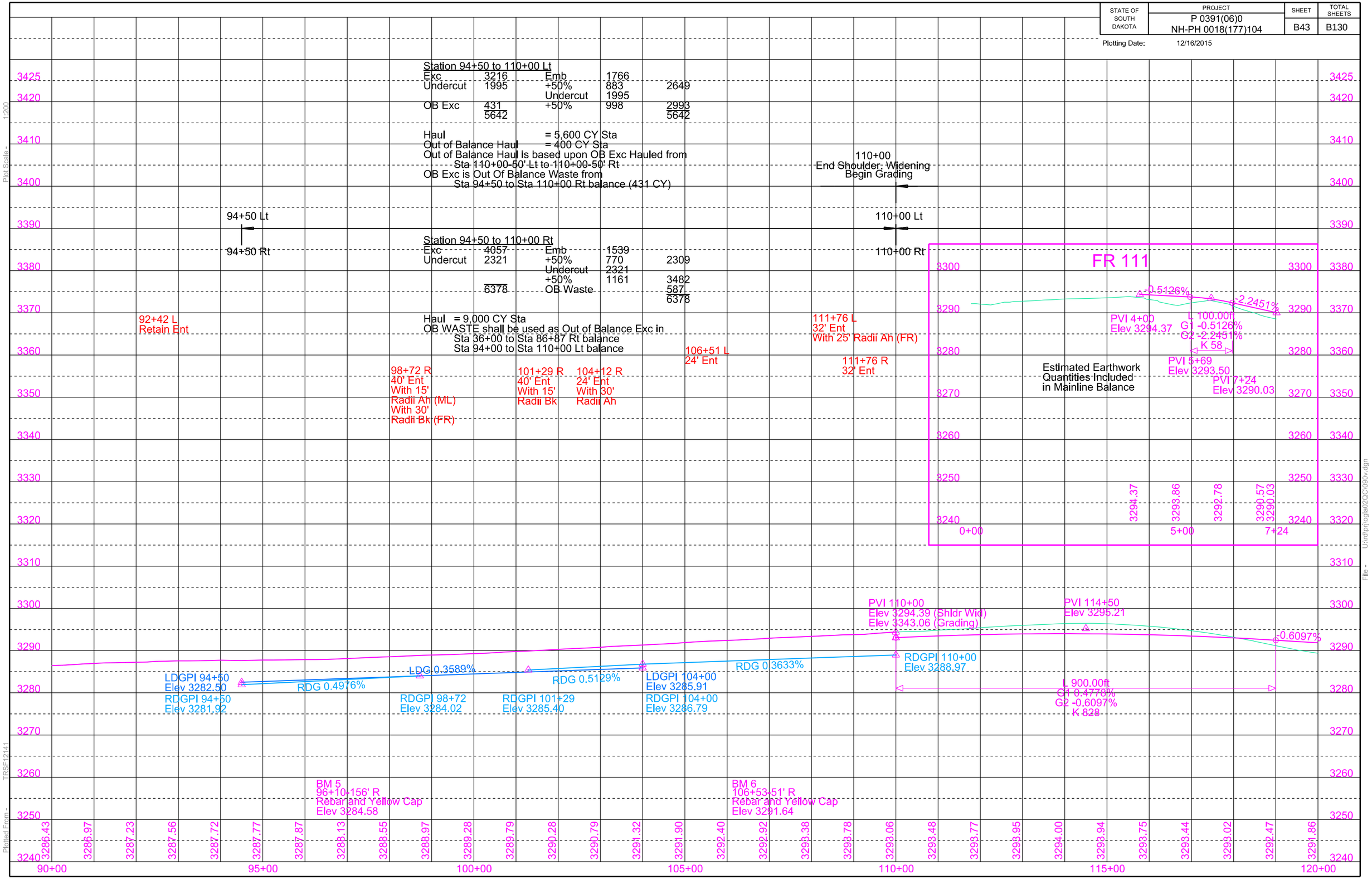
Parcel 4
112+15.46 to a 139+51.40 L
Temporary Easement for
Cut, Fill, Access Road, Traffic
Diversion & Entrances containing
4.9 ac, more or less

Parcel 4
112+06 to 131+79.76 R
Temporary Easement for
Cut, Fill & Entrance containing
1.5 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\trap\rj\oglala02\CV090.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B43	B130

Plotting Date: 12/16/2015



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B44	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

122+16
Take Out 3-12' X 10'-66' RCBC
(Incidental Work, Structure)

122+10 (35.2 Sq. Mi)
Site 1
Alternate A
Install 3 - 10'x10' - 178' -11 1/8"
Box Culvert (CIP)
Alternate B
Install 3 - 11'x10' - 180' - 0"
Box Culvert (Precast)
(See Section E)

131+84-71'L
Take Out Cattle Guard

132+01
Take Out 15"-70' CMP
(Incidental Work, Grading)

131+35-57' L
Install 18" - 78' CMP
& 2 Safety Ends

135+55-33' R
Take Out 18"-56' CMP
(Incidental Work, Grading)

135+53-57' L
Install 18" - 60' CMP
& 2 Safety Ends

131+35 R & Bk
Remove and Reset
Tubular Gates

131+40 - 148' L
Do Not Disturb
Well

Sec. 9 - T35N - R44W

a 141+49 - 110' L
Do Not Disturb
Well

Oglala Sioux Tribe -
Allotment T 11184

Parcel 7

DIV 122
PI 16+31.82
N 260882.67
E 1386221.82
Del 70°06'35"R
Dc 12°03'44"
T 333.28'
L 581.23'
R 475.00'

Oglala Sioux Tribe -
Allotment T 11184

Parcel 4 & 5

PI 129+66.33
N 260624.31
E 1387045.17
Del 19°54'56" L
Dc 1°32'17"
T 653.99'
L 1294.78'
R 3725.00'

137+01 L
End Type 2

135+53 L
Install 2-12'
Tubular Gates

EQUATION
138+80.00 Bk =
a 138+87.00 Ah

a 141+16 - 95' L
to a 142+06 - 103' L
Do Not Disturb
Wood Board Fence

a 143+16 L
Begin Type 2

a 147+85 L
End Type 2

125+59 L
Elm Ent

131+35 L & Bk
1-20' Barb Wire
Gate

131+83-130' L
Install 1-20'
Cattle Guard

Stream Crossing

Type 2 Fence

Present Hwy US 18

1/256 Line

129+86-98'R
Environmental
Site O3

135+53 R
1-24' Barb Wire Gate

a 144+92 R
Begin Type 2

a 143+89 R
End Type 2

a 147+56 - 103' R
a 149+06 - 143' R
Do Not Disturb
Chain Link Fence

Michael C. Carlow, Sr.
Allotment 11184-B

Parcel A1

131+35 R & Ah
1-24' Barb Wire Gate
In Cross Fence

130+87 R
End Type 2

131+21 R
Begin Type 2

Eileen Whirlwind Horse
Allotment 11184-A

Parcel 6

1/16 Line

1/64 Line

1/4 Line

1/256 Line

DIV 122
PI 20+41.15
N 260617.00
E 1386639.08
Del 40°49'21" L
Dc 14°19'26"
T 148.85'
L 285.00'
R 400.00'

Parcel 5
132+24.13 to 133+45.36 L
Temporary Easement for
Cut containing
0.1 ac, more or less

Parcel 7
a 139+43.01 to a 149+20 L
Temporary Easement for
Cut, Fill & Entrance containing
0.8 ac, more or less

Parcel A1
125+17.25 to 126+67.50 R
Temporary Easement for
Cut containing
0.1 ac, more or less

Parcel 6
131+66.73 to 132+60 R
Temporary Easement for
Fill & Entrance containing
0.1 ac, more or less

Parcel 6
133+65 to 138+52.72 R
Temporary Easement for
Cut containing
0.3 ac, more or less

Parcel 4
137+31.86 to 138+73.76 R
Temporary Easement for
Cut containing
0.1 ac, more or less

Parcel 7
138+52.72 to a 166+46.94 R
Temporary Easement for
Cut, Fill & Entrances containing
2.3 ac, more or less

Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\drp\ogla02QC\120.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B45	B130

Plotting Date: 12/16/2015 ROW Revision - AR

Station 110+00 to a139+50 Lt & Rt

Exc	32257	Emb	28193	
Undercut	9732	+35%	9868	38061
Muck	1215	Undercut	9732	
OB Exc	9210	+35%	3406	13138
		Waste		1215
	52414			52414

Haul = 316,100 CY Sta
Out of Balance Haul = 958,700 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from Sta b245+00 to a139+50
WASTE is MUCK Excavation to be disposed of at a site approved by the Engineer
Included in the EXC amount is 1546 CY of Unstable Material
OB Exc is Out Of Balance Waste from Sta b245+00 to Sta b268+61 Lt balance (9210 CY)

DIV 122

(Earthwork Information Only)

DIV 122			
Traffic Diversion Exc	43	Traffic Diversion Emb	3066
Added Traffic Diversion Exc	1808	+35%	1073
Traffic Diversion Borrow	2288	Riprap Class B	36
Riprap Class B	36		
	4175		4175

PVI 10+40 Elev 3295.11
PVI 10+65 Elev 3294.82
PVI 10+90 Elev 3294.48
-1.3858%
-1.7612%
-1.1321%
PVI 12+50 Elev 3291.65
L 100.00ft G1 -1.7612% G2 -4.9460% K 31
-4.9460%
L 470.00ft G1 -4.9460% G2 7.6792% K 37
PVI 16+75 Elev 3270.63
PVI 19+65 Elev 3292.90
L 110.00ft G1 7.6792% G2 4.1619% K 31
4.1619%
PVI 20+50 Elev 3296.44
4.8776%
4.1363%
4.6598%
PVI 21+27 Elev 3300.21
PVI 21+52 Elev 3301.39
PVI 21+77 Elev 3302.56

3294.29 3294.53 3289.18 3284.23 3279.77 3277.78 3278.47 3281.85 3287.92 3294.29 3294.88

10+00 15+00 20+00 25+00

a 139+50 - End Grading
Begin Shoulder Widening
a139+50 Lt
a139+50 Rt

135+53 L 24' Ent
135+53 R 24' Ent

a 142+59 L 32' Ent
a 144+25 R 40' Ent With 50' Radii Bk With 20' Radii Ah
a 144+25 R & Ah 24' Ent With 40' Radii Ah
a 148+11 L 24' Ent With 25' Radii

IDENTICAL POINTS

PVI a 139+50 Elev 3327.82 (Shldr Wid) Elev 3326.49 (Grading)

PVI 134+00 Elev 3328.38

127+90-830' L to 130+97-139' L 16' Ent
131+35 L 40' Ent
131+35 R 24' Ent With 15' Radii Bk (ML)
131+35-84' R & Bk 24' Ent With 40' Radii Bk

-0.3481%
LDG 1.1321%
LDG -0.3055%
RDG 1.6803%
RDG -0.3397%
RDG 0.3397%
RDG 0.3000%
RDG -1.0133%
RDGPI 134+50 Elev 3321.61
RDGPI 135+72 Elev 3323.66
RDGPI a 140+00 Elev 3322.23
LDGPI a 142+59 Elev 3322.30
LDGPI a 147+50 Elev 3320.80
LDGPI a 141+00 Elev 3320.50
RDGPI a 143+50 Elev 3321.00
RDGPI a 142+00 Elev 3322.52
RDGPI a 140+50 Elev 3322.07

L 700.00ft G1 -0.6097% G2 3.7863% K 159
3.7863%
L 1025.00ft G1 3.7863% G2 -0.3481% K 248
RDGPI 127+50 Elev 3301.49
RDG 5.7450%
-0.6097%
RDGPI 125+50 Elev 3290.00
PVI 123+75 Elev 3289.57

Q_{100}=2456 cfs
El 3279.5
Q_{25}=911 cfs
El 3275.3
Q_{cr}>Q_{100}=NA cfs
El 3292.76
FL 3268.51
FL 3267.88

BM 7
123+00-49' R
Rebar and Yellow Cap
Elev 3280.90

BM 8
133+52-48' R
Rebar and Yellow Cap
Elev 3320.36

BM 9
143+85-49' R
Rebar with Yellow Cap
Elev 3322.97

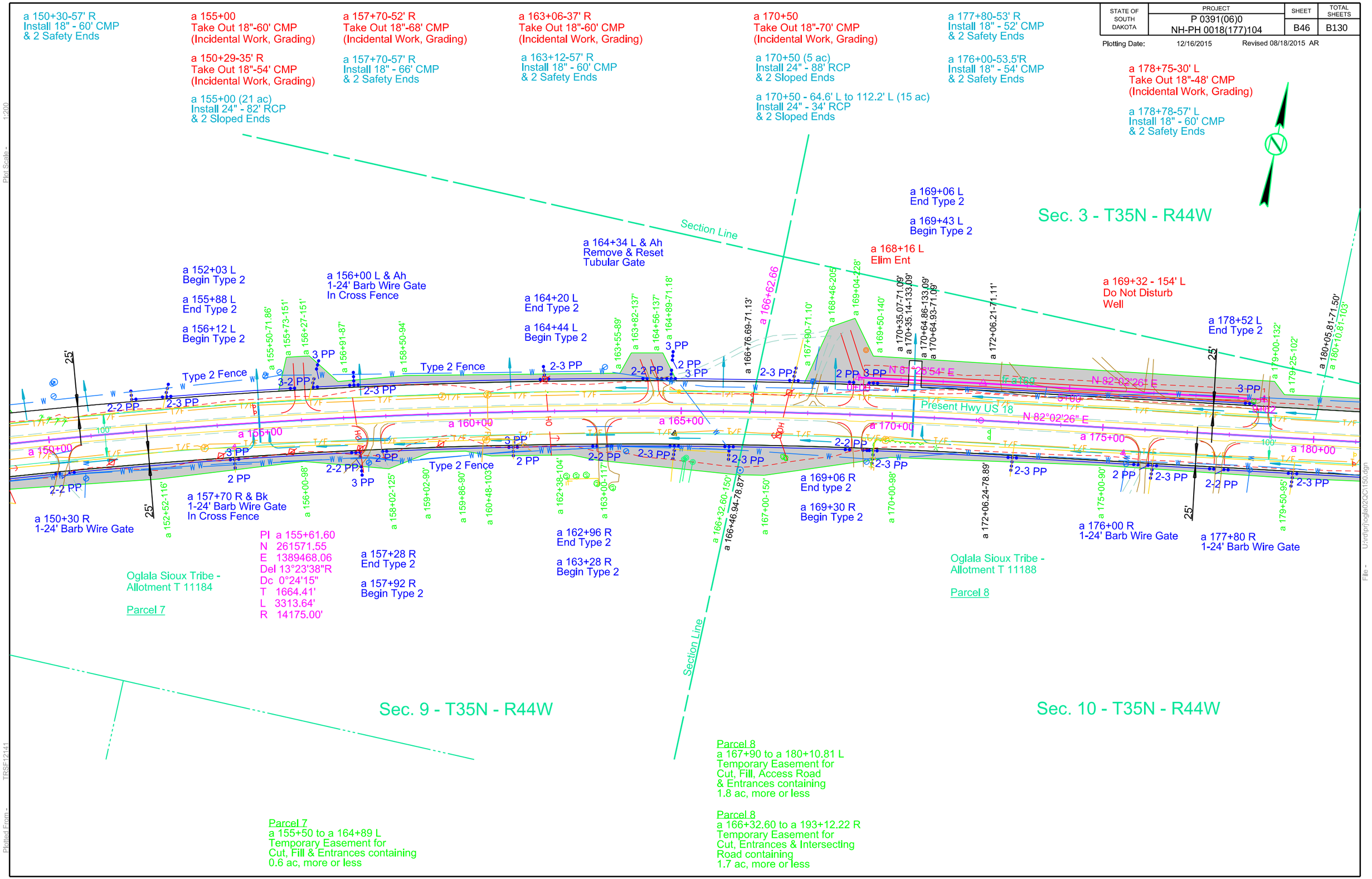
3291.86 3291.42 3291.60 3292.40 3293.83 3295.89 3298.58 3301.90 3305.66 3309.45 3312.98 3316.11 3318.84 3321.16 3323.08 3324.60 3325.71 3326.43 3326.73 3326.69 3326.66 3327.65 3327.32 3326.90 3326.60 3326.19 3325.83 3325.63 3325.26 3325.03 3324.61 3324.37

120+00 125+00 130+00 135+00 a 138+87 a 140+00 a 145+00 a 150+00

Plot Scale - 1:200
Plotted From - TPSF12141
File - U:\drip\logla02QC\1120v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B46	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR



Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\rdp\oglala\02QC\150.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B47	B130

Plotting Date: 12/16/2015

Station a139+50 to b207+21 Lt

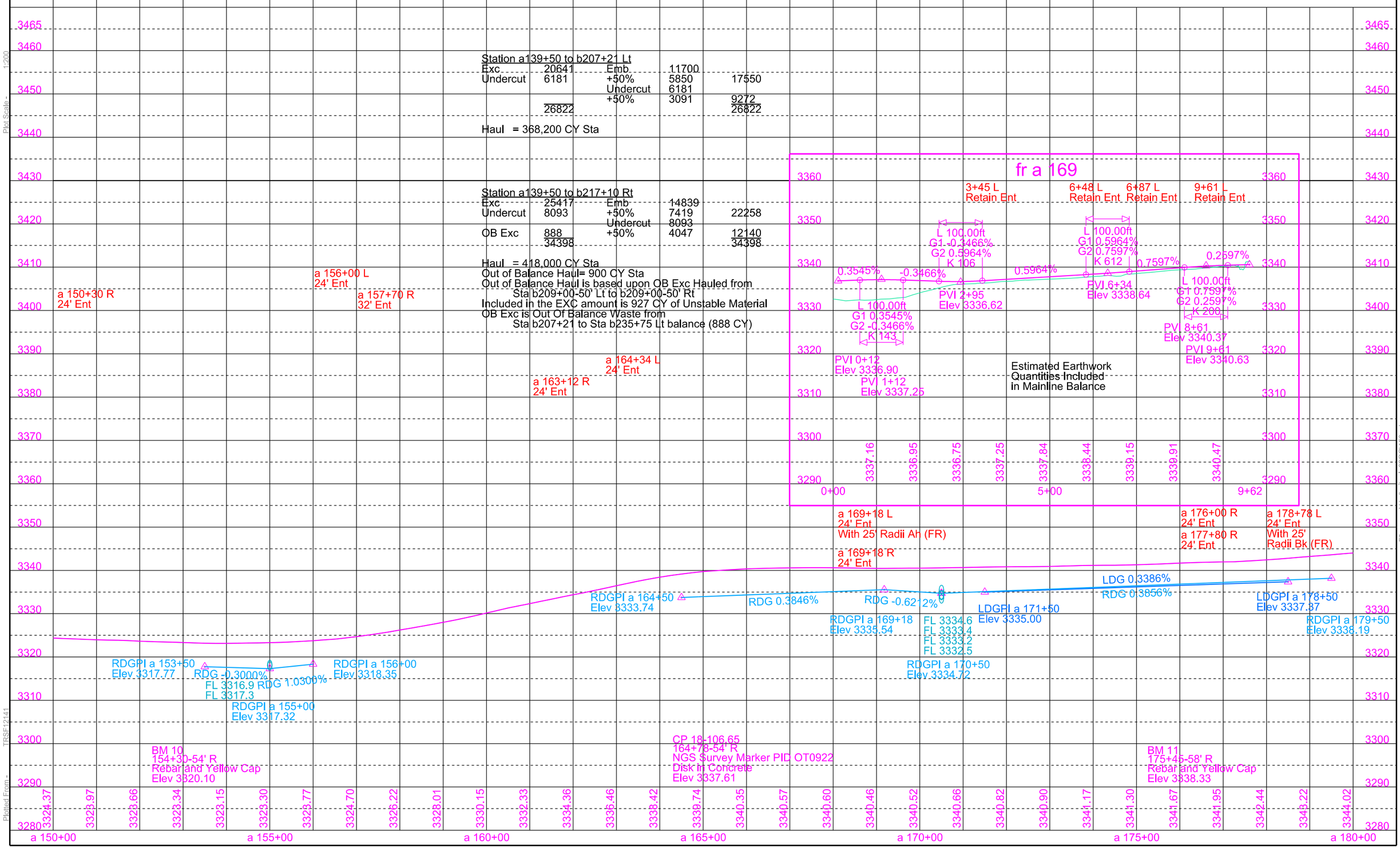
Exc	20641	Emb	11700	
Undercut	6181	+50%	5850	17550
		Undercut	6181	
		+50%	3091	9272
	26822			26822

Haul = 368,200 CY Sta

Station a139+50 to b217+10 Rt

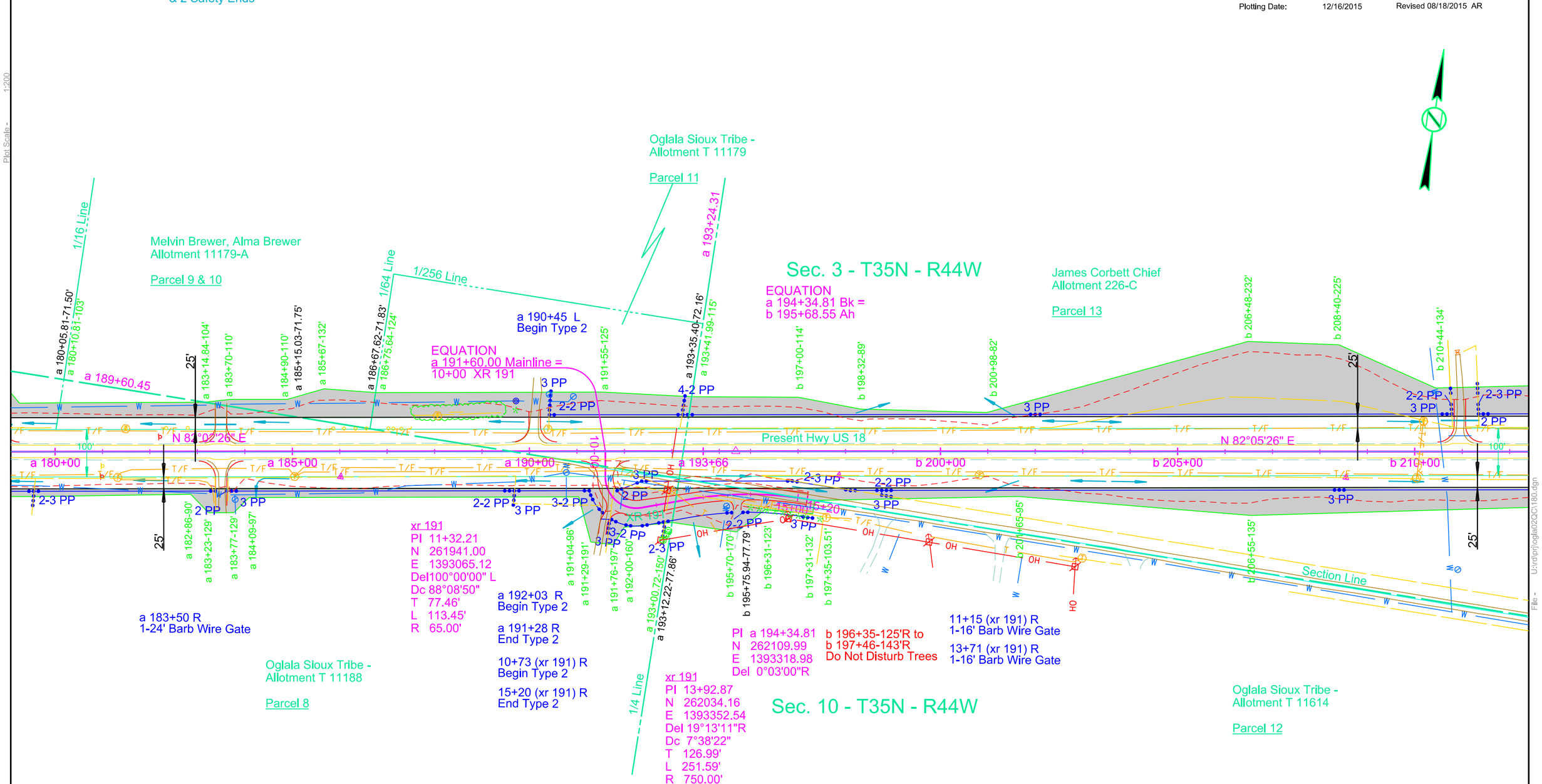
Exc	25417	Emb	14839	
Undercut	8093	+50%	7419	22258
		Undercut	8093	
OB Exc	888	+50%	4047	12140
	34398			34398

Haul = 418,000 CY Sta
Out of Balance Haul= 900 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta b209+00-50' Lt to b209+00-50' Rt
Included in the EXC amount is 927 CY of Unstable Material
OB Exc is Out Of Balance Waste from
Sta b207+21 to Sta b235+75 Lt balance (888 CY)



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B48	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR



Parcel 9
a 180+05.81 to a 185+15.03 L
Temporary Easement for
Cut containing
0.3 ac, more or less

Parcel 10
a 183+14.84 to a 186+75.64 L
Temporary Easement for
Cut containing
0.3 ac, more or less

Parcel 11
a 186+67.62 to a 193+41.99 L
Temporary Easement for
Cut containing
0.8 ac, more or less

Parcel 13
a 193+35.40 to b 221+53.89 L
Temporary Easement for
Cut & Fill containing
3.9 ac, more or less

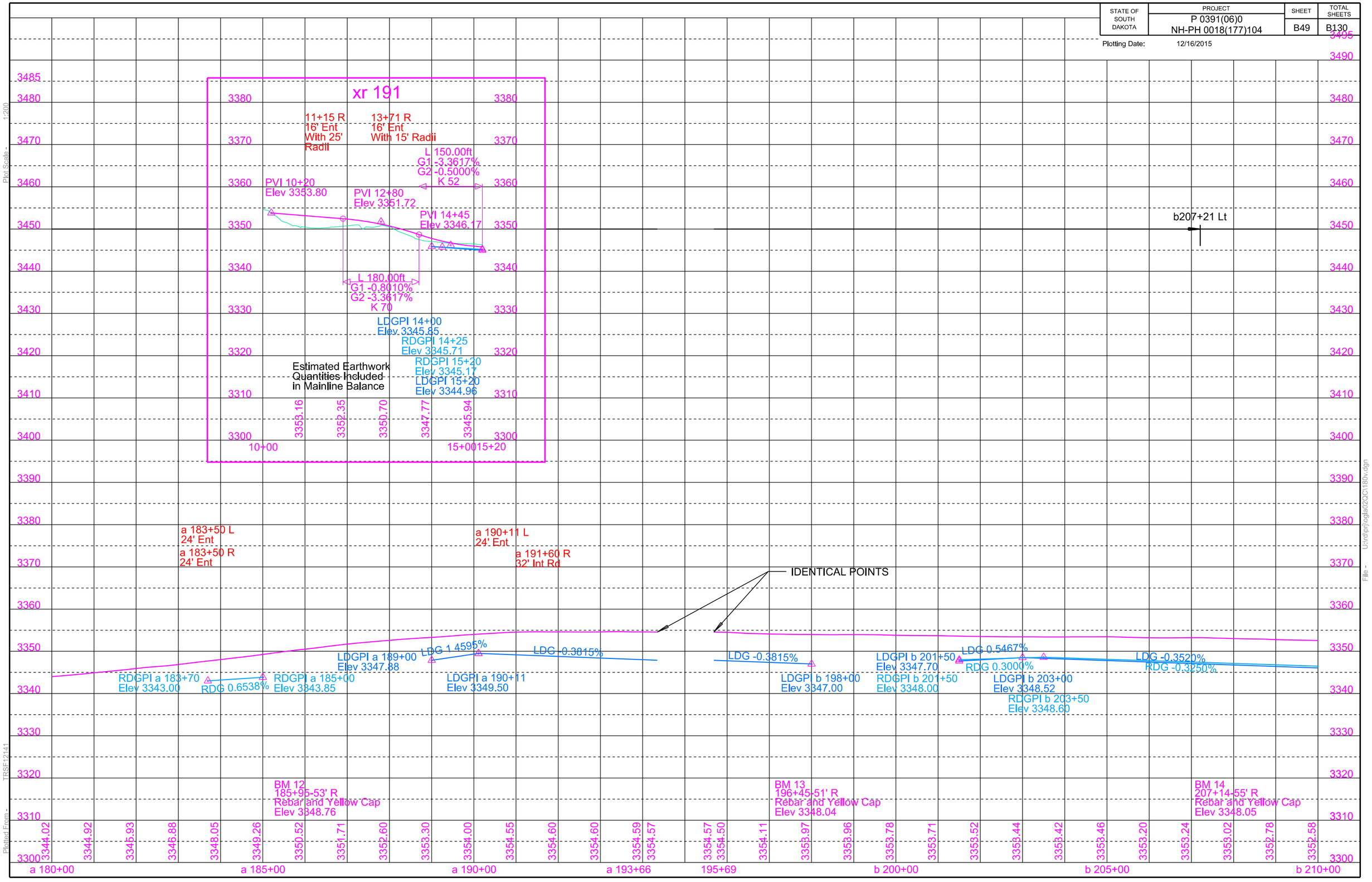
Parcel 12
a 193+00.72 to b 197+35 R
Temporary Easement for
Cut & Intersecting Road containing
0.4 ac, more or less

Parcel 13
b 195+75.94 to b 221+02.28 R
Temporary Easement for Cut,
Fill & Intersecting Road containing
2.2 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdp\ioglal02\QC\180.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B49	B130

Plotting Date: 12/16/2015



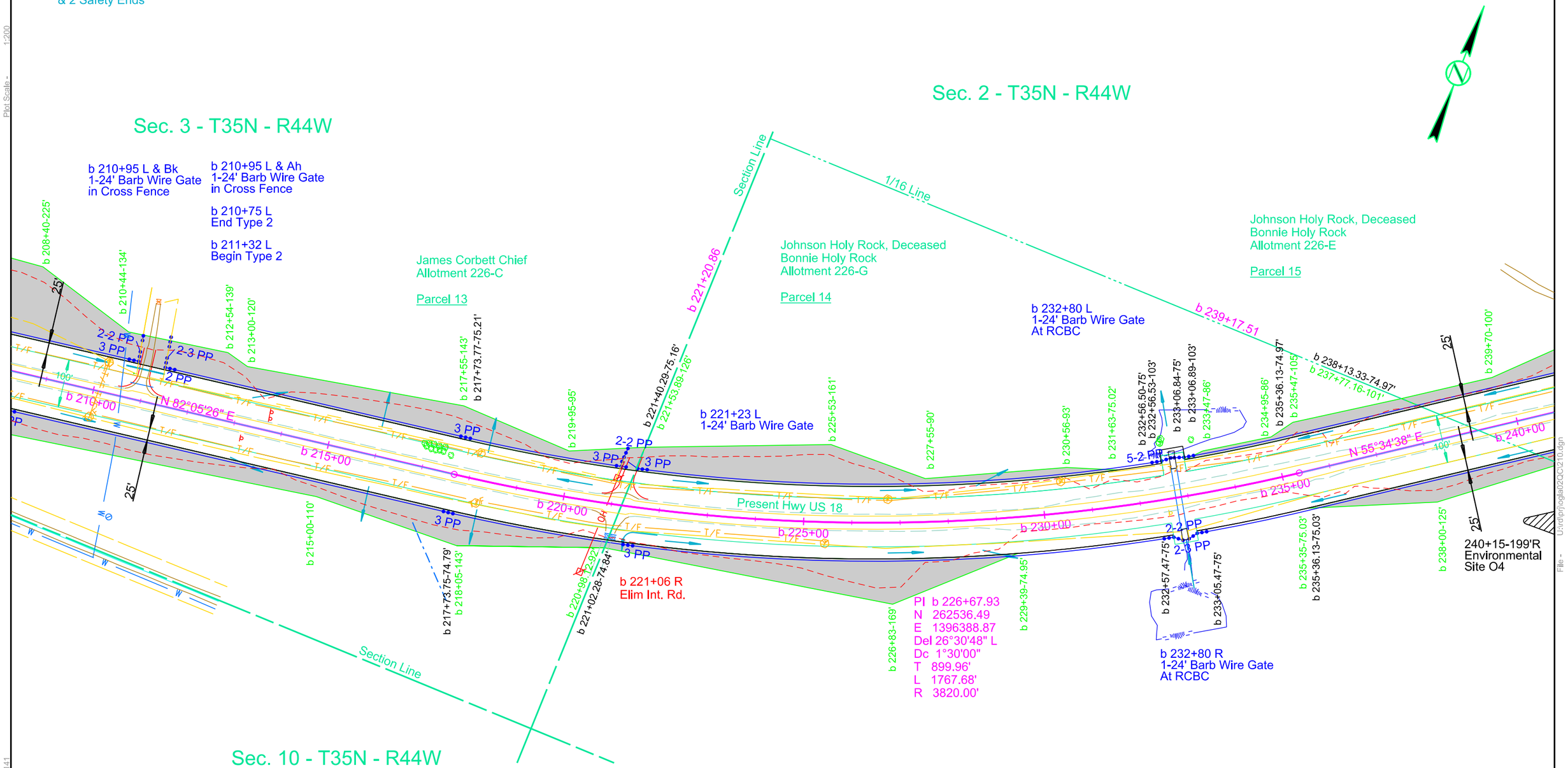
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B50	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

b 210+95-33' L
Take Out 18"-48' CMP
(Incidental Work, Grading)

b 210+95-65' L
Install 18" - 74' CMP
& 2 Safety Ends

b 232+80
Retain 12'x12'-171'
RCBC



Parcel 14
b 221+40.29 to b 231+63 L
Temporary Easement for
Cut & Fill containing
1.0 ac, more or less

Parcel 14
b 220+98.12 to b 229+39 R
Temporary Easement for
Cut & Fill containing
0.9 ac, more or less

Parcel 14
b 233+06.84 to b 238+13.33 L
Temporary Easement for
Cut & Fill containing
0.2 ac, more or less

Parcel 14
b 235+35 to b 240+66 R
Temporary Easement for
Cut containing
0.4 ac, more or less

Parcel 15
b 237+77.16 to b 254+39.96 L
Temporary Easement for
Cut & Fill containing
3.0 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\roj\ojla02\QC\210.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B51	B130

Plotting Date: 12/16/2015

Station b207+21 to b235+75 Lt

Exc	24534	Emb	14663	
Undercut	3303	+50%	7331	21994
		Undercut	3303	
		+50%	1652	4955
	27837	OB WASTE		888
				27837

Haul = 106,200 CY Sta
Included in the EXC amount is 1791 CY of Unstable Material
OB WASTE shall be used as Out of Balance Exc in
Sta a139+50 to Sta b217+10 Rt balance

b 235+75
End Shoulder Widening
Begin Grading

b235+75 Lt

b235+75 Rt

b 217+10 Rt

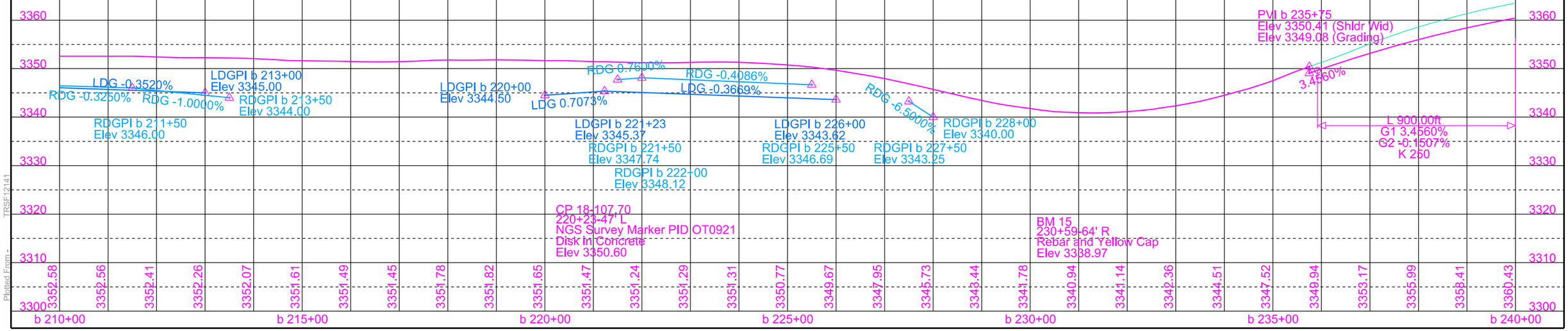
Station b217+10 to b235+75 Rt

Exc	4704	Emb	7821	
Undercut	1850	+50%	3911	11732
		Undercut	1850	
OB Exc	7953	+50%	925	2775
	14507			14507

Haul = 143,100 CY Sta
Out of Balance Haul = 27,500 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta b245+00 to b235+75
Included in the EXC amount is 888 CY of Unstable Material
OB Exc is Out Of Balance Waste from
Sta b235+75 to Sta b245+00 Lt & Rt balance (4984 CY)
Sta b245+00 to Sta b268+61 Lt balance (2969 CY)

b 210+95 L
24' Ent

b 221+23 L
24' Ent



Plot Scale - 1:200
TPSF12141
Plotted From -
File - U:\rdp\hogla02\QC\210v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B52	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

b 251+60
Take Out 18"-76' CMP
(Incidental Work, Grading)

b 251+60 (6 ac)
Install 24" - 128' RCP
& 2 Sloped Ends

b 251+60-88.7' R
Install Bank and Channel
Protection Gabions
(4.5 CY)

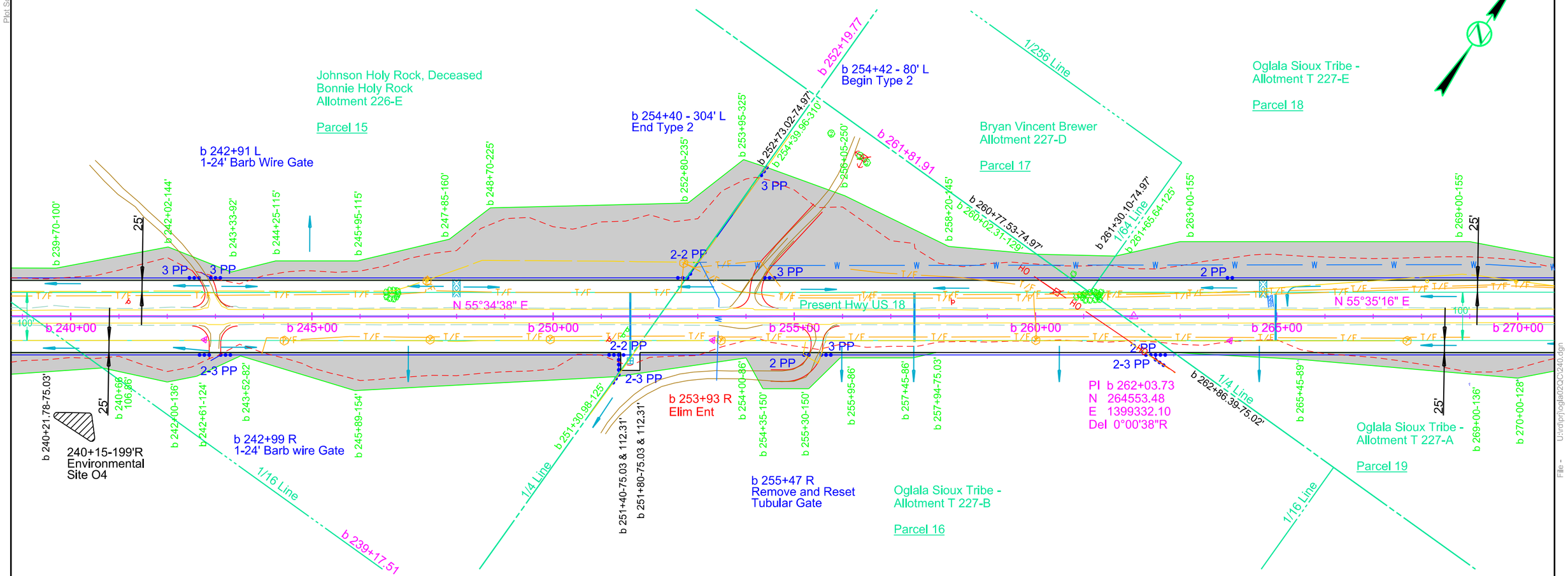
b 257+49
Take Out 24"-61' CMP
(Incidental Work, Grading)

b 257+49 (19 ac)
Install 30" - 86' RCP
& 2 Sloped Ends

b 264+98
Take Out 18"-54' CMP
(Incidental Work, Grading)

b 264+98 (3 ac)
Install 24" - 82' RCP
& 2 Sloped Ends

Sec. 2 - T35N - R44W



Parcel 15
b 240+21.78 to b 251+40 R
Temporary Easement for
Cut & Fill containing
1.3 ac, more or less

Parcel 16
b 252+73.02 to b 260+77.53 L
Temporary Easement for
Cut containing
2.1 ac, more or less

Parcel 16
b 251+30.98 to b 257+94 R
Temporary Easement for
Cut, Fill & Entrance containing
0.5 ac, more or less

Parcel 17
b 260+02.31 to b 261+65.64 L
Temporary Easement for
Cut containing
0.1 ac, more or less

Parcel 18
b 261+30.10 to b 283+42.83 L
Temporary Easement for
Cut & Fill containing
2.1 ac, more or less

Parcel 19
b 262+86.39 to b 284+11.56 R
Temporary Easement for Cut,
Fill & Intersecting Road containing
1.8 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\oglala\2Qc\240.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B53	B130

Plotting Date: 12/16/2015

Station b235+75 to b245+00 Lt & Rt

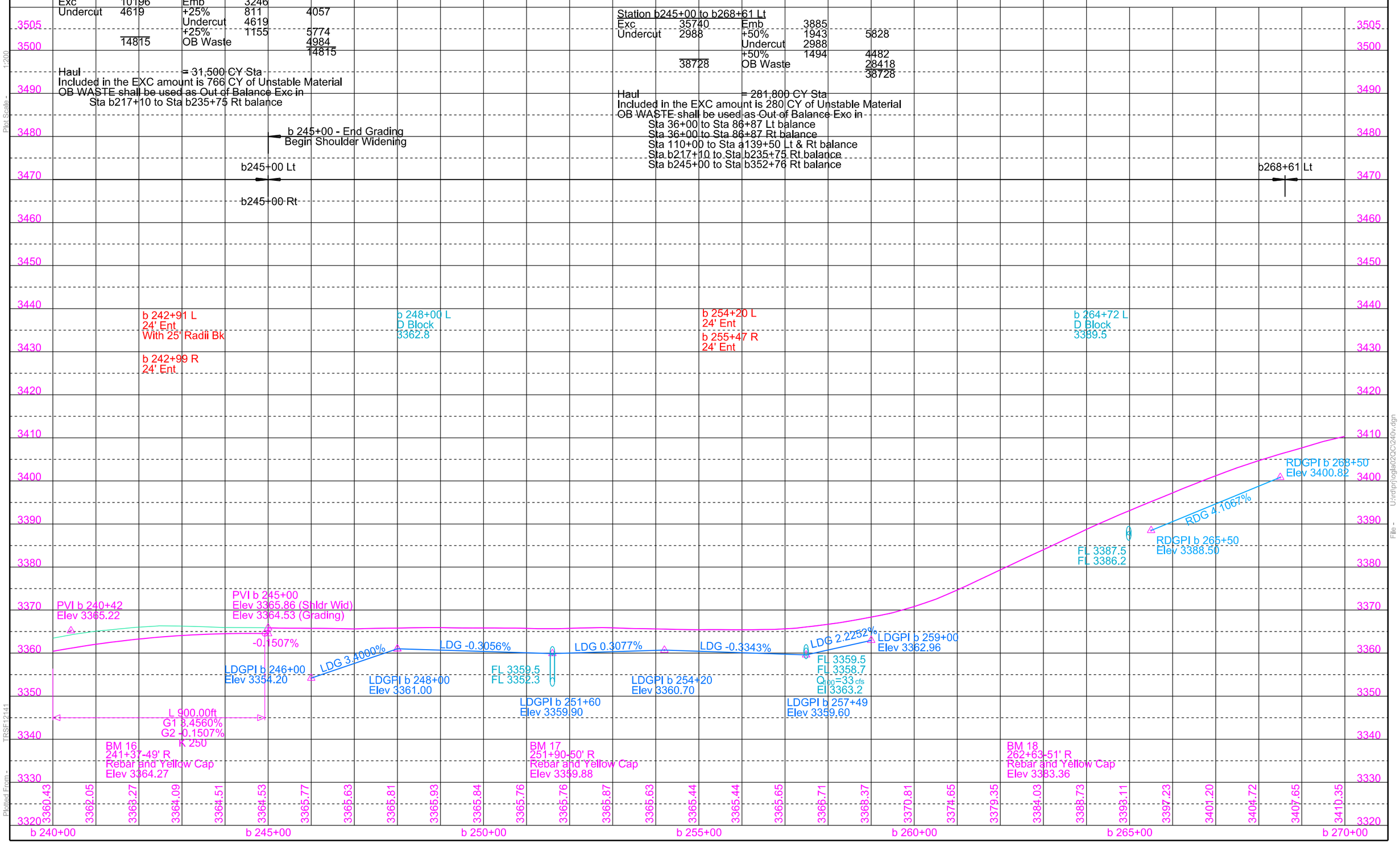
Exc	10196	Emb	3246	
Undercut	4619	+25%	811	4057
		Undercut	4619	
		+25%	1155	5774
	14815	OB Waste		4984
				14815

Haul = 31,500 CY Sta
Included in the EXC amount is 766 CY of Unstable Material
OB WASTE shall be used as Out of Balance Exc in
Sta b217+10 to Sta b235+75 Rt balance

Station b245+00 to b268+61 Lt

Exc	35740	Emb	3885	
Undercut	2988	+50%	1943	5828
		Undercut	2988	
		+50%	1494	4482
	38728	OB Waste		28418
				38728

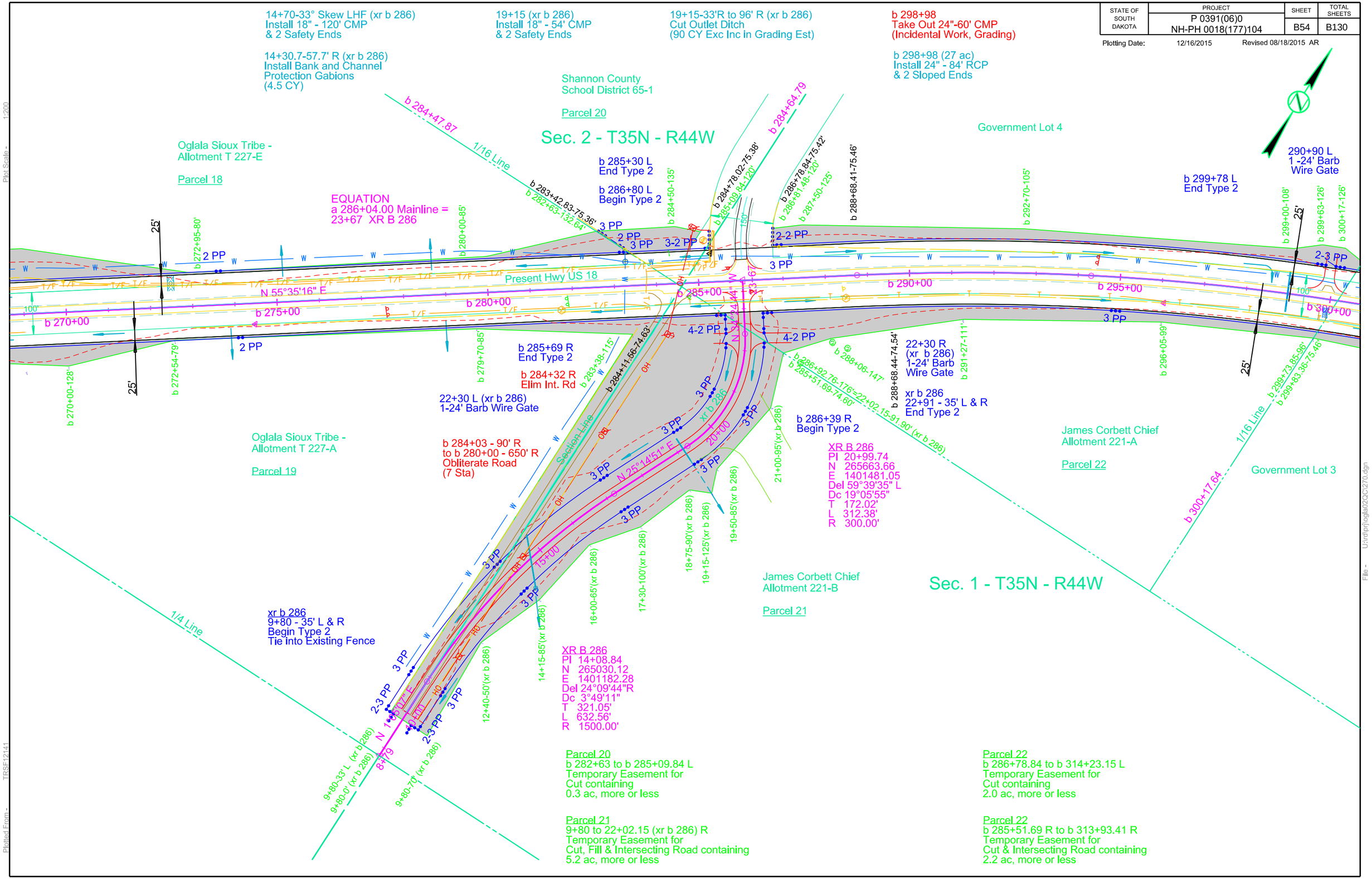
Haul = 281,800 CY Sta
Included in the EXC amount is 280 CY of Unstable Material
OB WASTE shall be used as Out of Balance Exc in
Sta 36+00 to Sta 86+87 Lt balance
Sta 36+00 to Sta 86+87 Rt balance
Sta 110+00 to Sta a139+50 Lt & Rt balance
Sta b217+10 to Sta b235+75 Rt balance
Sta b245+00 to Sta b352+76 Rt balance



Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\drdph\oglad2QC\240v.dgn

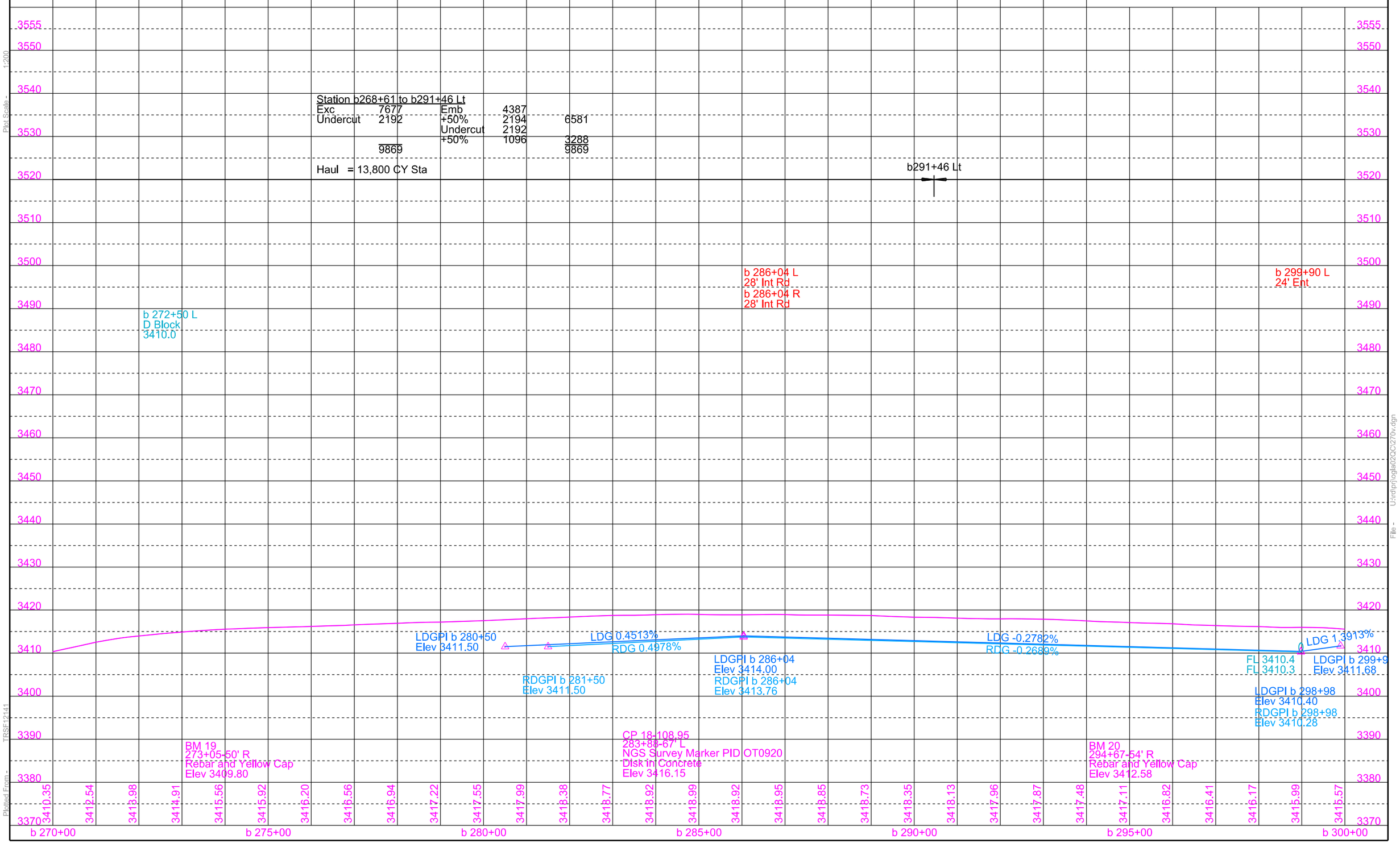
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B54	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B55	B130

Plotting Date: 12/16/2015



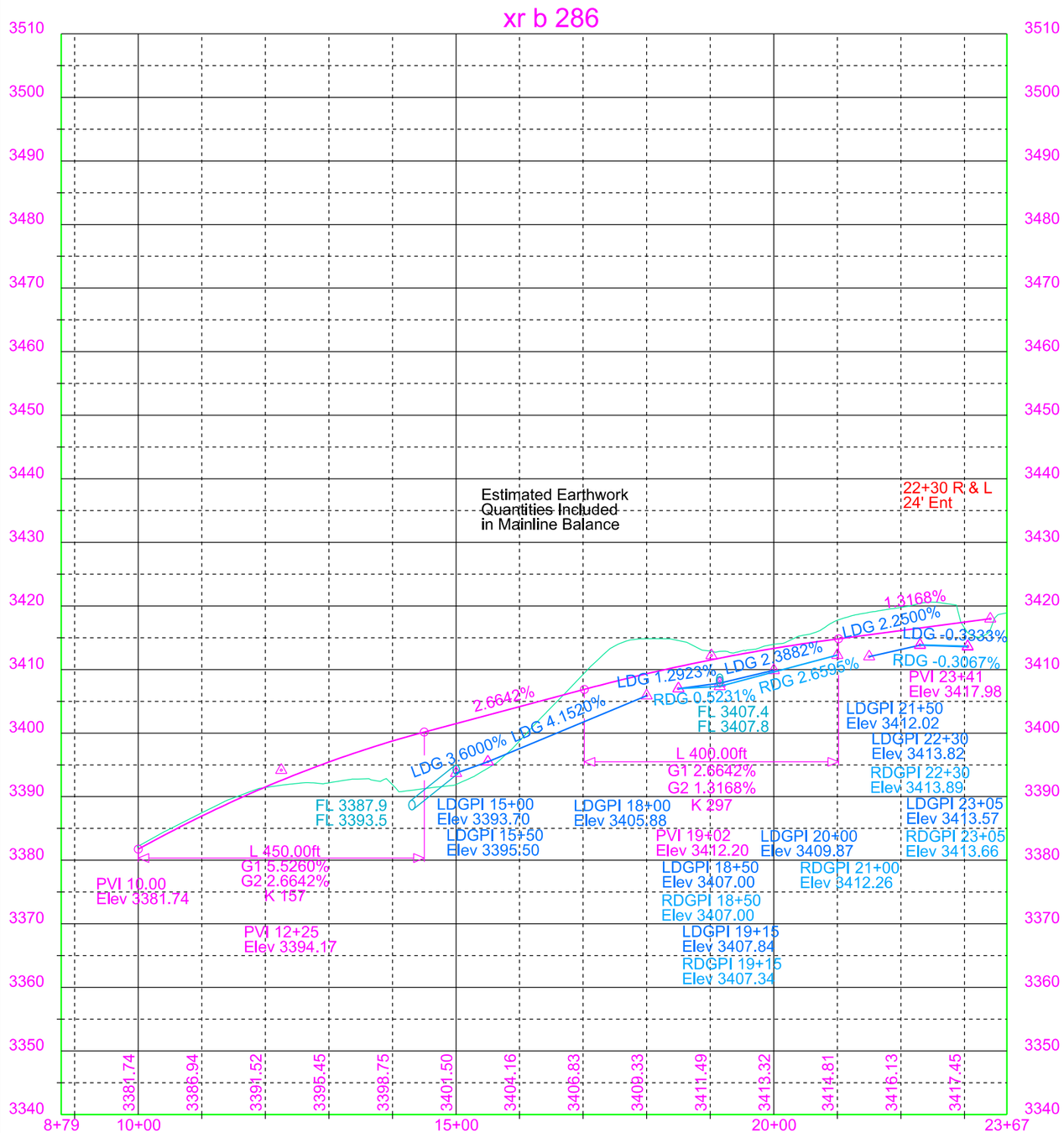
Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\drlp\hogla02\QC\270v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B56	B130

Plotting Date: 12/16/2015



Plot Scale - 1:200

Plotted From - TRSF12141

File - ...\rdprj\ogla02\OCXRB28604v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B57	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

b 312+97
Take Out 24"-56' CMP
(Incidental Work, Grading)

b 312+97 (22 ac)
Install 24" - 80' RCP Arch
& 2 Sloped Ends

b 312+97-39.7' R to 94' R
Cut Outlet Ditch
(10 CY Exc Inc in Grading Est)

b 319+79
Take Out 42"-65' CMP
(Incidental Work, Grading)

b 319+79 (277 ac)
Install Twin 42" - 82' RCP Arch
(Spaced 25' C to C)
& 4 Flared Ends

b 319+79-46.9' R to
b 320+62-116' R
to b 322+77-118'R
Cut Outlet Ditch
(180 CY Exc Inc in Grading Est)

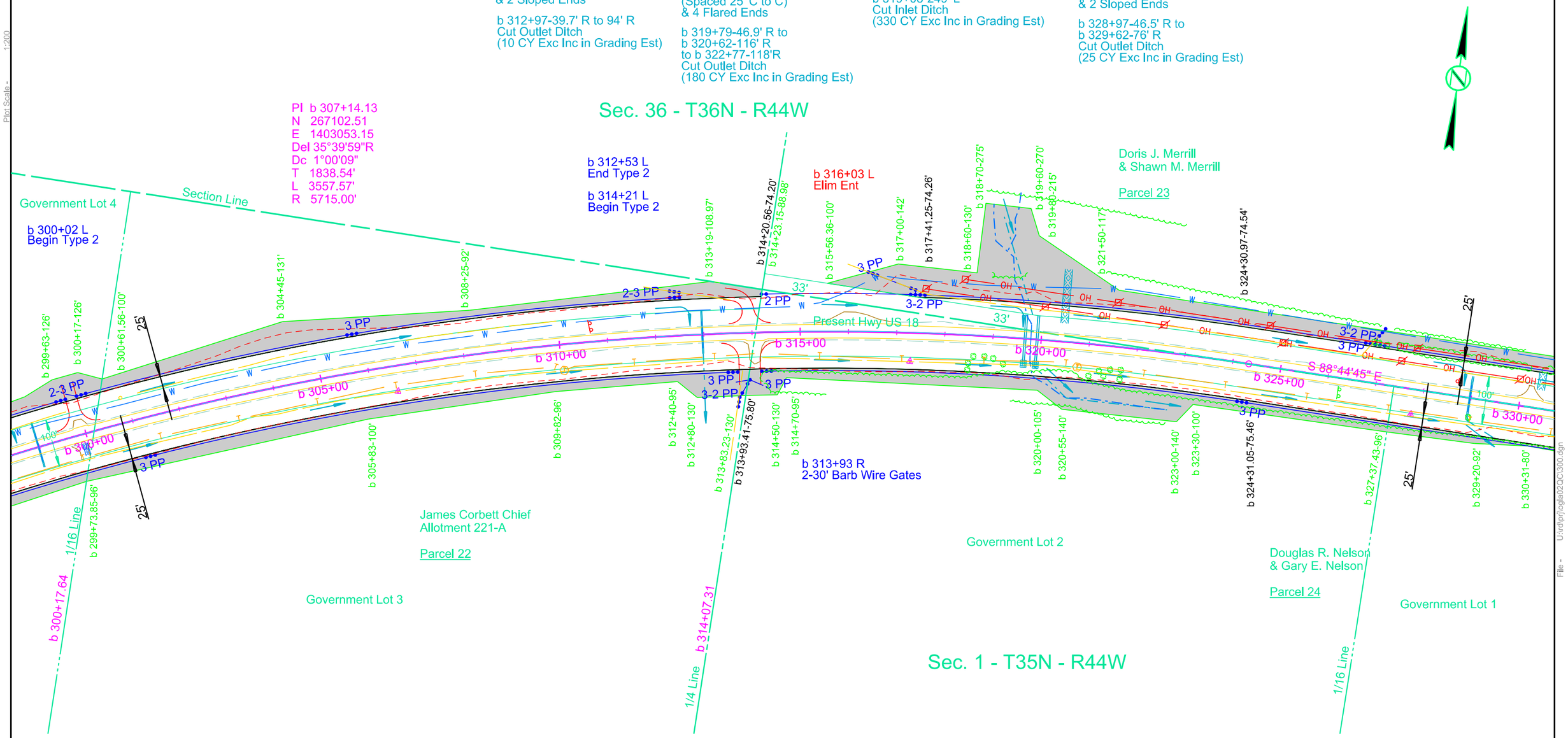
b 319+79-46.9' R
Install Bank and Channel
Protection Gabions
(20.0 CY)

b 319+79-50.0' L to
b 319+08-249' L
Cut Inlet Ditch
(330 CY Exc Inc in Grading Est)

b 328+97
Take Out 24"-56' CMP
(Incidental Work, Grading)

b 328+97 (27 ac)
Install 30" - 76' RCP
& 2 Sloped Ends

b 328+97-46.5' R to
b 329+62-76' R
Cut Outlet Ditch
(25 CY Exc Inc in Grading Est)



Parcel 24
b 313+83.23 to b 340+29.08 R
Temporary Easement for
Cut, Fill & Outlet Ditches containing
1.6 ac, more or less

Parcel 23
b 315+56.36 to b 340+30.01 L
Temporary Easement for Cut,
Ditch Block & Inlet Ditch containing
3.8 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\drlprj\ogla02\QC\300.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B58	B130

Plotting Date: 12/16/2015

Station b291+46 to b337+00 Lt

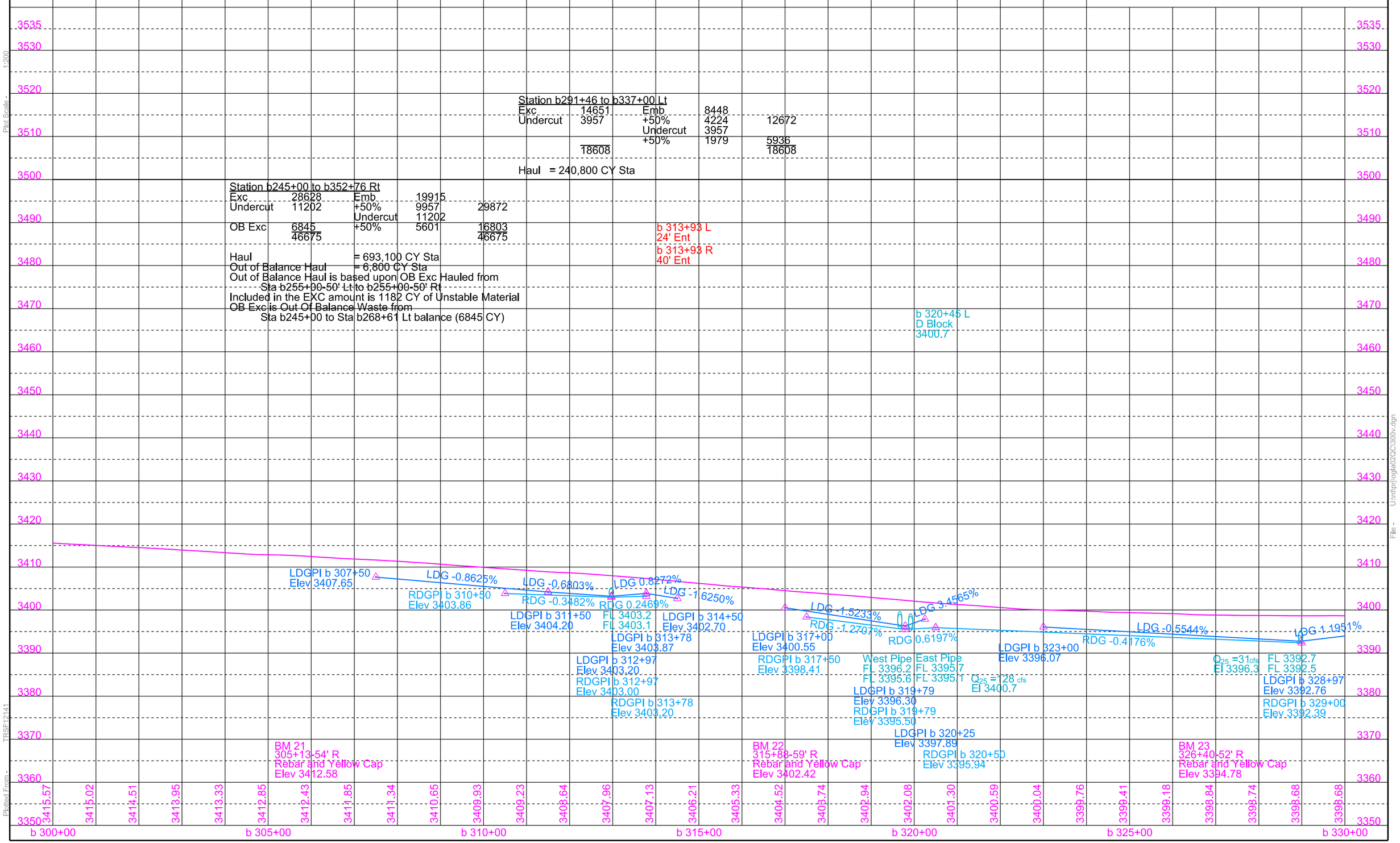
Exc	14651	Emb	8448	
Undercut	3957	+50%	4224	12672
		Undercut	3957	
		+50%	1979	5936
	18608			18608

Haul = 240,800 CY Sta

Station b245+00 to b352+76 Rt

Exc	28628	Emb	19915	
Undercut	11202	+50%	9957	29872
		Undercut	11202	
OB Exc	6845	+50%	5601	16803
	46675			46675

Haul = 693,100 CY Sta
Out of Balance Haul = 6,800 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta b255+00-50' Lt to b255+00-50' Rt
Included in the EXC amount is 1182 CY of Unstable Material
OB Exc is Out Of Balance Waste from
Sta b245+00 to Sta b268+61 Lt balance (6845 CY)



Plot Scale - 1:200
Plotted From - TPSF12141
File - U:\rdp\hogla02\QC\300v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B59	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

b 340+07
Take Out 18"-58' CMP
(Incidental Work, Grading)

b 339+72 (14 ac)
Install 24" - 86' RCP
& 2 Sloped Ends

b 339+72-50.6'R to 112'R
Cut Outlet Ditch
(35 CY Exc Inc in Grading Est)

b 342+52
Take Out 2-6'x6'-48' RCBC
(Incidental Work, Grading)

b 343+38-43' R
Take Out 18"-42' CMP
(Incidental Work, Grading)

b 342+67-23° Skew LHF(552 ac)
Install Triple 66" - 102' RCP
w / Controlled Density Fill
(Spaced 9.4' C to C)
& 6 Flared Ends

b 342+43.9 - 54.5'R
Install Bank and Channel
Protection Gabions
(42.0 CY)

b 342+91.6-72.0'R to b 343+75.3-66.3'R
Install 18" - 76' CMP
& 2 Safety Ends

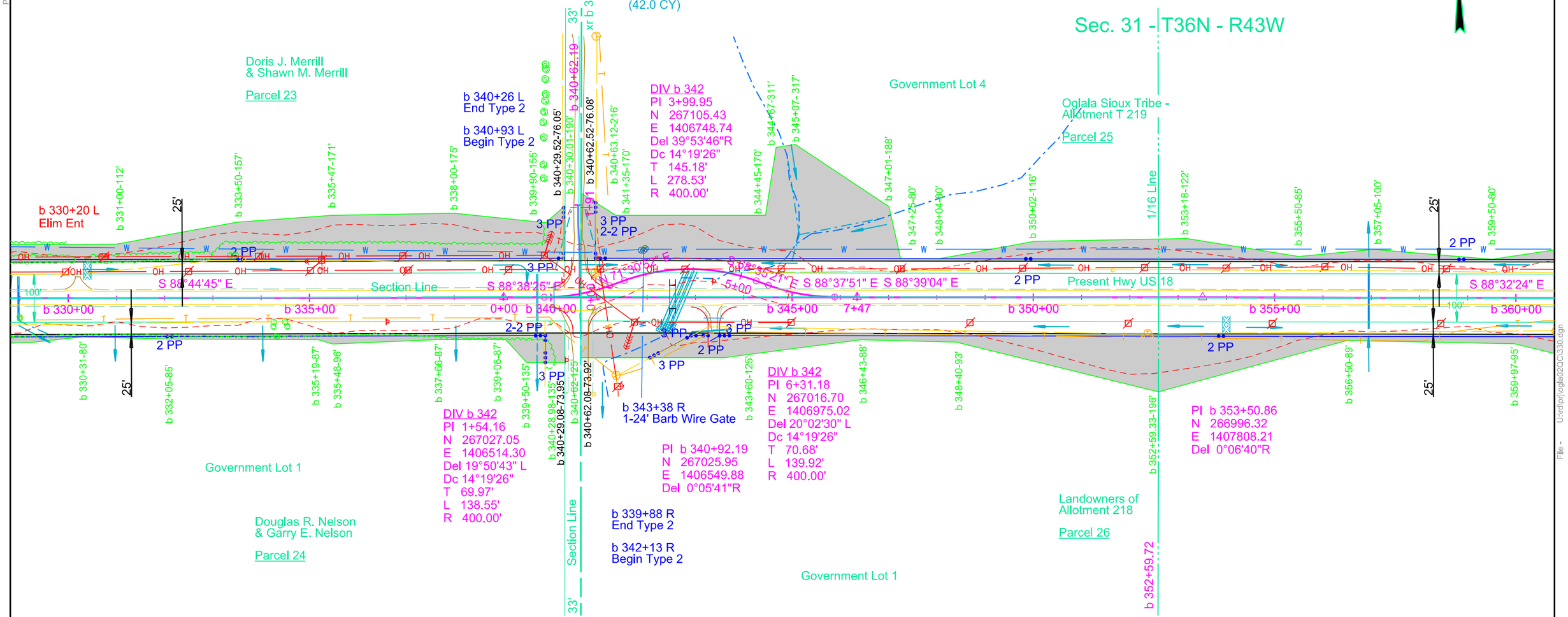
b 345+15-130'L to b 346+85-164'L
Cut Inlet Ditch
(60 CY Exc Inc in Grading Est)

b 345+15-130'L to b 344+90-294'L
Cut Inlet Ditch
(60 CY Exc Inc in Grading Est)

b 345+00-76.5'L to b 345+15-130'L
Cut Inlet Ditch
(55 CY Exc Inc in Grading Est)

b 356+95
Take Out 18"-96' CMP
(Incidental Work, Grading)

b 356+95 (7 ac)
Install 24" - 122' RCP
& 2 Sloped Ends



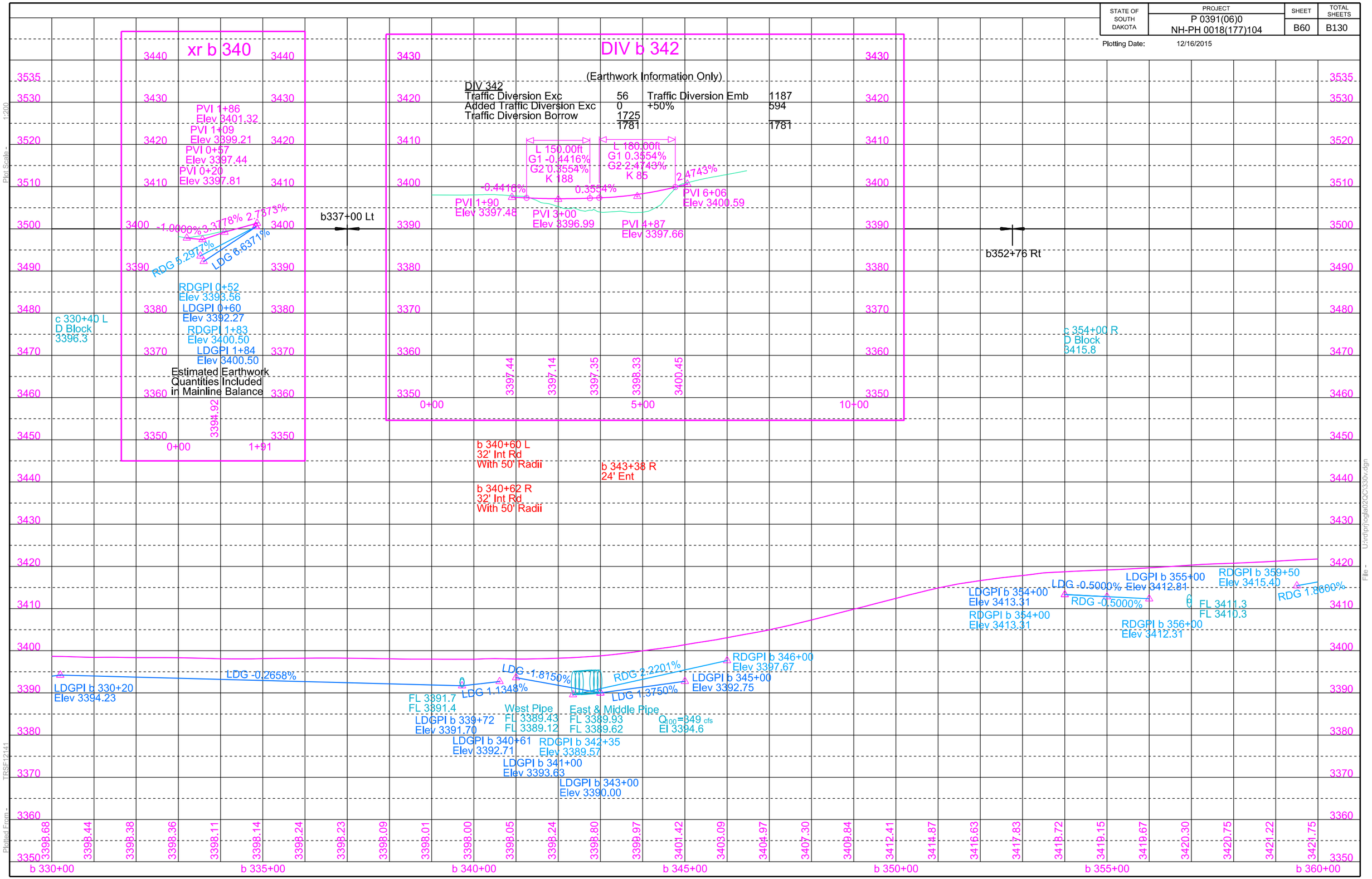
Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\rdprj\ogla02\C\330.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B60	B130

Plotting Date: 12/16/2015

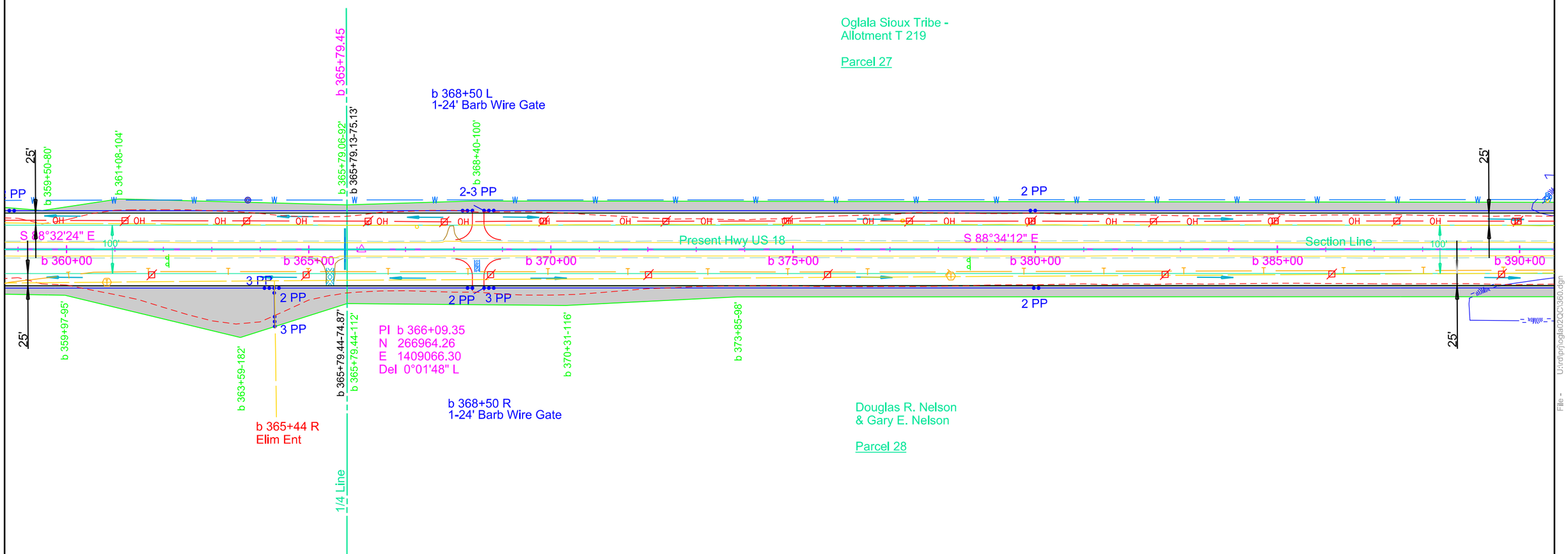


STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B61	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

b 365+75
Take Out 18"-52' CMP
(Incidental Work, Grading)

b 365+75 (5 ac)
Install 24" - 72' RCP
& 2 Sloped Ends



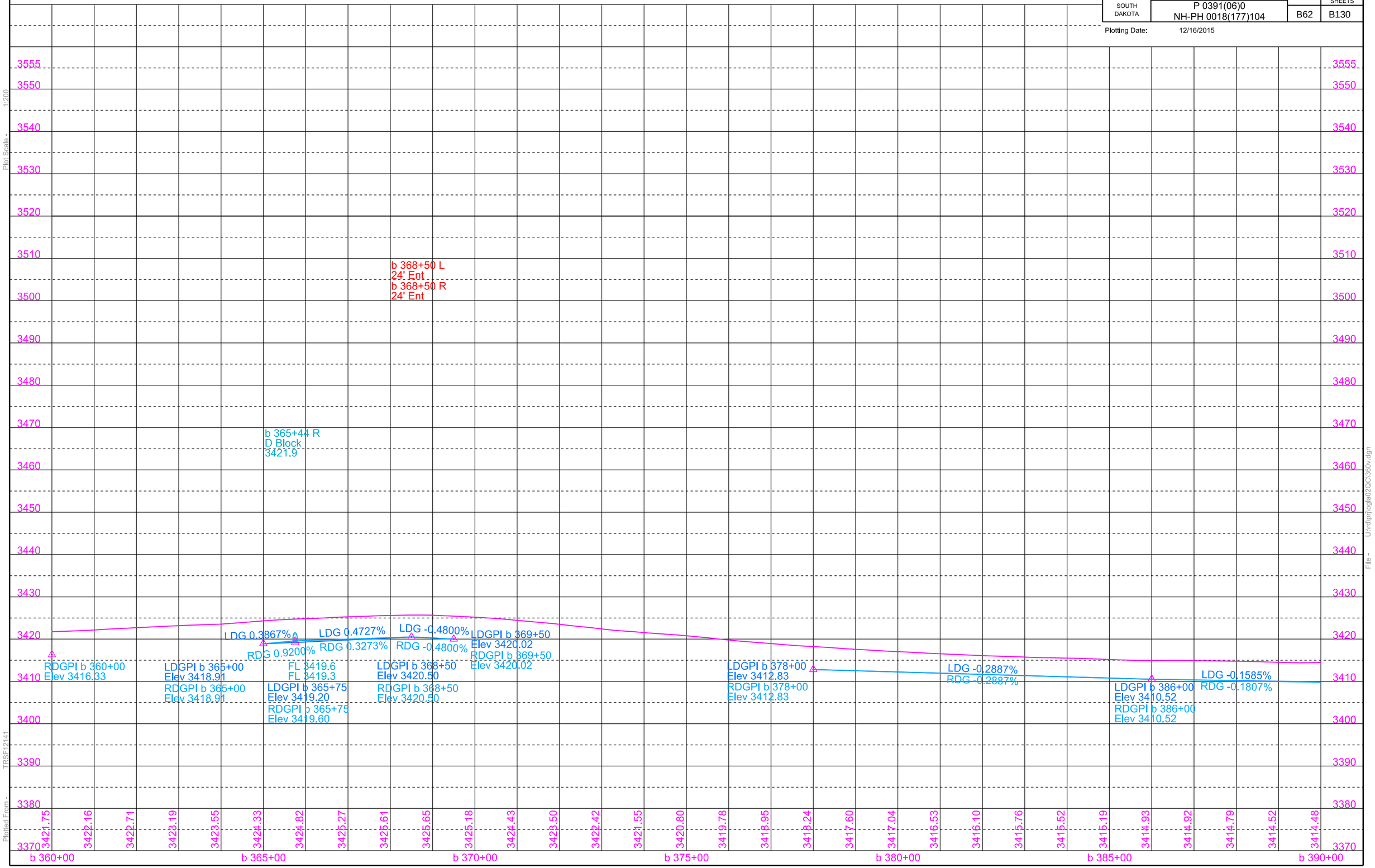
Parcel 27
b 365+79.06 to b 392+18.32 L
Temporary Easement for
Cut containing
1.4 ac, more or less

Parcel 28
b 365+79.44 to b 391+85.72 R
Temporary Easement for
Cut containing
1.6 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\oglau2\qc\36u.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B62	B130

Plotting Date: 12/16/2015



Plot Scale - 1:200

Plotted From - TPSF12141

File - U:\rdp\hoglau02\QC\360v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B63	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

b 392+10-39' L
Take Out 24"-42' CMP
(Incidental Work, Grading)

b 392+09-40' R
Take Out 18"-44' CMP
(Incidental Work, Grading)

b 392+42
Take Out 18"-58' CMP
(Incidental Work, Grading)

b 392+45
Take Out 18"-56' CMP
(Incidental Work, Grading)

b 392+82 (117 ac)
Install Twin 30" - 72' RCP Arch
(Spaced 24' C to C)
& 4 Sloped Ends

b 404+74-32' R
Take Out 18"-50' CMP
(Incidental Work, Grading)

b 404+99-65' R
Take Out Cattle Guard

b 404+86-51' R (10 ac)
Install 18" - 64' CMP
& 2 Safety Ends

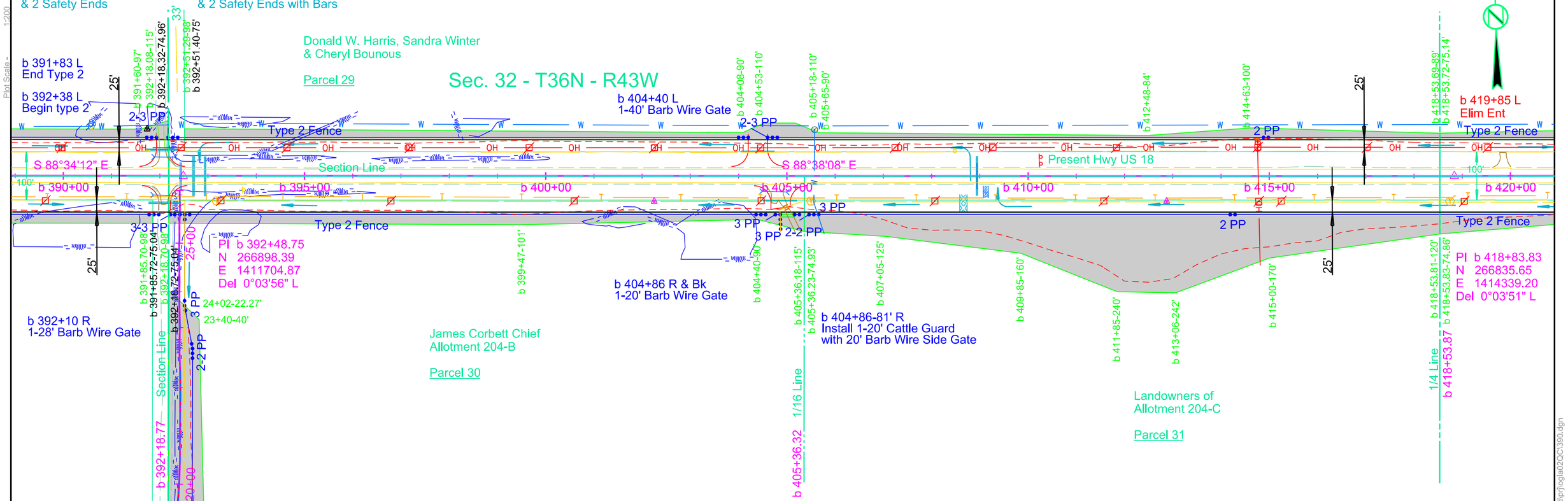
b 404+40-51' L (21 ac)
Install 18" - 62' CMP
& 2 Safety Ends

b 408+94
Take Out 18"-54' CMP
(Incidental Work, Grading)

b 408+94 (21 ac)
Install 24" - 68' RCP
& 2 Sloped Ends

b 392+05-54.5' L (50 ac)
Install 24" - 56' CMP Arch
& 2 Safety Ends

b 392+10-55.5' R (43 ac)
Install 30" - 54' CMP Arch
& 2 Safety Ends with Bars



Parcel 29
b 392+51.29 to b 418+53.72 L
Temporary Easement for
Cut & Entrance containing
1.1 ac, more or less

Parcel 30
12+57 to 24+02 (dr b 392) R
Temporary Easement for
Ditch Clean Out containing
1.7 ac, more or less

Parcel 30
b 392+18.70 to b 405+36.23 R
Temporary Easement for
Cut & Entrance containing
0.7 ac, more or less

Parcel 31
b 405+36.18 to b 418+53.83 R
Temporary Easement for
Cut containing
2.8 ac, more or less

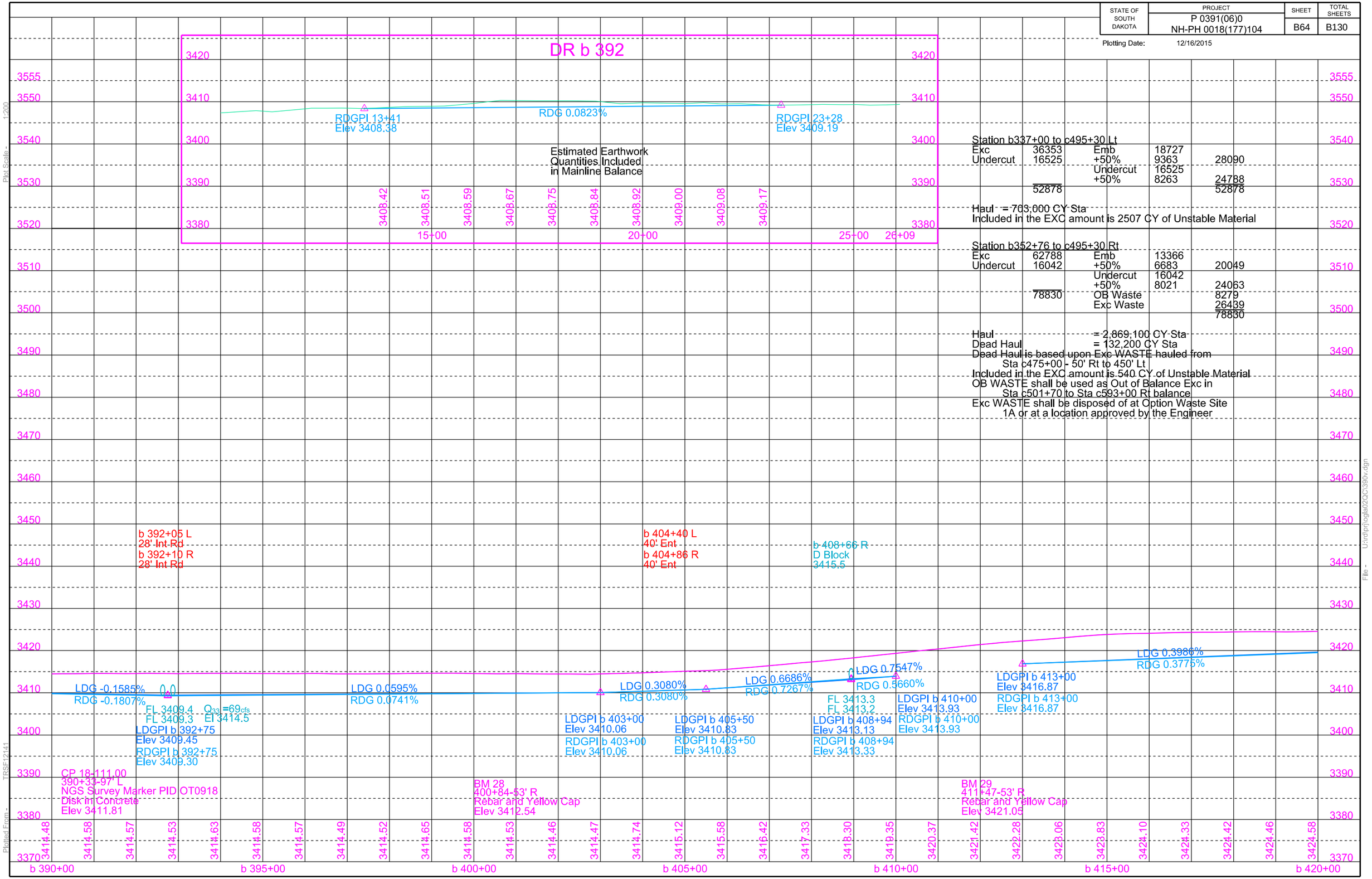
Parcel 32
b 418+53.69 to c 433+32 L
Temporary Easement for
Cut & Fill containing
0.9 ac, more or less

Parcel 33
b 418+53.81 to c 444+96.01 R
Temporary Easement for
Cut & Fill containing
2.3 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdi\pj\ogla\02QC\390.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B64	B130

Plotting Date: 12/16/2015



Station b337+00 to c495+30 Lt

Exc	36353	Emb	18727	
Undercut	16525	+50%	9363	28090
		Undercut	16525	
		+50%	8263	24788
	52878			52878

Haul = 763,000 CY Sta
Included in the EXC amount is 2507 CY of Unstable Material

Station b352+76 to c495+30 Rt

Exc	62788	Emb	13366	
Undercut	16042	+50%	6683	20049
		Undercut	16042	
		+50%	8021	24063
	78830	OB Waste		8279
		Exc Waste		26439
				78830

Haul = 2,869,100 CY Sta
Dead Haul = 132,200 CY Sta
Dead Haul is based upon Exc WASTE hauled from
Sta c475+00 - 50' Rt to 450' Lt
Included in the EXC amount is 540 CY of Unstable Material
OB WASTE shall be used as Out of Balance Exc in
Sta c501+70 to Sta c593+00 Rt balance
Exc WASTE shall be disposed of at Option Waste Site
1A or at a location approved by the Engineer

Plot Scale - 1:200
Plotted From - TPSF12141
File - U:\rdp\hogla02\QC\390v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B65	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

b 421+46
Take Out 24"-60' CMP
(Incidental Work, Grading)

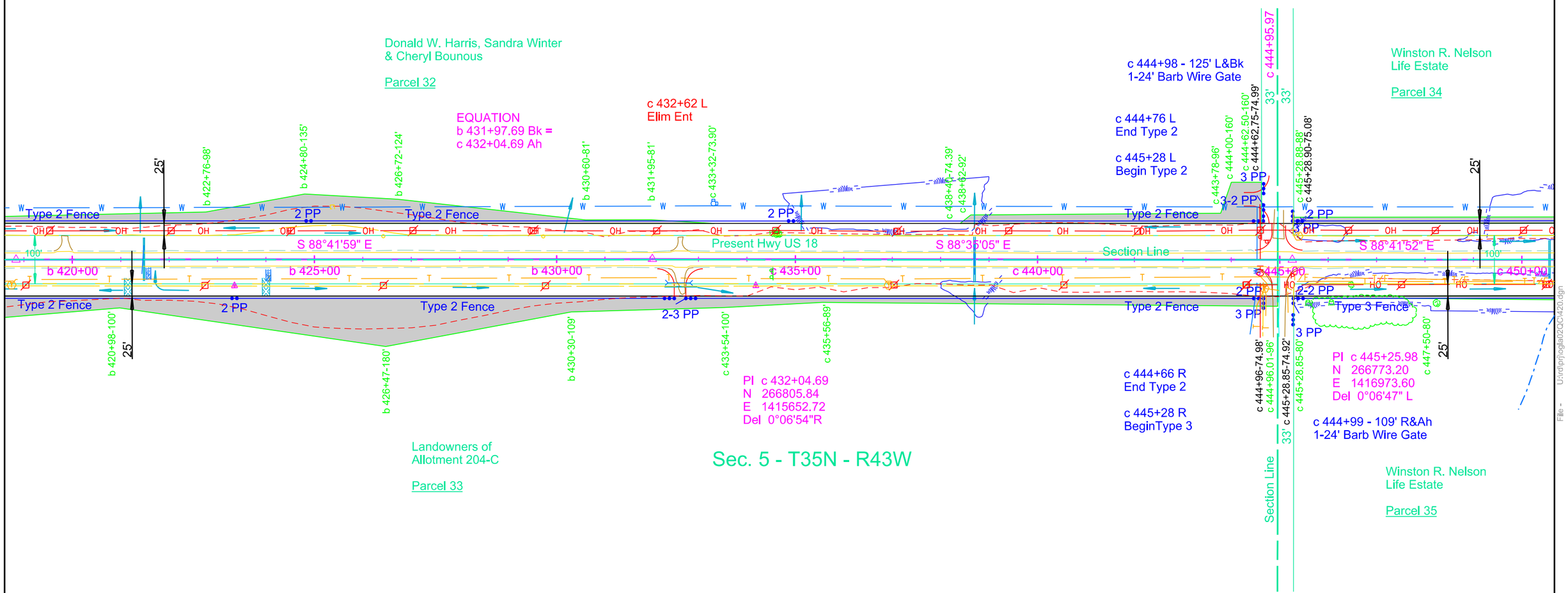
b 421+48 (15 ac)
Install 24" - 76' RCP
& 2 Sloped Ends

c 432+60-49' R
Take Out 18"-45' CMP
(Incidental Work, Grading)

c 432+62-57' R (7 ac)
Install 18" - 60' CMP
& 2 Safety Ends

c 438+70
Take Out 36"-63' CMP
(Incidental Work, Grading)

c 438+70 (62 ac)
Install 36" - 78' RCP Arch
& 2 Flared Ends



Parcel 34
c 445+28.88 to c 471+36.29 L
Temporary Easement for
Cut, Fill & Entrance containing
0.9 ac, more or less

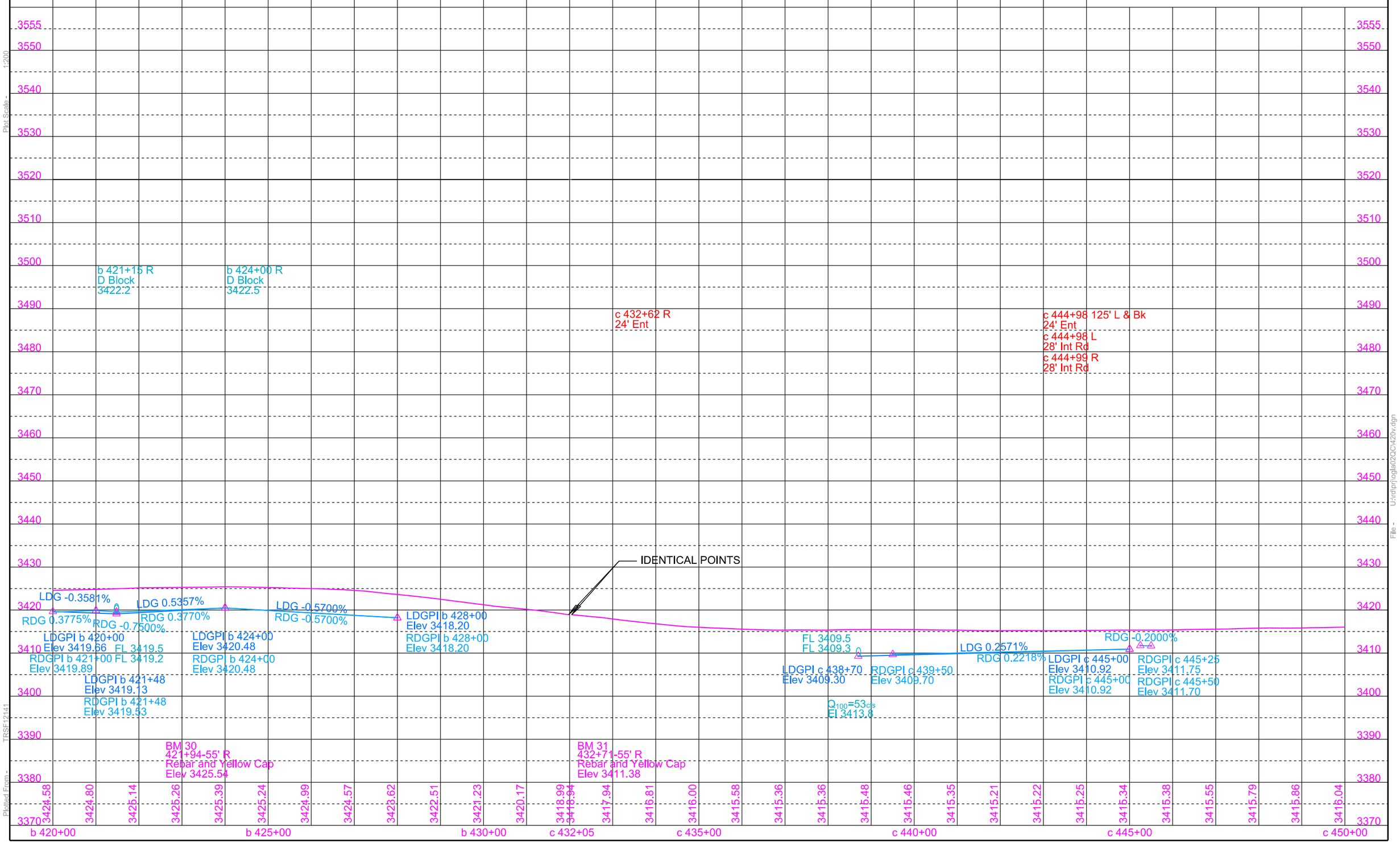
Parcel 32
c 438+40 to c 444+62.75 L
Temporary Easement for
Cut, Fill & Entrance containing
0.4 ac, more or less

Parcel 35
c 445+28.85 to c 471+36.25 R
Temporary Easement for
Cut containing
0.8 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\trap\nj\oglau02\GC420.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B66	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR



Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\rdp\hoglat02\QC\420v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B67	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

c 450+81
Take Out 30"-55' CMP
(Incidental Work, Grading)

c 450+81 (271 Ac) (Equalizer)
Install Triple 30" - 68' RCP Arch
(Spaced 24' C to C)
& 6 Sloped Ends

c 463+40-40' R
Take Out 18"-58' CMP
(Incidental Work, Grading)

c 461+00-52' R
Install 24" - 48' CMP Arch
& 2 Safety Ends

c 465+71-38' R
Take Out 24"-58' CMP
(Incidental Work, Grading)

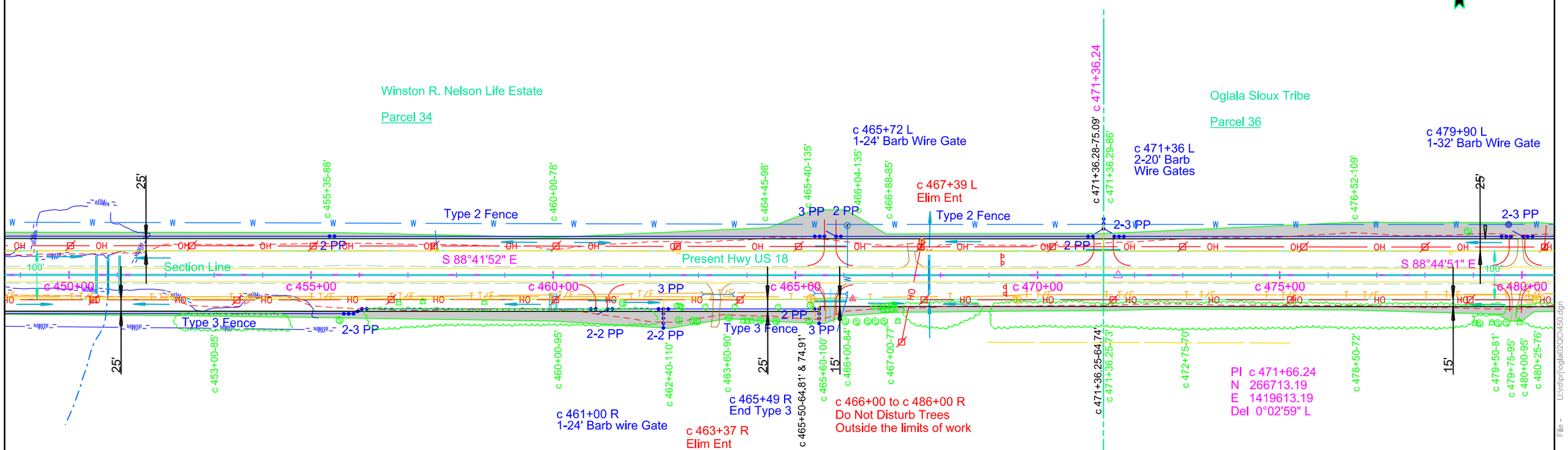
c 465+72-54' R
Install 24" - 54' CMP
& 2 Safety Ends

c 465+72-59.5' L
Install 18" - 56' CMP
& 2 Safety Ends

c 467+76
Take Out 18"-60' CMP
(Incidental Work, Grading)

c 467+76 (19 ac)
Install 30" - 72' RCP Arch
& 2 Sloped Ends

c 471+36-52.3' L
Install 18" - 64' CMP
& 2 Safety Ends



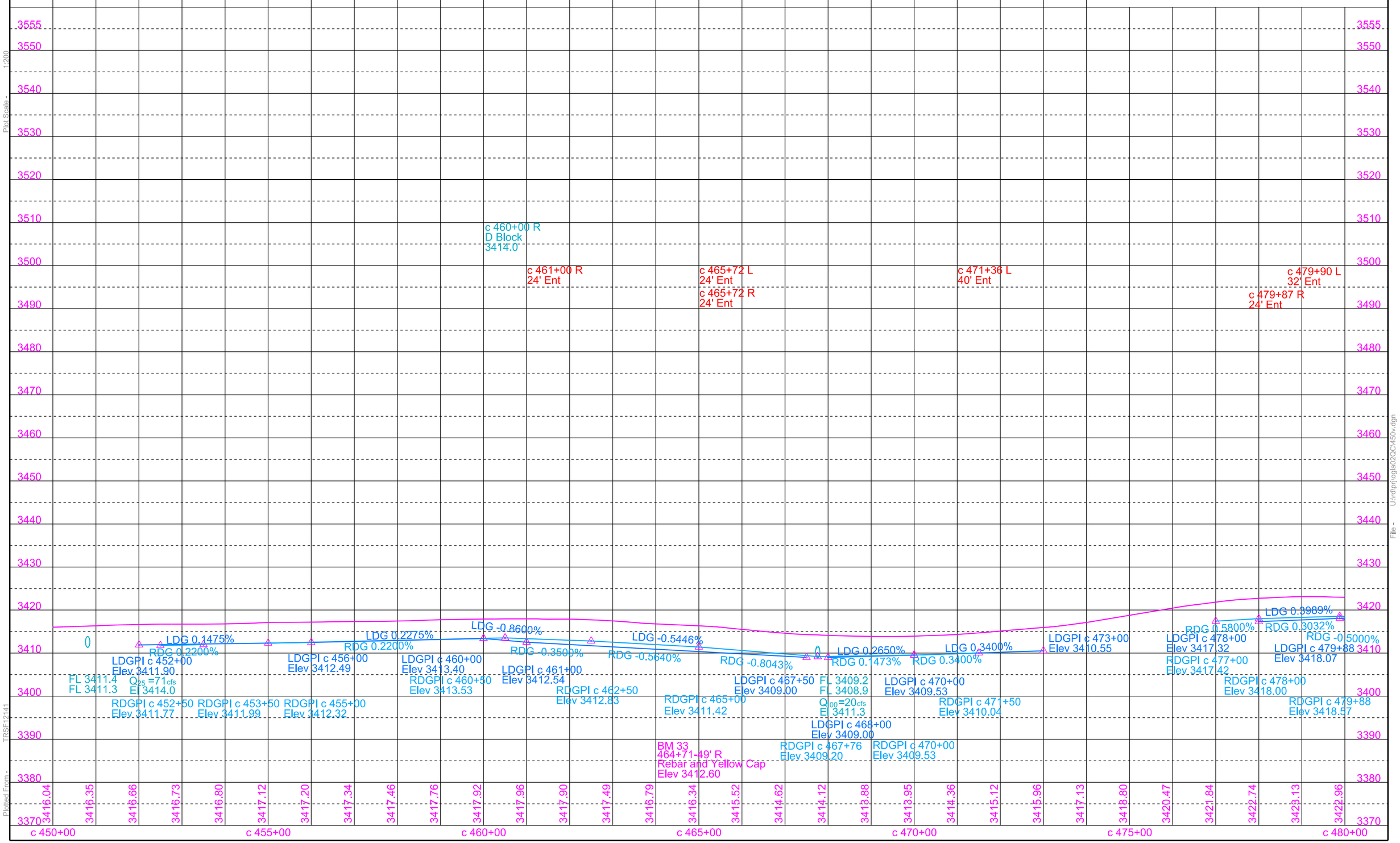
Parcel 36
c 471+36.28 to c 486+85 L
Temporary Easement for
Cut containing
0.8 ac, more or less

Parcel 37
c 471+36.25 to c 486+00 R
Temporary Easement for
Cut & Entrance containing
0.3 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\ogla\02\0C\450.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B68	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR



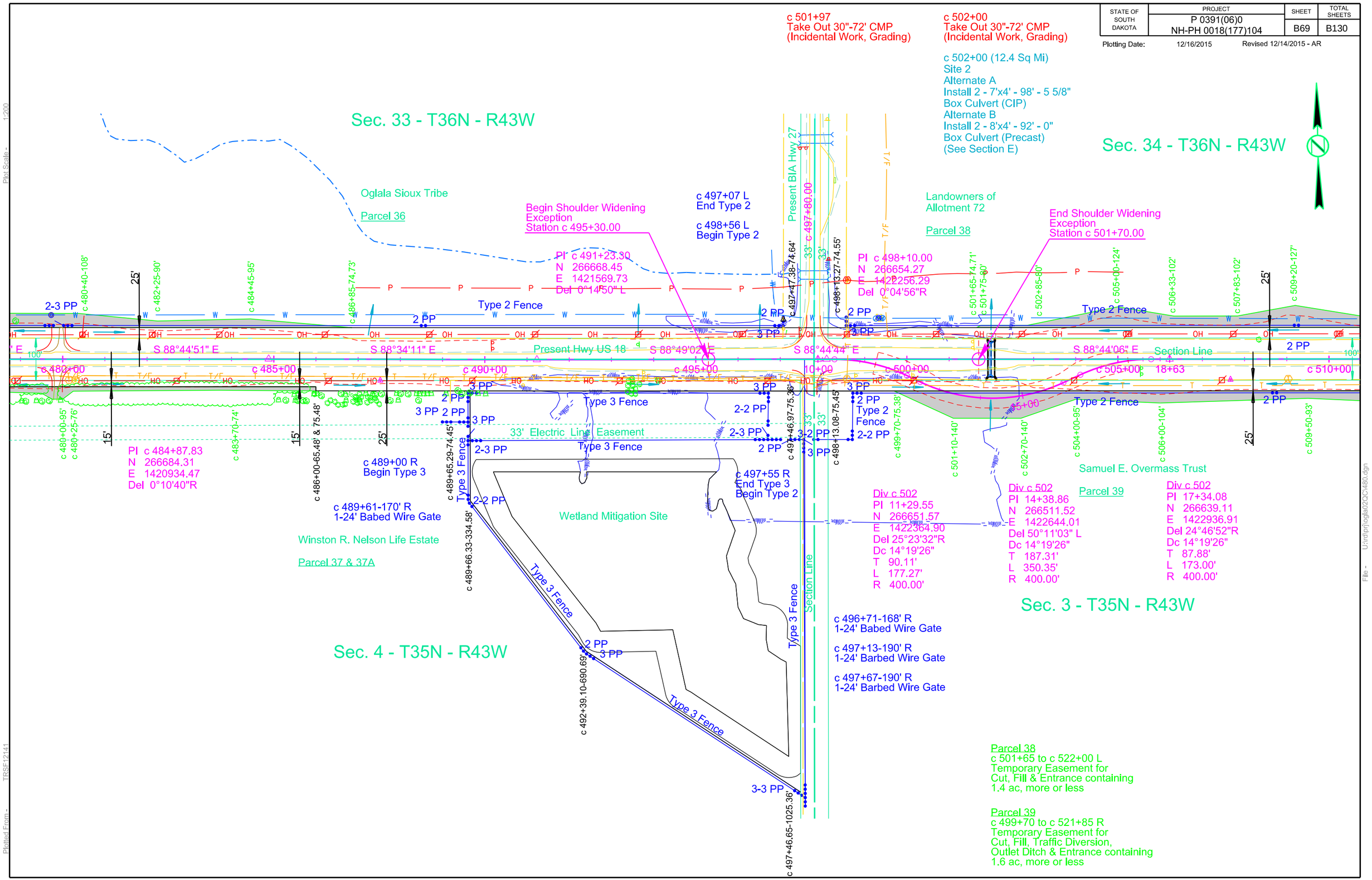
Plot Scale - 1:200

Plotted From - TPSF12141

File - U:\rdp\hogla02\QC\450v.dgn

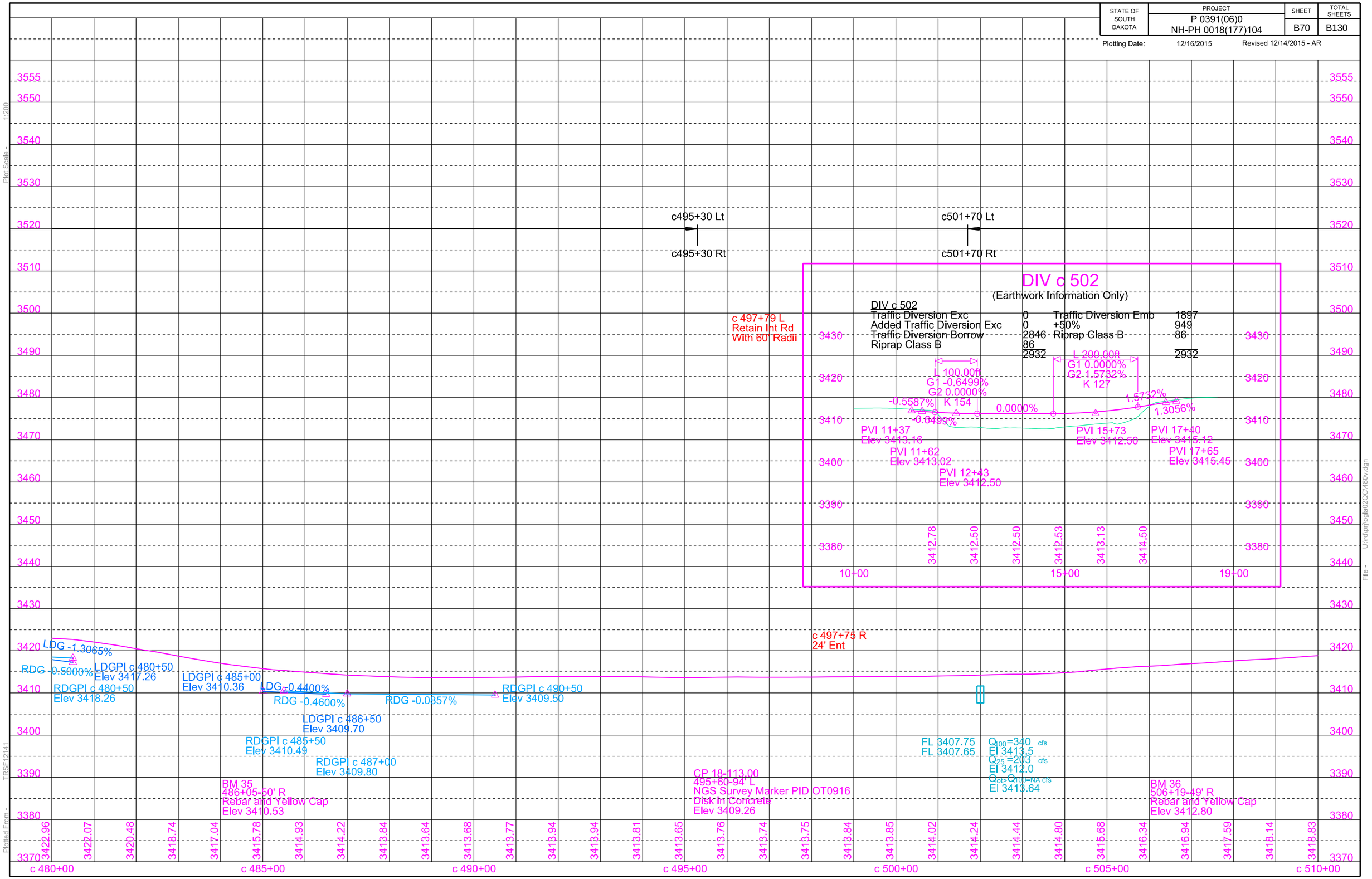
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B69	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B70	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B71	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

c 520+70
Take Out 24"-68' CMP
(Incidental Work, Grading)

c 520+00-64' L
Install 18" - 68' CMP
& 2 Safety Ends

c 520+80 (94 ac)
Install 36" - 78' RCP
& 2 Flared Ends

c 520+80 -47.5' R to 98' R
Cut Outlet Ditch
(10 CY Inc in Grading Est)

c 534+50
Take Out 36"-58' CMP
(Incidental Work, Grading)

c 534+50 (112 ac)
Install 36" - 78' RCP Arch
& 2 Flared Ends

Sec. 34 - T36N - R43W

Oglala Sioux Tribe - Allotment 72

Parcel 38

Landowners of Allotment 71

Parcel 40

c 520+00 L
1-24' Barb Wire Gate

c 524+21.52
c 524+21.76-74.40'
c 524+21.77-79'

c 511+83-85'
c 512+97-115'
c 518+00-90'
c 519+25-100'
c 519+68-136'
c 520+32-136'
c 522+00-74.53'
c 530+95-102'
c 532+41-182'
c 532+65-182'
c 533+89-99'
c 534+60-90'

25'
Type 2 Fence
2-3 PP
2 PP
Type 2 Fence
2 PP
25'

2 PP
Section Line
S 88°47'41" E
Present Hwy US 18
S 88°44'50" E
100'
100'

c 510+00
c 515+00
c 520+00
c 525+00
c 530+00
c 535+00
c 540+00

Type 2 Fence
3 PP 2 PP
3-2 PP
2 PP
Type 2 Fence

25'
25'

c 513+30-110'
c 519+18-95'
c 519+68-132'
c 520+50-132'
c 521+85-75.46'
c 524+21.42-75.60'
c 524+76-75.60'
c 525+48-90'
c 531+85-130'
c 533+17-95'
c 538+28-95'

PI c 511+31.73
N 266625.09
E 1423577.70
Del 0°03'34" L

PI c 524+51.51
N 266597.33
E 1424897.18
Del 0°02'50"R

PI c 537+73.53
N 266568.43
E 1426218.89
Del 0°01'49" L

Samuel E. Overmass Trust

Parcel 39

c 520+00 R
1-24' Barb Wire Gate

1/4 Line

Charles E. Divan & Linda L. Divan

Parcel 41

Sec. 3 - T35N - R43W

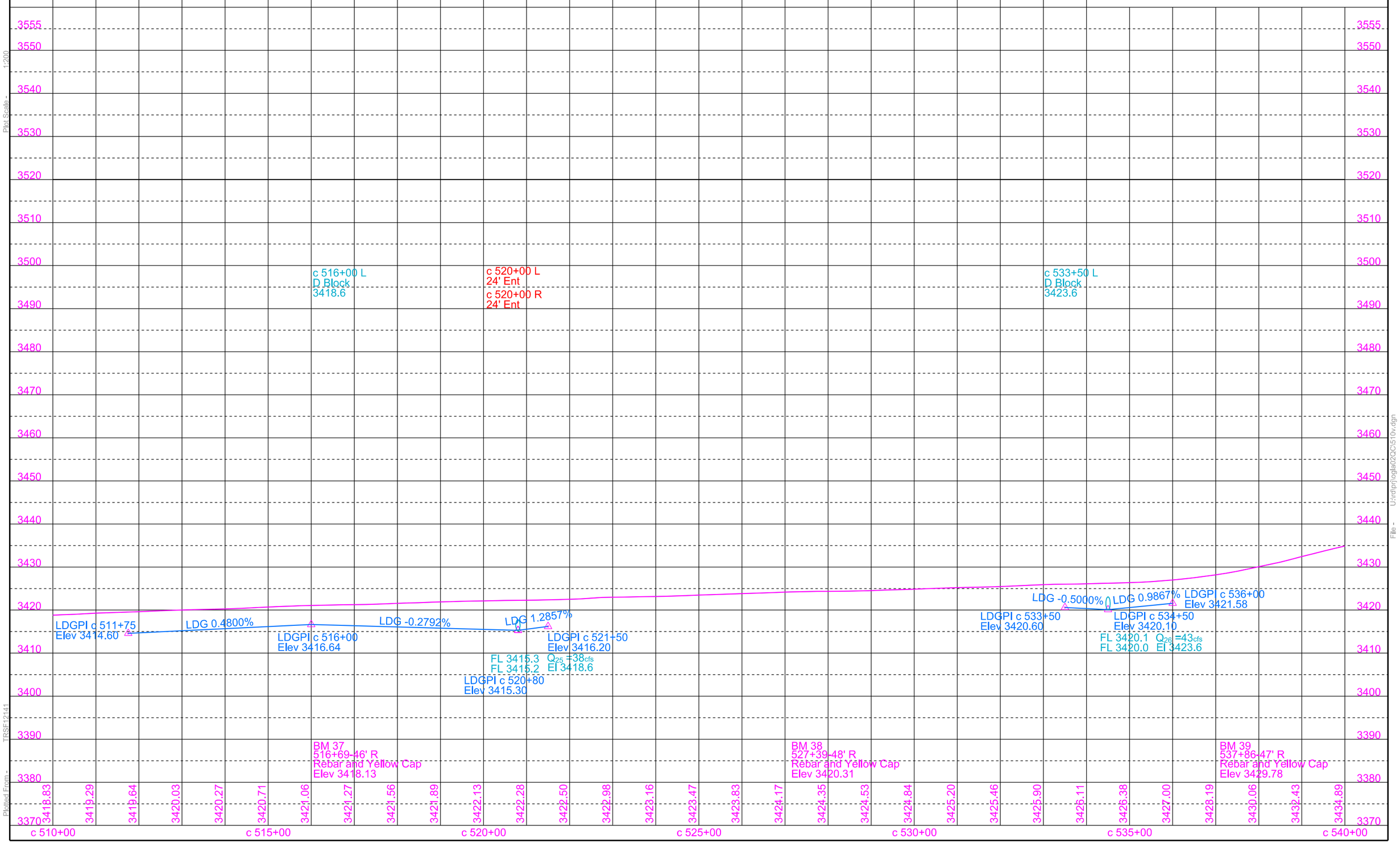
Parcel 40
c 524+21.76 to c 550+63.55 L
Temporary Easement for
Cut, Fill & Entrance containing
1.4 ac, more or less

Parcel 41
c 524+76 to c 550+29.99 R
Temporary Easement for
Cut & Fill containing
1.5 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\oglau2\c1510.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B72	B130

Plotting Date: 12/16/2015



Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\rdp\hogla02\QC\510v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B73	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

ROW Revision 7-14-14 AR

c 550+50-71' R
Take Out 18"-28' CMP
(Incidental Work, Grading)

c 550+51-57' R
Install 18" - 64' CMP
& 2 Safety Ends

c 550+53-57' L
Install 18" - 60' CMP
& 2 Safety Ends

c 555+67
Take Out 18"-76' CMP
(Incidental Work, Grading)

c 555+67 (10 ac)
Install 24" - 98' RCP
& 2 Sloped Ends

c 555+67-60.2' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

Sec. 34 - T36N - R43W

Sec. 35 - T36N - R43W

Landowners of Allotment 71

Parcel 40

c 550+20-118' L
Do Not Disturb
Shed

c 550+63.03

33'

c 550+53 - 107' L & Bk
1-24' Barb Wire Gate

c 550+53 L
1-24' Barb Wire Gate

c 548+67 L
Elim Ent

Douglas R. Nelson & Gary E. Nelson

Parcel 42

c 561+77 L
1-24' Barb Wire Gate

c 543+40-89' c 544+27-111' c 546+40-95' c 550+00-93' c 550+21-118' c 550+63.36-74.93' 550+63.55-118' c 550+96.33-74.92' c 550+96.39-90' c 559+65-98' c 561+50-119' c 563+80-100' c 564+58-102' c 565+50-116' c 567+90-97' c 569+69-101'

25' 25' 25'

2 PP Type 2 Fence 2 PP 3 PP 3 PP 3 PP 2 PP 2-3 PP Type 2 Fence 2 PP

OH OH OH OH

100' S 88°46'40" E Present Hwy US 18 S 88°45'13" E Section Line S 88°47'56" E S 88°

c 540+00 c 545+00 c 550+00 c 555+00 c 560+00 c 565+00 c 570+00

2-2 PP Type 2 Fence 3 PP 4-2 PP 2 PP 3 PP 2 PP Type 2 Fence 3-3 PP

33'

PI c 550+94.66
N 266540.25
E 1427539.72
Del 0°01'27"R

PI c 564+14.01
N 266511.55
E 1428858.76
Del 0°02'43" L

c 544+67-115' c 545+98-85' c 550+29.98-95' c 550+29.99-75.07' c 550+62.98-95' c 550+62.99-75.07' c 554+57-85' c 554+69-115' c 555+33-115' c 555+50-80' c 557+00-80' c 557+61-103' c 559+49-102' c 561+65-137' c 564+30-102' c 568+75-85' c 569+28-151' c 570+08-151'

c 550+31 R
End Type 2

c 550+67 R
Begin Type 2

c 555+01 R
1-24' Barb Wire Gate

c 569+68 R
2- 20' Barb Wire Gates

Charles E. Divan & Linda L. Divan

Parcel 41

Section Line

Elvira Martinez
Allotment 84

Parcel 43

Sec. 2 - T35N - R43W

Sec. 3 - T35N - R43W

Parcel 42
c 550+96.33 to c 577+04.27 L
Temporary Easement for
Cut & Fill containing
1.4 ac, more or less

Parcel 43
c 550+62.98 to c 577+03.86 R
Temporary Easement for
Cut, Fill & Entrances containing
1.5 ac, more or less

Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\rdprj\oglau02\C\540.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B74	B130

Plotting Date: 12/16/2015

Station c501+70 to c595+07 Lt

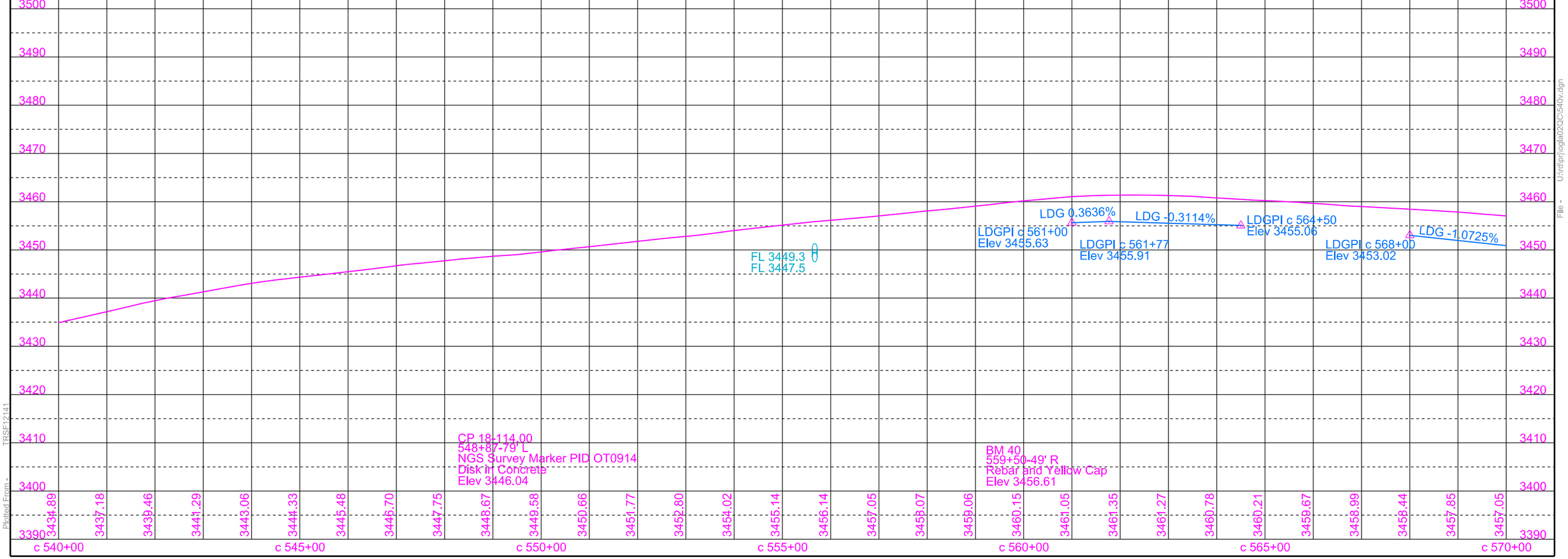
Exc	32198	Emb	10569	
Undercut	9048	+50%	5284	15853
		Undercut	9048	
		+50%	4524	13572
	41246	OB Waste		11821
				41246

Haul = 194,800 CY Sta
Included in the EXC amount is 157 CY of Unstable Material
OB WASTE shall be used as Out of Balance Exc in
Sta c501+70 to Sta c593+00 Rt balance
Sta c593+00 to Sta d636+12 Rt balance

Station c501+70 to c593+00 Rt

Exc	12170	Emb	12790	
Undercut	8386	+50%	6395	19185
		Undercut	8386	
OB Exc	11208	+50%	4193	12579
	31764			31764

Haul = 424,200 CY Sta
Out of Balance Haul = 55,900 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta c495+30 to c501+70 Rt
Sta c593+00-50' Lt to c593+00-50' Rt
OB Exc is Out Of Balance Waste from
Sta b352+76 to Sta c495+30 Rt balance (8279 CY)
Sta c501+70 to Sta c595+07 Lt balance (2929 CY)



Plot Scale - 1:200
Plotted From - TPSF12141
File - U:\rdlp\hogla02\QC\540v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B75	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

c 570+76
Take Out 18"-79' CMP
(Incidental Work, Grading)

c 570+76 (4 ac)
Install 24" - 104' RCP
& 2 Sloped Ends

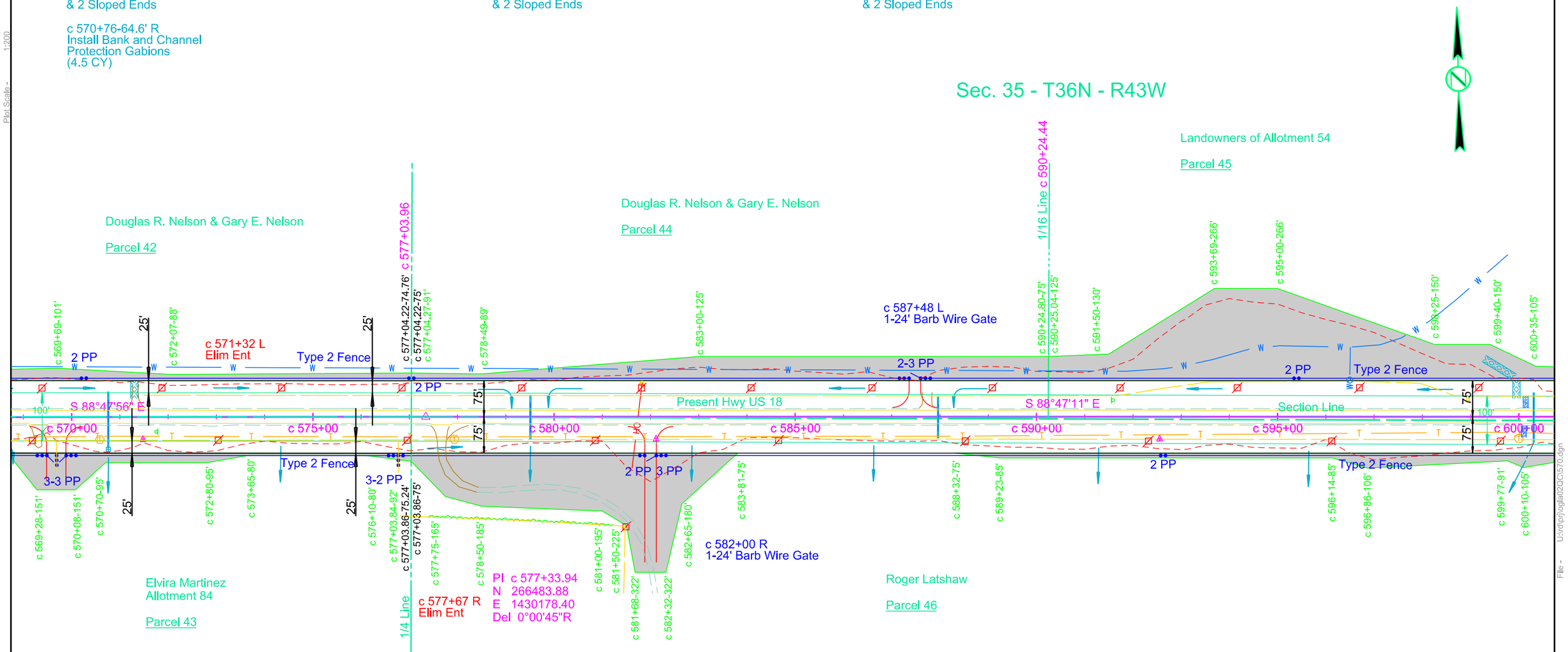
c 570+76-64.6' R
Install Bank and Channel
Protection Gabions
(4.5 CY)

c 579+51
Take Out 24"-62' CMP
(Incidental Work, Grading)

c 579+51 (42 ac)
Install 30" - 76' RCP
& 2 Sloped Ends

c 587+96
Take Out 18"-56' CMP
(Incidental Work, Grading)

c 587+96 (7 ac)
Install 24" - 72' RCP
& 2 Sloped Ends



Parcel 44
c 577+04.22 to c 590+25.04 L
Temporary Easement for
Cut containing
1.2 ac, more or less

Parcel 46
c 577+03.84 to c 583+81 R
Temporary Easement for
Cut, Fill, Entrance & Obliterate
Entrance containing
1.8 ac, more or less

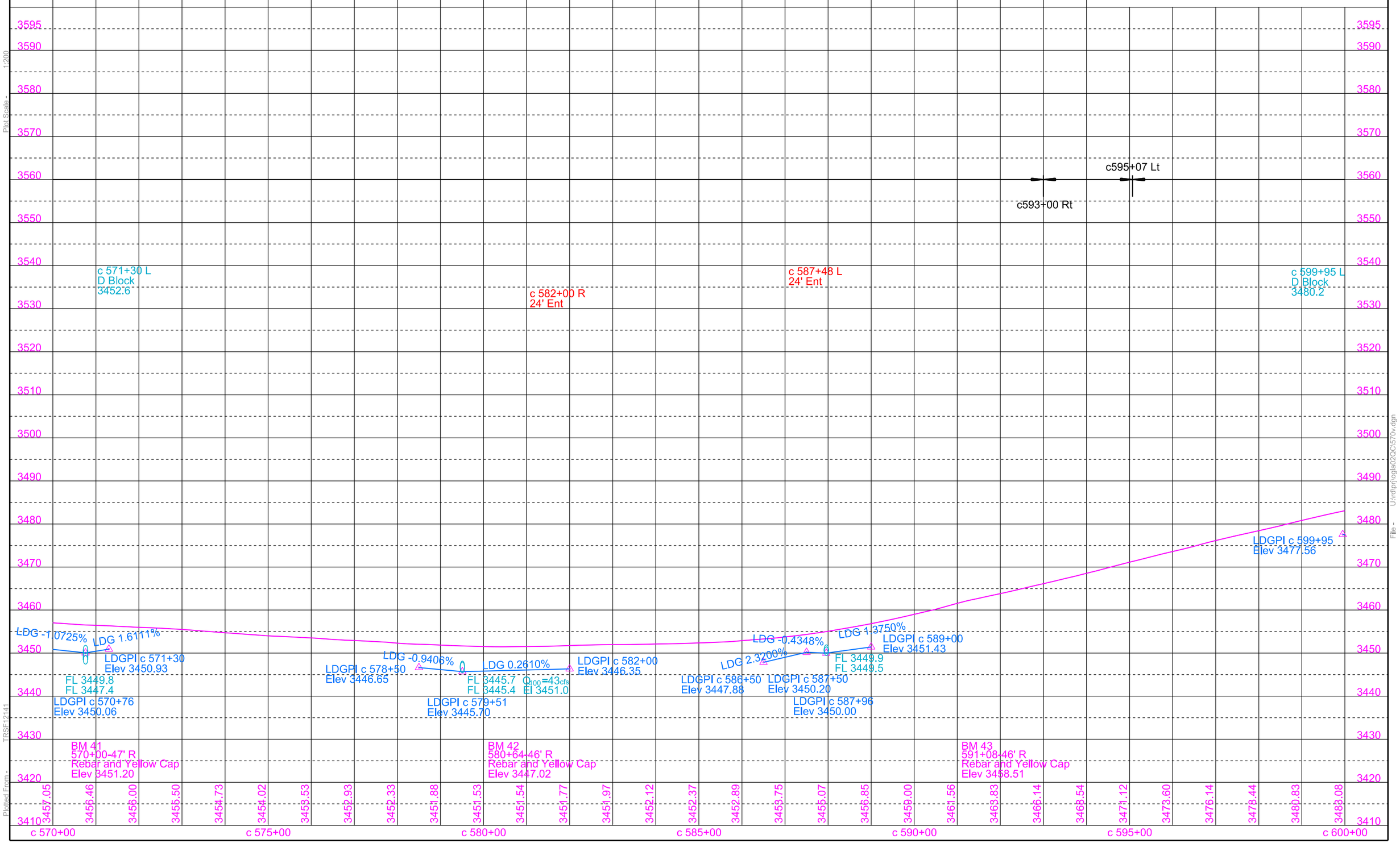
Parcel 45
c 590+24.80 to c 603+45.54 L
Temporary Easement for
Cut & Fill containing
2.8 ac, more or less

Parcel 46
c 588+32 to c 603+11.92 R
Temporary Easement for
Cut & Fill containing
0.7 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\oglau2\Qc\570.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B76	B130

Plotting Date: 12/16/2015



Plot Scale - 1:200

Plotted From - TPSF12141

File - U:\rdlp\hogla02\QC\570v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B77	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

c 600+31
Take Out 18"-82' CMP
(Incidental Work, Grading)

c 600+31 (21 ac)
Install 24" - 90' RCP
& 2 Sloped Ends

c 600+31-52.9' R to
c 600+16-86' R
Cut Outlet Ditch
(10 CY Exc Inc in
Grading Est)

d 605+31
Take Out 30"-96' CMP
(Incidental Work, Grading)

d 605+22 (16 ac)
Install 24" - 140' RCP
& 2 Sloped Ends

d 605+22-78' R to 121' R
Cut Outlet Ditch
(10 CY Exc Inc in Grading Est)

d 609+45-84' L
Take Out 18"-121' CMP
(Incidental Work, Grading)

d 609+03.4-61.1' L to d 609+94.9-70.5' L
Install 18" - 84' CMP
& 2 Safety Ends

d 610+74 (12 ac)
Install 24" - 156' RCP
& 2 Sloped Ends

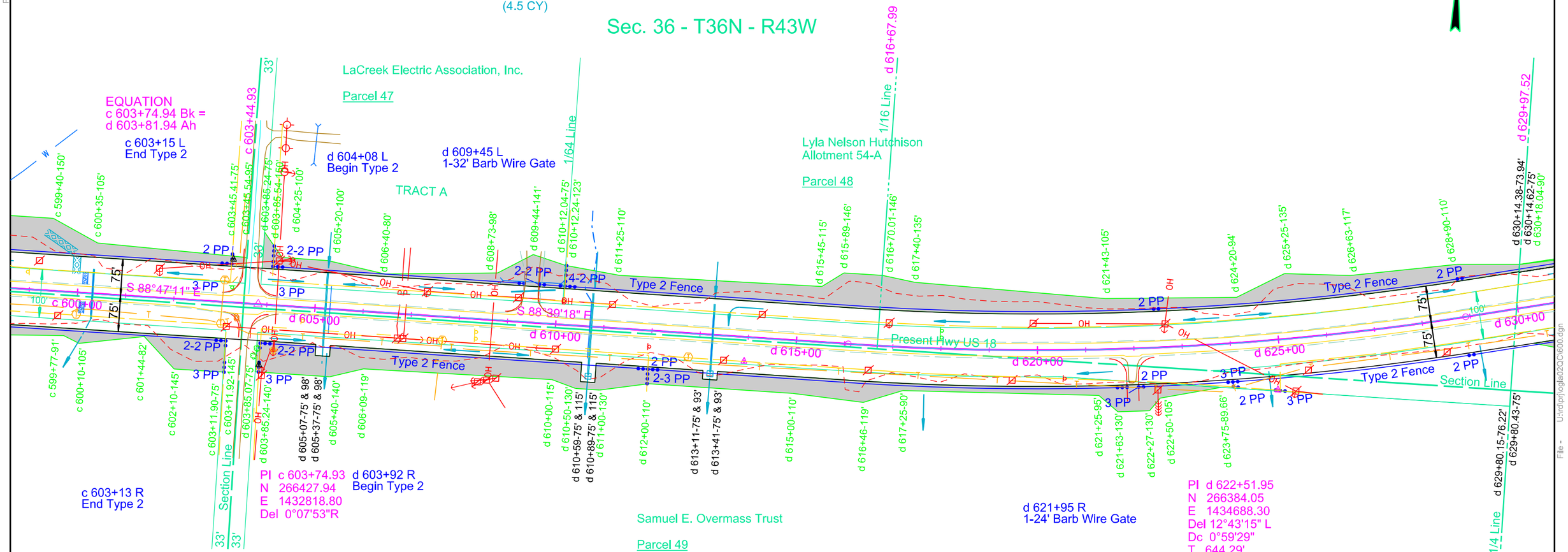
d 610+74-99.5' R
Install Bank and Channel
Protection Gabions
(4.5 CY)

d 610+71
Take Out 18"-114' CMP
(Incidental Work, Grading)

d 613+26 (15 ac)
Install 24" - 128' RCP
& 2 Sloped Ends

d 613+26-77.4' R
Install Bank and Channel
Protection Gabions
(4.5 CY)

d 613+26
Take Out 18"-94' CMP
(Incidental Work, Grading)



Parcel 47
c 603+85.24 to d 610+12.24 L
Temporary Easement for
Cut & Fill containing
0.4 ac, more or less

Parcel 49
d 603+85.07 to d 623+75 R
Temporary Easement for
Cut, Fill & Entrance containing
1.6 ac, more or less

Parcel 48
d 610+12.04 to d 630+18.04 L
Temporary Easement for
Cut & Fill containing
1.9 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\drafp\jogla02\Ch600.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B78	B130

Plotting Date: 12/16/2015

Station c595+07 to d652+79 Lt

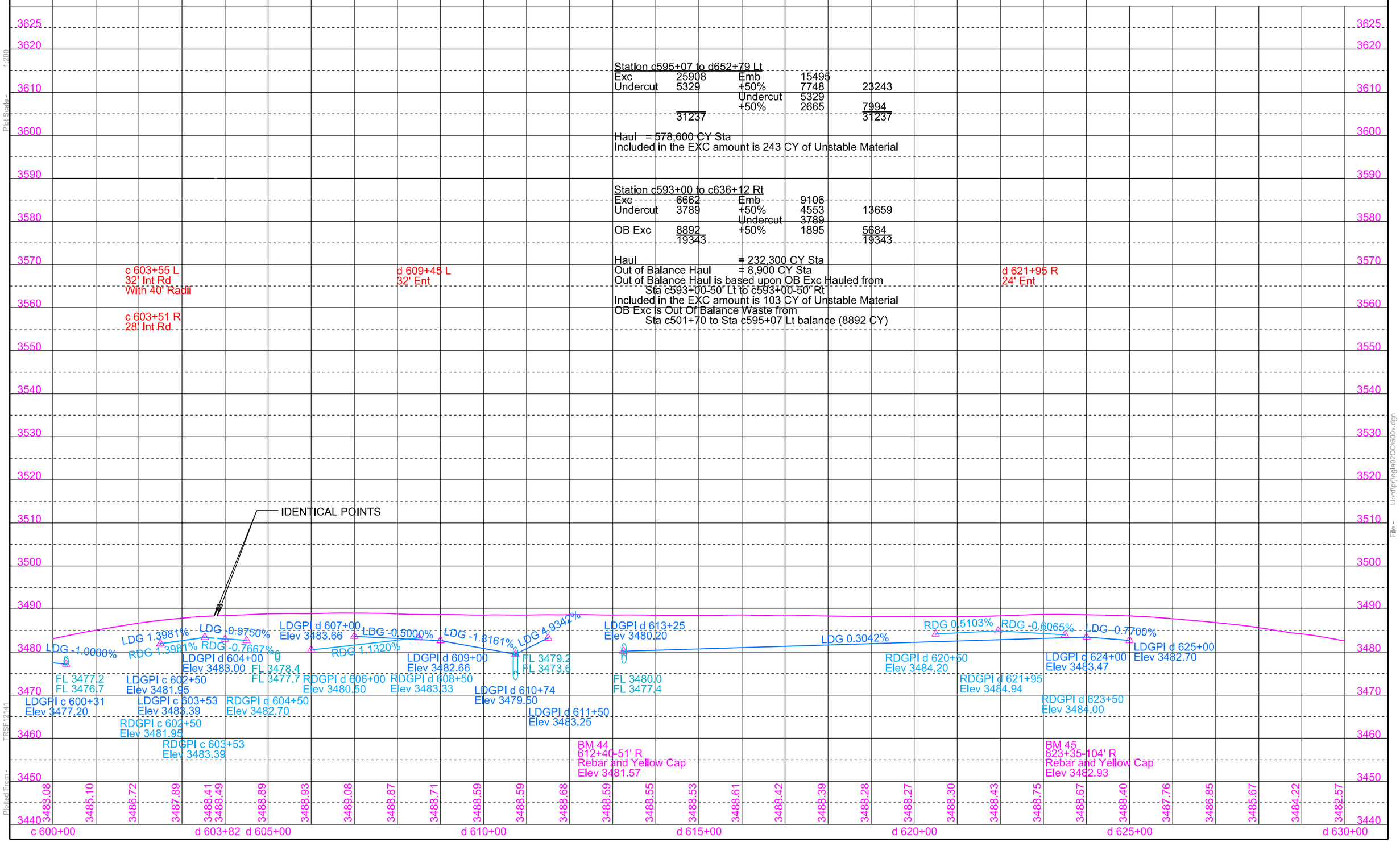
Exc	25908	Emb	15495	
Undercut	5329	+50%	7748	23243
		Undercut	5329	
		+50%	2665	7994
	31237			31237

Haul = 578,600 CY Sta
Included in the EXC amount is 243 CY of Unstable Material

Station c593+00 to c636+12 Rt

Exc	6662	Emb	9106	
Undercut	3789	+50%	4553	13659
		Undercut	3789	
OB Exc	8892	+50%	1895	5684
	19343			19343

Haul = 232,300 CY Sta
Out of Balance Haul = 8,900 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta c593+00-50' Lt to c593+00-50' Rt
Included in the EXC amount is 103 CY of Unstable Material
OB Exc is Out Of Balance Waste from
Sta c501+70 to Sta c595+07 Lt balance (8892 CY)



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B79	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR

d 634+50
Take Out 18"-90' CMP
(Incidental Work, Grading)

d 634+50 (3 ac)
Install 24" - 118' RCP
& 2 Sloped Ends

d 634+50-79.3' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

d 640+99
Take Out 18"-72' CMP
(Incidental Work, Grading)

d 640+99 (3 ac)
Install 24" - 120' RCP
& 2 Sloped Ends

d 640+99-84.1' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

d 649+98
Take Out 30"-54' CMP
(Incidental Work, Grading)

d 649+85 (3 ac)
Install 24" - 96' RCP
& 2 Sloped Ends

d 649+85-63.9' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

d 651+50
Take Out 5'x7'-66'
RC Cattle Pass
(Incidental Work, Grading)

d 651+50 (4 ac)
Install 5'x7'-84'
RC Cattle Pass
& 2 End Sections

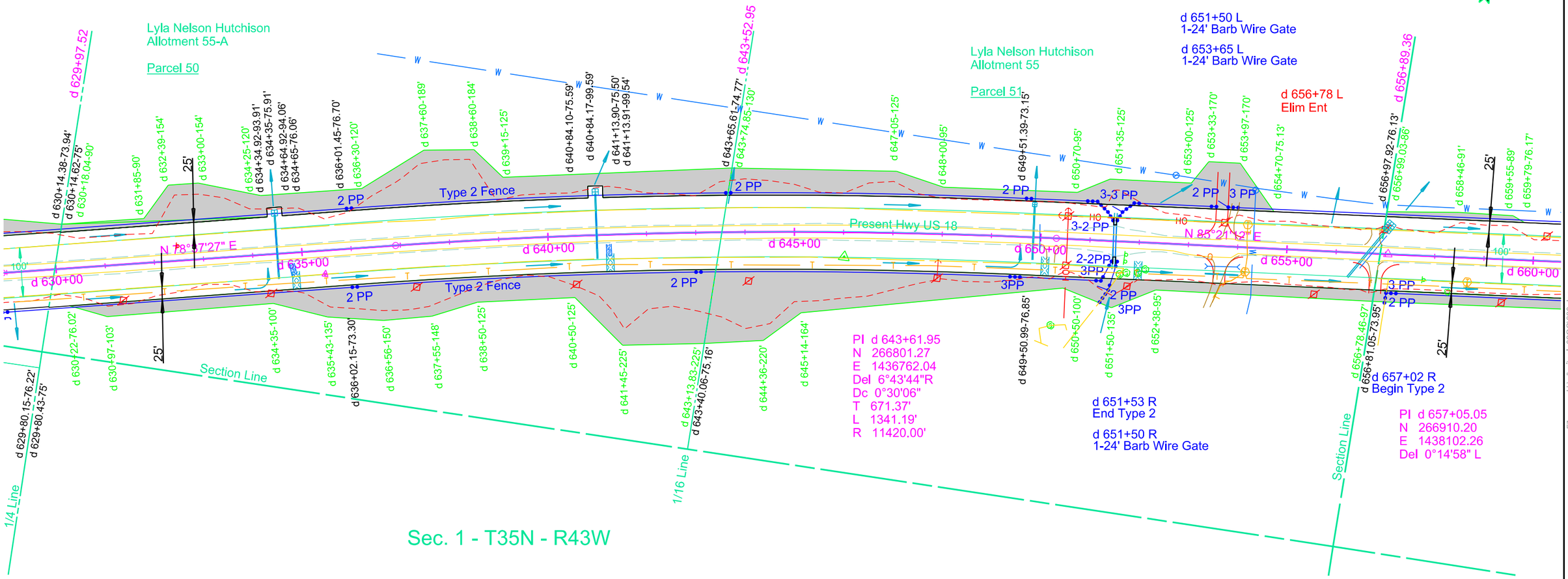
d 653+71-41' R
Take Out 18"-60' CMP
(Incidental Work, Grading)

d 653+65-57' R
Install 18" - 60' CMP
& 2 Safety Ends

d 656+73
Take Out 30"-86' CMP
(Incidental Work, Grading)

d 656+63-37° Skew LHF (60 ac)
Install 36" - 110' RCP
& 2 Flared Ends

d 657+01.0-50.4' L
Install Bank and Channel
Protection Gabions
(6.0 CY)



Parcel 50
d 630+14.38 to d 643+74.85 L
Temporary Easement for
Cut & Fill containing
1.7 ac, more or less

Parcel 50
d 630+22 to d 643+40.06 R
Temporary Easement for
Cut & Fill containing
1.9 ac, more or less

Parcel 51
d 643+65.61 to d 654+70 L
Temporary Easement for
Cut, Fill & Entrance containing
1.2 ac, more or less

Parcel 51
d 643+13.83 to d 656+81.05 R
Temporary Easement for
Cut containing
1.7 ac, more or less

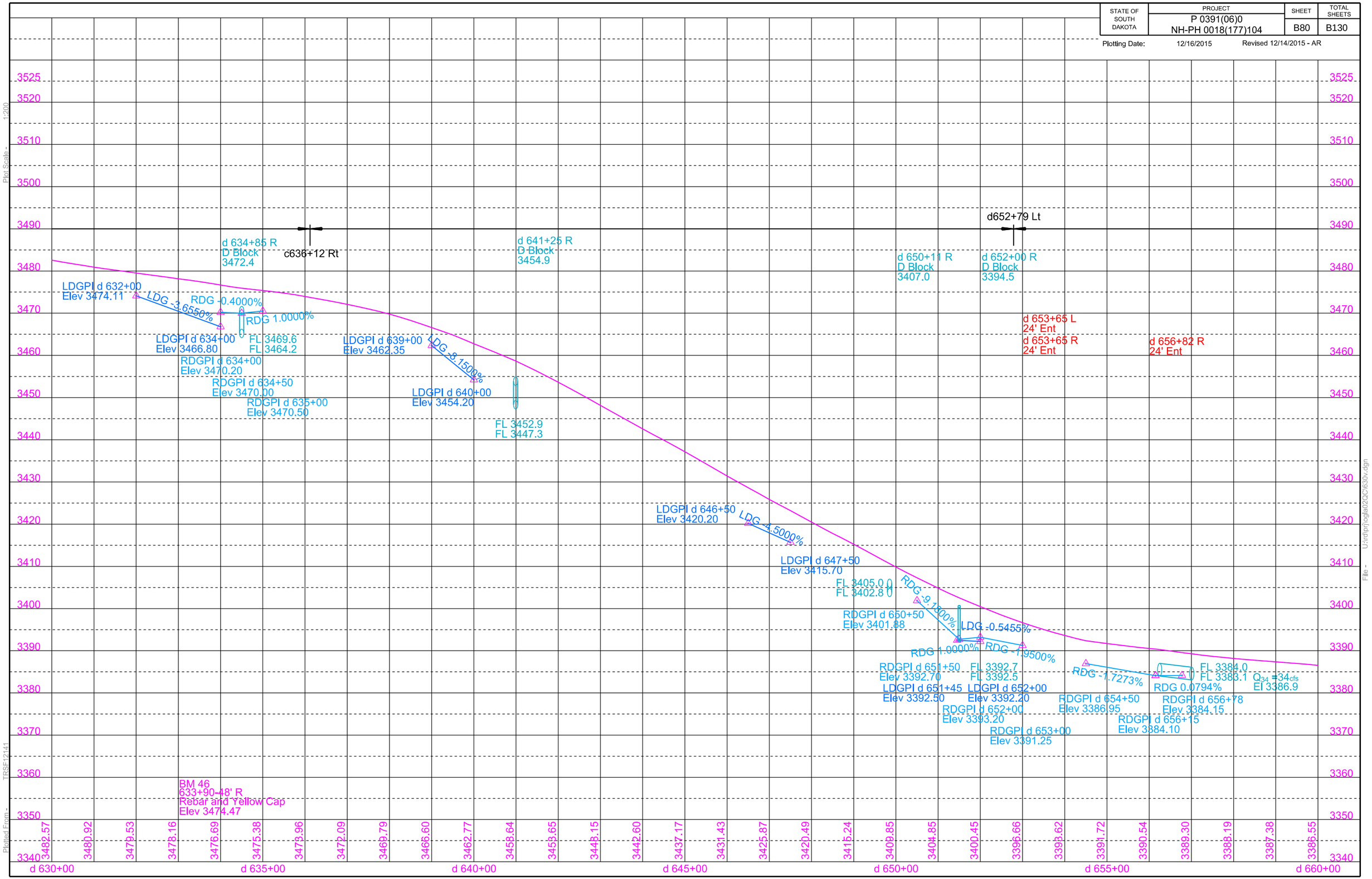
Parcel 52
d 656+97.92 to d 659+79 L
Temporary Easement for
Cut & Fill containing
0.1 ac, more or less

Parcel 52
d 656+78.46 to d 682+89.70 R
Temporary Easement for
Cut, Fill, Inlet Ditch
& Entrance containing
1.8 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\drlprj\ogla02\Q\C630.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B80	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR



Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\rdprj\oglal02\ol630v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B81	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

d 664+97
Take Out 30"-110' CMP
(Incidental Work, Grading)

d 664+83.6-92.9' L
Install Bank and Channel
Protection Gabions
(6.0 CY)

d 665+00-10° Skew RHF (38 ac)
Install 30" - 148' RCP
& 2 Sloped Ends

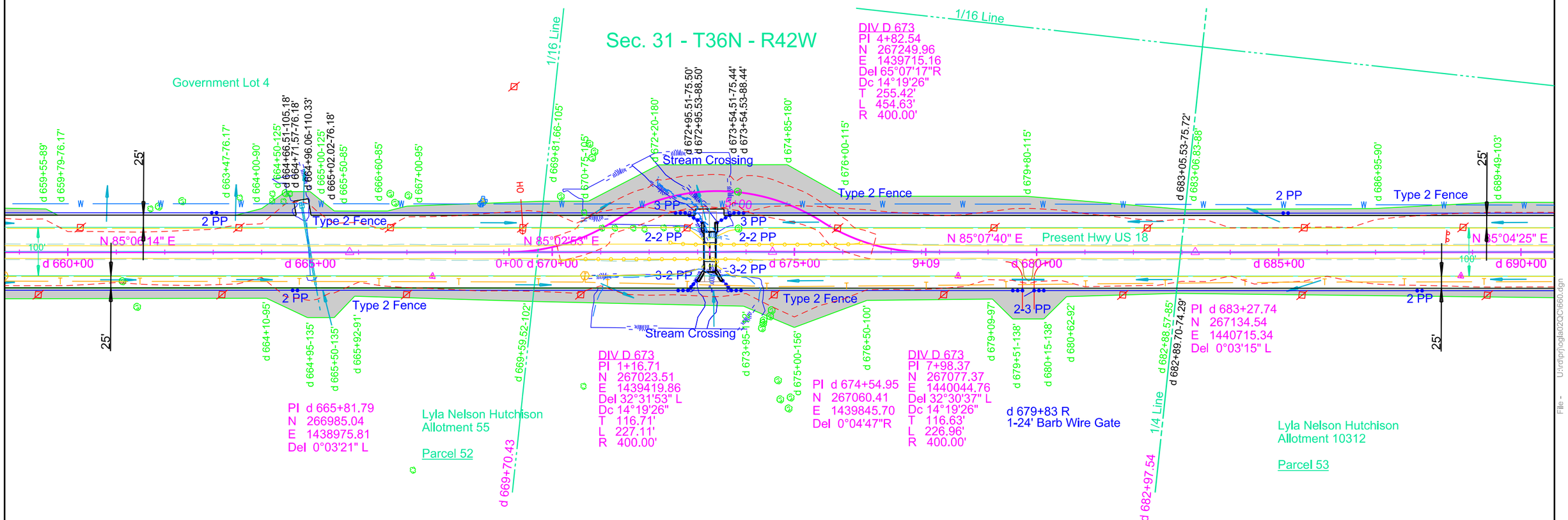
d 665+12.0-68.4' R to
d 665+21-120' R
Cut Inlet Ditch
(10 CY Exc Inc in
Grading Est)

Take Out 3 Cable Guardrail
at the following locations :
d 670+13 to d 674+13 R
d 672+41 to d 676+41 L

d 673+27
Take Out 2-12'x12'-40'
(Incidental Work, Structure)

d 673+25 (27.4 Sq. Mi)
Site 3
Alternate A
Install 2 - 11'x10' - 122' - 7 5/8"
Box Culvert (CIP)
Alternate B
Install 2 - 12'x10' - 126' - 0"
Box Culvert (Precast)
(See Section E)

d 679+83-57' R
Install 18" - 62' CMP
& 2 Safety Ends



Parcel 53
d 683+05.53 to d 696+55.88 L
Temporary Easement for
Cut, Fill & Intersecting Road containing
0.9 ac, more or less

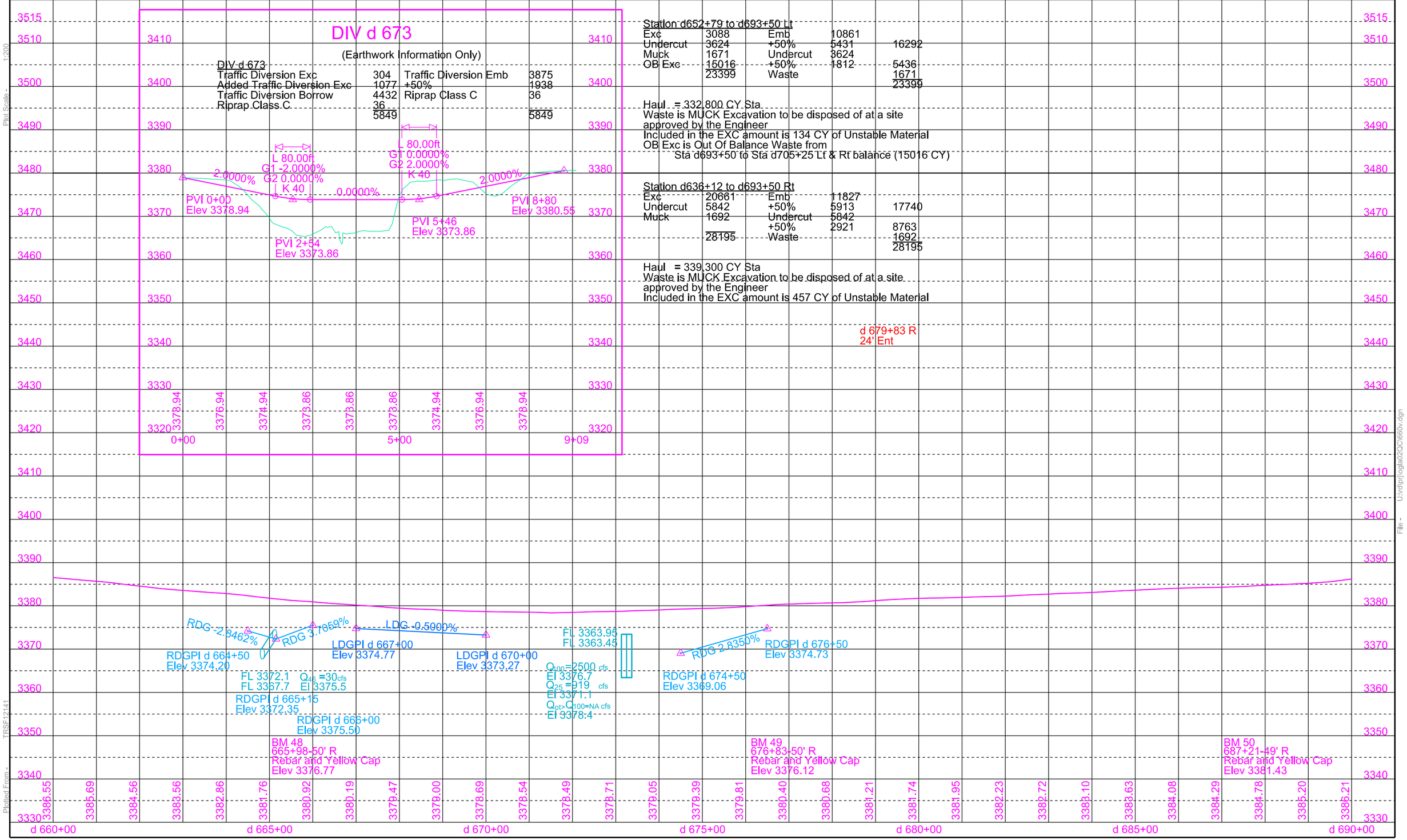
Parcel 53
d 682+88.57 to d 696+17.53 R
Temporary Easement for
Cut, Fill & Entrance containing
0.6 ac, more or less

Parcel 52
d 663+47 to d 683+06.83 L
Temporary Easement for
Cut, Fill & Traffic Diversion containing
1.9 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\oglau2\ch\680.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B82	B130

Plotting Date: 12/16/2015



DIV d 673

Traffic Diversion Exc	304	Traffic Diversion Emb	3875
Added Traffic Diversion Exc	1077	+50%	1938
Traffic Diversion Borrow	4432	Riprap Class C	36
Riprap Class C	36		
	5849		5849

Station d652+79 to d693+50 Lt

Exc	3088	Emb	10861	
Undercut	3624	+50%	5431	16292
Muck	1671	Undercut	3624	
OB Exc	15016	+50%	1812	5436
	23399	Waste		1671
				23399

Haul = 332,800 CY Sta
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
Included in the EXC amount is 134 CY of Unstable Material
OB Exc is Out Of Balance Waste from
Sta d693+50 to Sta d705+25 Lt & Rt balance (15016 CY)

Station d636+12 to d693+50 Rt

Exc	20661	Emb	11827	
Undercut	5842	+50%	5913	17740
Muck	1692	Undercut	5842	
		+50%	2921	8763
	28195	Waste		1692
				28195

Haul = 339,300 CY Sta
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
Included in the EXC amount is 457 CY of Unstable Material

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdip\hoglau22\QC\66dv.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B83	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

d 696+82
Take Out 18"-54' CMP
(Incidental Work, Grading)

d 696+85 (19 ac)
Install 24" - 70' RCP Arch
& 2 Sloped Ends

0+92.3-43.6' R to 1+59.8-33.7' R (xr d 696)
(20 ac)
Install 24" - 48' CMP
& 2 Safety Ends

3+00-18' R to 3+73-2' L (xr d696)
Cut Outlet Ditch
(60 CY Exc Inc in Grading Est)

d 709+83
Take Out 24"-48' CMP
(Incidental Work, Grading)

d 709+50-38' R
Take Out 18"-48' CMP
(Incidental Work, Grading)

d 709+83 (27 ac)
Install 30" - 86' RCP
& 2 Sloped Ends

d 709+83-59.3' L to 91' L
Cut Outlet Ditch
(25 CY Exc Inc in Grading Est)

d 709+83-59.3' L
Install Bank and Channel
Protection Gabions
(6.0 CY)

xr d 696
PI 1+28.12
N 267374.66
E 1442011.11
Del 9°51'41"R
Dc 22°55'06"
T 21.57'
L 43.03'
R 250.00'

xr d 696
PI 2+03.92
N 267449.16
E 1442025.64
Del 9°51'41" L
Dc 22°55'06"
T 21.57'
L 43.03'
R 250.00'

Sec. 31 - T36N - R42W

d 696+08 L
End Type 2

d 696+82 L
Begin Type 2

d 696+26 - 110' L&Ah
1-30' Barb Wire Gate

d 709+55 L
Elim Ent

1/16 Line

Type 2 Fence

Present Hwy US 18

N 85°04'25" E

N 84°58'48" E

N 85°12'10" E

d 690+00 d 695+00 d 700+00 d 705+00 d 710+00 d 715+00 d 720+00

d 709+48 R
Elim Ent

PI d 692+76.42
N 267216.00
E 1441660.51
Del 0°05'38" L

PI d 700+20.92
N 267281.15
E 1442402.16
Del 0°13'22"R

PI d 718+74.27
N 267436.15
E 1444249.02
Del 18°39'51"R
Dc 1°00'22"
T 935.87'
L 1855.16'
R 5695.00'

d 696+52 R
Begin Type 2

d 695+78 R
End Type 2

d 696+26 - 135' R
1-24' Barb Wire Gate

d 696+26 - 106' R & Bk
1-24 ' Barb Wire Gate
in Cross Fence

d 696+26 - 107' R & Ah
1-24 ' Barb Wire Gate
in Cross Fence

Lyla Nelson Hutchison
Allotment 10312

Parcel 53

Samuel E. Overmass Trust

Parcel 54

Samuel E. Overmass Trust

Parcel 55

Section Line

Sec. 32 - T36N - R42W

Parcel 54
d 696+33.81 to d 706+00 L
Temporary Easement for
Cut, Fill, Intersecting Road
& Outlet Ditch containing
1.2 ac, more or less

Parcel 54
d 696+10.53 to d 709+12.77 R
Temporary Easement for
Cut & Entrance containing
2.0 ac, more or less

Parcel 55
d 709+94.12 to d 722+71.53 L
Temporary Easement for
Cut, Fill & Outlet Ditch containing
1.1 ac, more or less

Parcel 55
d 709+75.84 to d 722+96.40 R
Temporary Easement for
Cut containing
1.2 ac, more or less

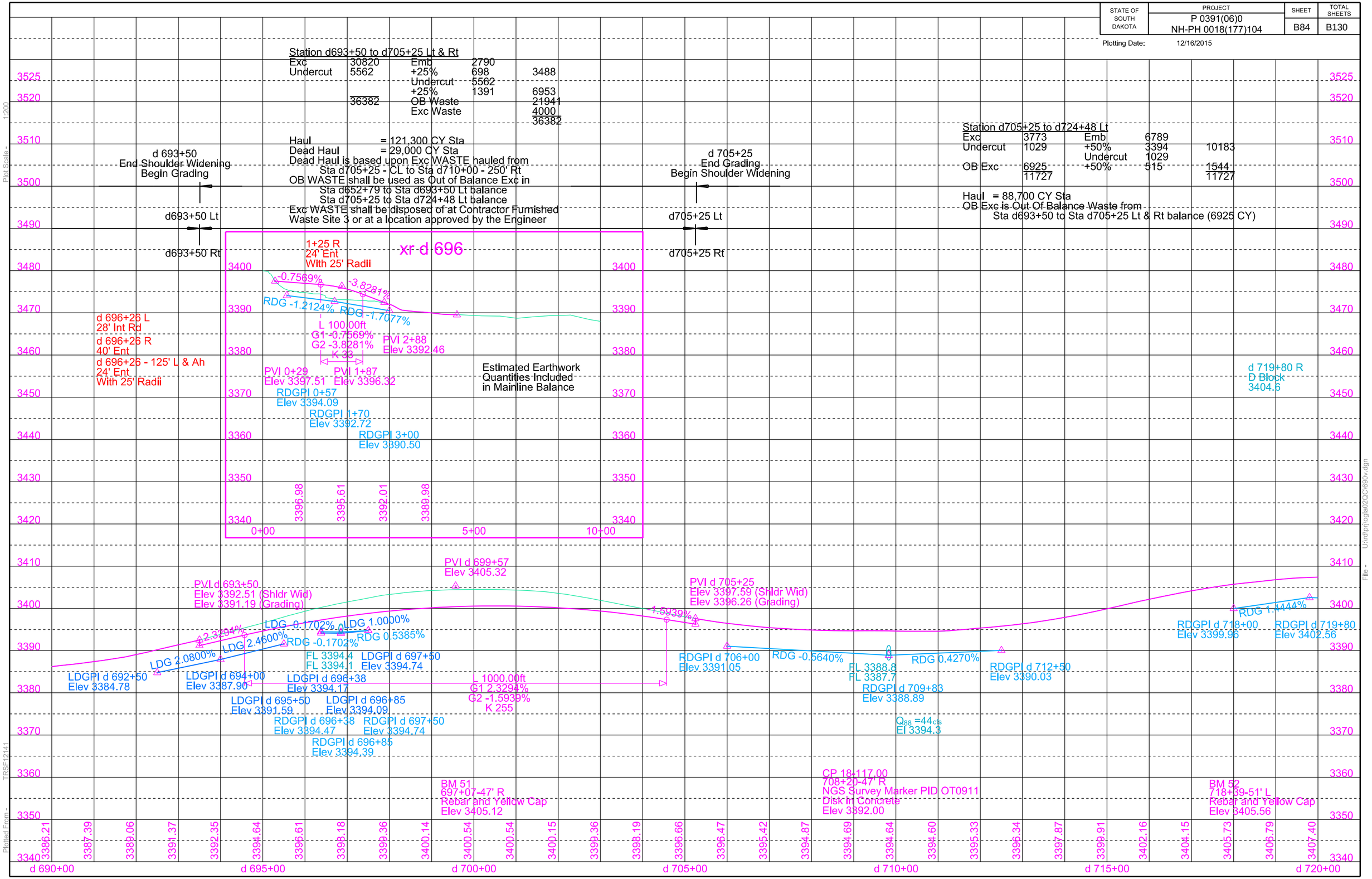
Plot Scale - 1:200

Plotted From - TRSF12141

File - U:\trap\rjoglau02\CV690.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B84	B130

Plotting Date: 12/16/2015



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B85	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

d 720+97
Take Out 24"-76' CMP
(Incidental Work, Grading)

d 720+97 (7 ac)
Install 24" - 130' RCP
& 2 Sloped Ends

d 720+97-94.5' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

d 725+31
Take Out 18"-118' CMP
(Incidental Work, Grading)

d 725+31 (10 ac)
Install 24" - 172' RCP
(CL 2 - 142' & CL 3 - 30')
& 2 Sloped Ends

d 725+31-116.1' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

d 730+52 - 147' L
Clean out &
Retain 12" - 24' CMP

d 730+48
Take Out 18"-86' CMP
(Incidental Work, Grading)

d 730+48 (23 ac)
Install 24" - 112' RCP
& 2 Sloped Ends

d 730+48-73.2' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

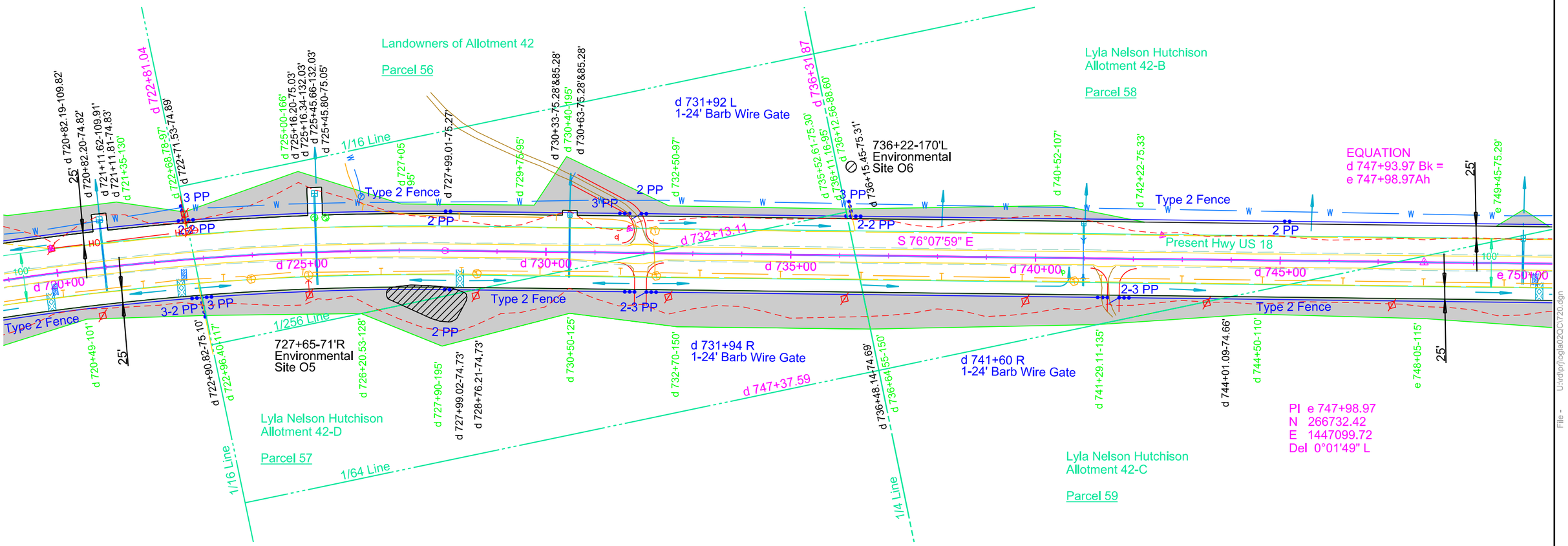
d 740+98
Retain 24"-74' RCP/ 4'x6' RCBC

d 740+98-Lt & Rt
Take Out 24" RCP
Flared End Section
(Incidental Work, Grading)

d 740+98 (10 ac)
Install 24"-32' RCP
& 1 Sloped End Lt
Install 24"-18' RCP
1-7.5° Short Radius Bend
& 1 Sloped End Rt

d 740+98-69.2' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

Sec. 32 - T36N - R42W



Parcel 56
d 722+68.78 to d 736+12.56 L
Temporary Easement for
Cut, Fill & Entrance containing
1.2 ac, more or less

Parcel 56
d 722+90.82 to d 728+76.21 R
Temporary Easement for
Cut containing
0.5 ac, more or less

Parcel 57
d 735+52.61 to d 736+15.45 L
Temporary Easement for
Cut containing
0.1 ac, more or less

Parcel 57
d 726+20.53 to d 736+64.55 R
Temporary Easement for
Cut containing
1.7 ac, more or less

Parcel 58
d 736+11.16 to d 742+22 L
Temporary Easement for
Cut & Fill containing
0.3 ac, more or less

Parcel 58
d 736+48.14 to d 744+01.09 R
Temporary Easement for
Cut containing
0.9 ac, more or less

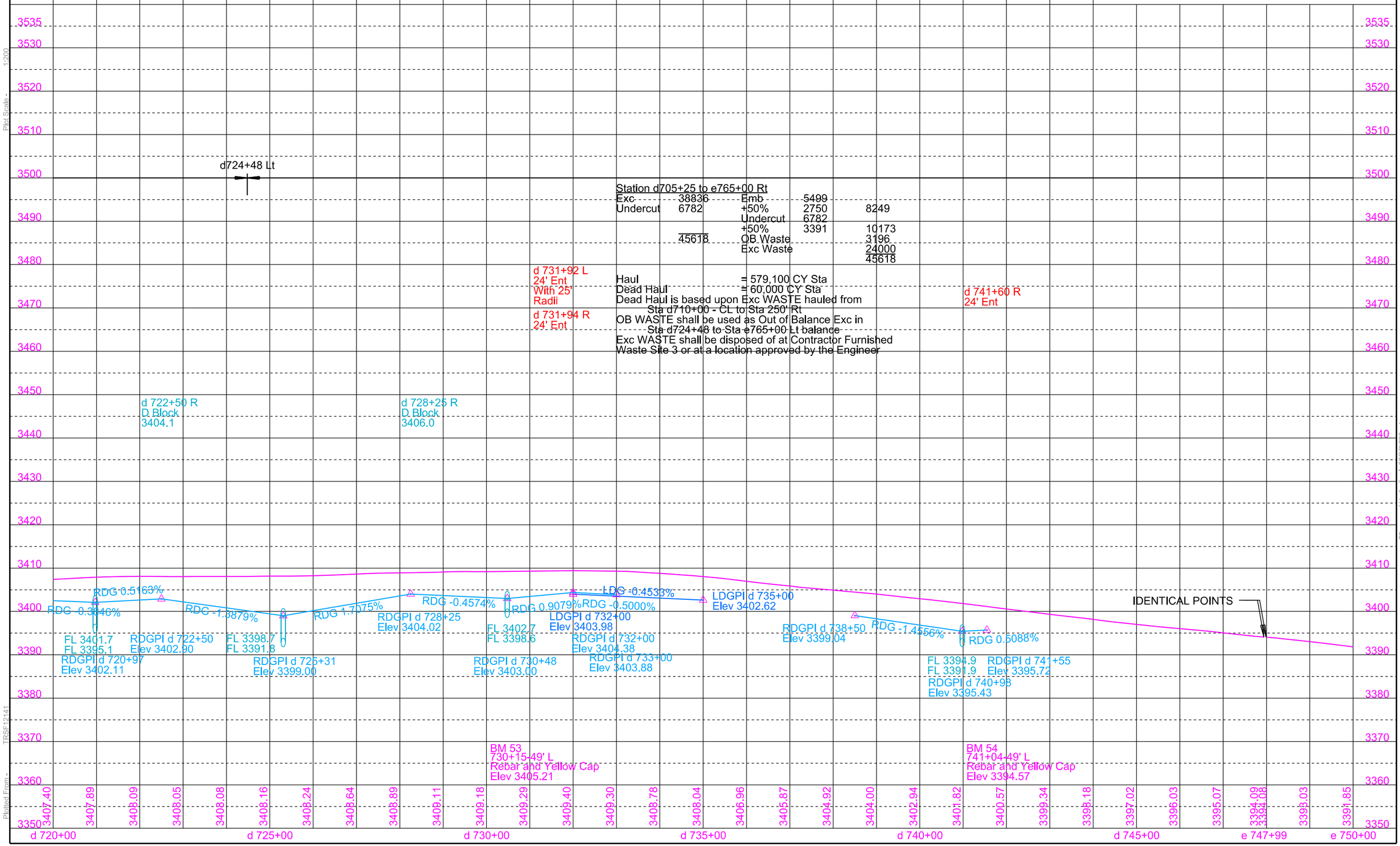
Parcel 58
e 749+45 to e 750+55 L
Temporary Easement for
Outlet Ditch containing
0.1 ac, more or less

Parcel 59
d 741+29.11 to e 763+68.97 R
Temporary Easement for
Cut containing
2.6 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\drdphlogla02\QCV720.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B86	B130

Plotting Date: 12/16/2015



Plot Scale - 1:200

Plotted From - TPSF12141

File - U:\rdp\hogla02\QCV720v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B87	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

e 750+01
Take Out 18"-53' CMP
(Incidental Work, Grading)

e 750+01 (39 ac)
Install 30" - 74' RCP
& 2 Sloped Ends

e 750+01-47.4' L
Install Bank and Channel
Protection Gabions
(6.0 CY)

e 750+01-47.4' L to 85' L
Cut Outlet Ditch
(15 CY Exc Inc in Grading Est)

e 755+68
Take Out 24"-51' CMP
(Incidental Work, Grading)

e 755+68 (41 ac)
Install 30" - 70' RCP
& 2 Sloped Ends

e 759+46
Take Out 18"-62' CMP
(Incidental Work, Grading)

e 759+46 (12 ac)
Install 24" - 86' RCP
& 2 Sloped Ends

e 759+46-54.1' L
Install Bank and Channel
Protection Gabions
(4.5 CY)

e 770+81
Take Out 36"-104' CMP
(Incidental Work, Grading)

e 770+83-23° Skew RHF (349 ac)
Install 48" - 102' RCP
& 2 Flared Ends

e 770+56.1-62.6' L
Install Bank and Channel
Protection Gabions
(12.0 CY)

e 770+56.1-62.6' L to e 770+33-116' L
Cut Outlet Ditch
(10 CY Exc Inc in Grading Est)

e 771+05.1-52.6' R to e 771+23-97' R
Cut Inlet Ditch
(10 CY Exc Inc in Grading Est)

e 773+50
Take Out 36"-104' CMP
(Incidental Work, Grading)

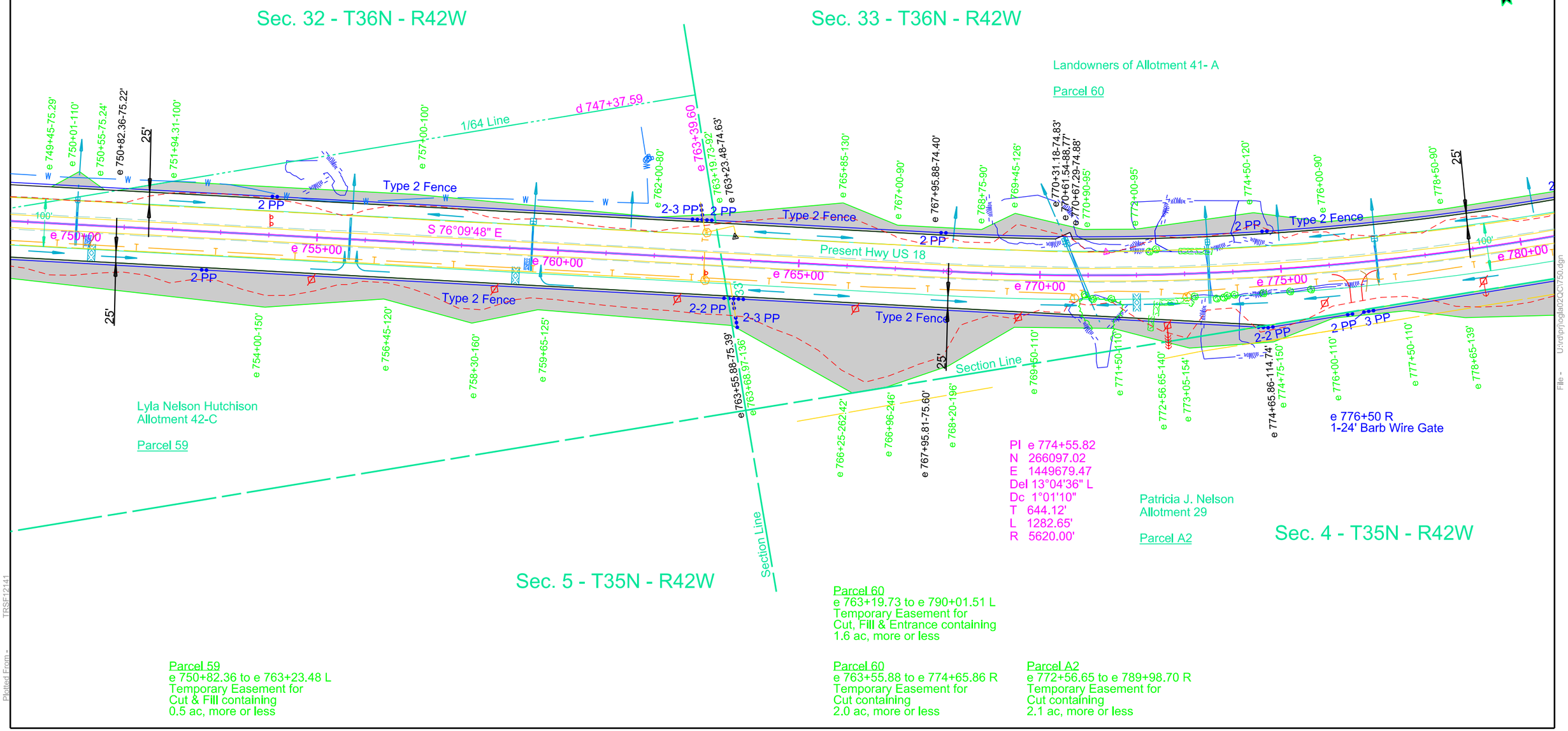
e 773+50 (65 ac)
Install 36" - 108' RCP
& 2 Flared Ends

e 773+50-60.0' L
Install Bank and Channel
Protection Gabions
(6.0 CY)

e 776+99
Take Out 18"-60' CMP
(Incidental Work, Grading)

e 776+99 (8 ac)
Install 24" - 76' RCP
& 2 Sloped Ends

e 776+99-42.8' L
Install Bank and Channel
Protection Gabions
(4.5 CY)



Parcel 59
e 750+82.36 to e 763+23.48 L
Temporary Easement for
Cut & Fill containing
0.5 ac, more or less

Parcel 60
e 763+19.73 to e 790+01.51 L
Temporary Easement for
Cut, Fill & Entrance containing
1.6 ac, more or less

Parcel 60
e 763+55.88 to e 774+65.86 R
Temporary Easement for
Cut containing
2.0 ac, more or less

Parcel A2
e 772+56.65 to e 789+98.70 R
Temporary Easement for
Cut containing
2.1 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\drj\rjogla\02\Ctr750.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B88	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

Station d724+48 to e765+00 Lt

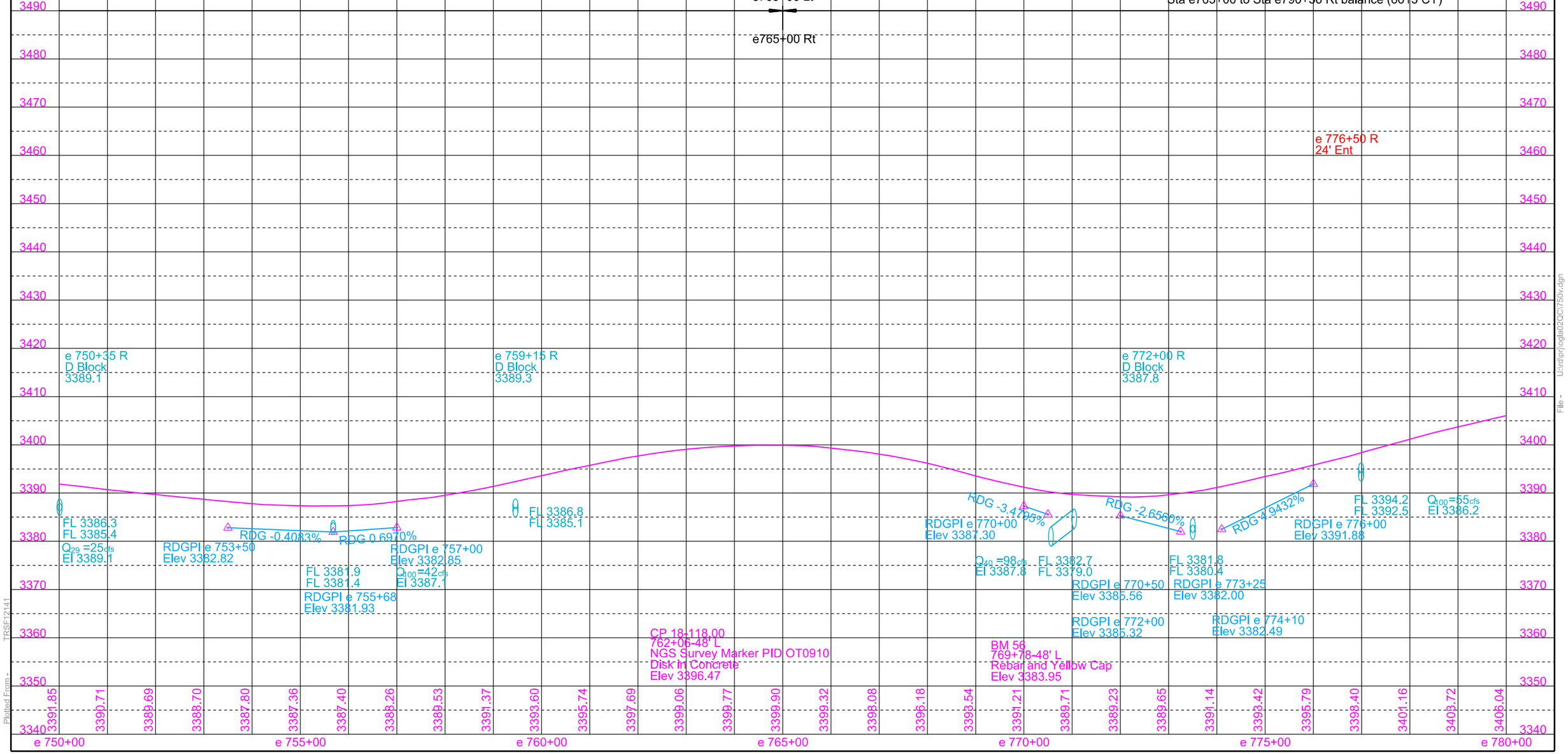
Exc	2923	Emb	10569	
Undercut	3429	+50% Undercut	5285 3429	15854
OB Exc	14646 20998	+50%	1715	5144 20998

Haul = 410,200 CY Sta
Out of Balance Haul = 14,600 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta e765+00-50' Rt to e765+00-50' Lt
Included in the EXC amount is 386 CY of Unstable Material
OB Exc is Out Of Balance Waste from
Sta d705+25 to Sta e765+00 Rt balance (3196 CY)
Sta e765+00 to Sta e790+56 Rt balance (11450 CY)

Station e765+00 to e788+05 Lt

Exc	2012	Emb	5030	
Undercut	2160	+50% Undercut	2515 2160	7545
Muck	1290			
OB Exc	6613 12075	+50% Waste	1080	3240 1290 12075

Haul = 73,600 CY Sta
Out of Balance Haul = 6,600 CY Sta
Out of Balance Haul is based upon OB Exc Hauled from
Sta e765+00-50' Rt to e765+00-50' Lt
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
OB Exc is Out Of Balance Waste from
Sta e765+00 to Sta e790+56 Rt balance (6613 CY)



Plot Scale - 1:200
Plotted From - TPSF12141
File - U:\rdip\jogla02\QCV750v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B89	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

e 795+43
Take Out 48"-126' CMP
(Incidental Work, Grading)

e 794+49.7-97.4' L
Install Class C Riprap
(29 Tons)

e 794+49.7-97.4' L to e 794+13.5-160' L
Cut Outlet Ditch
(90 CY Exc Inc in Grading Est)

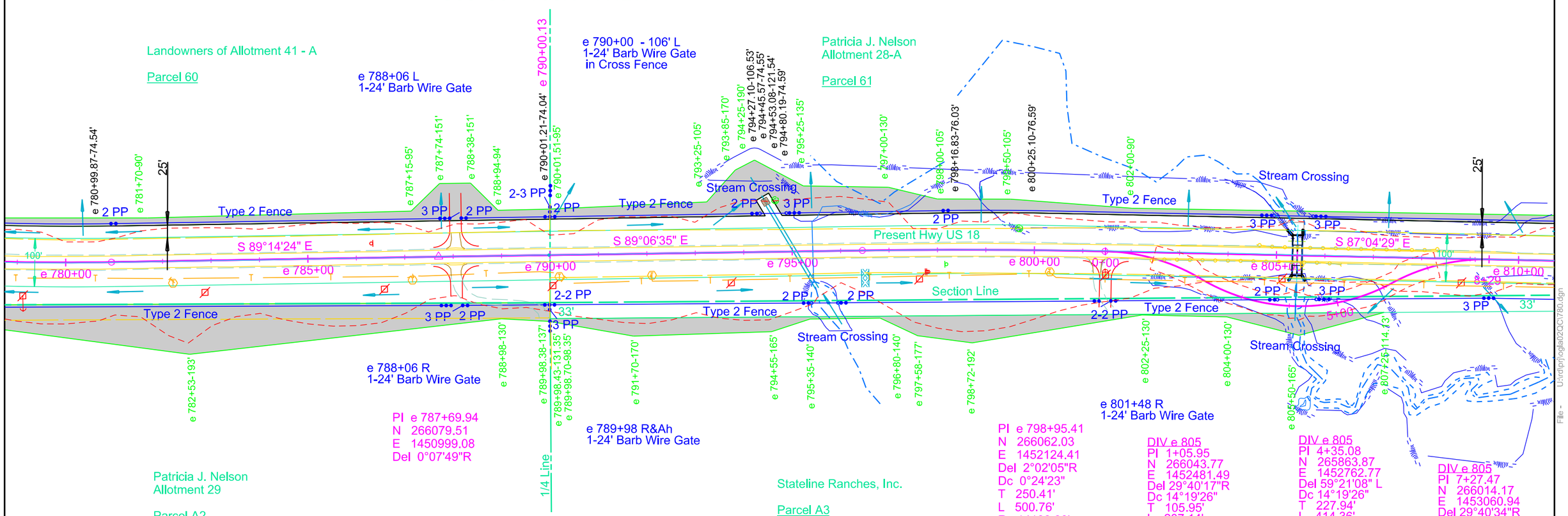
e 795+06-30° Skew RHF (DA 2.3 sq mi)
Install 72" - 188' RCP
(CL 2 - 148' & CL 3 - 40')
with 2 Standard Headwalls
& 2 Flared Ends

Take Out 3 Cable Guardrail
at the following locations :
e 802+40 to e 806+36 R
e 804+58 to e 808+35 L

e 801+48-57' R
Install 18" - 60' CMP
& 2 Safety Ends

e 805+43
Take Out 2-10'x7'-42' RCBC
(Incidental Work, Structure)

e 805+43 (15.8 Sq. Mi)
Install 2 - 9'x7' - 108' - 8 5/16"
Box Culvert (CIP)
(See Section E)



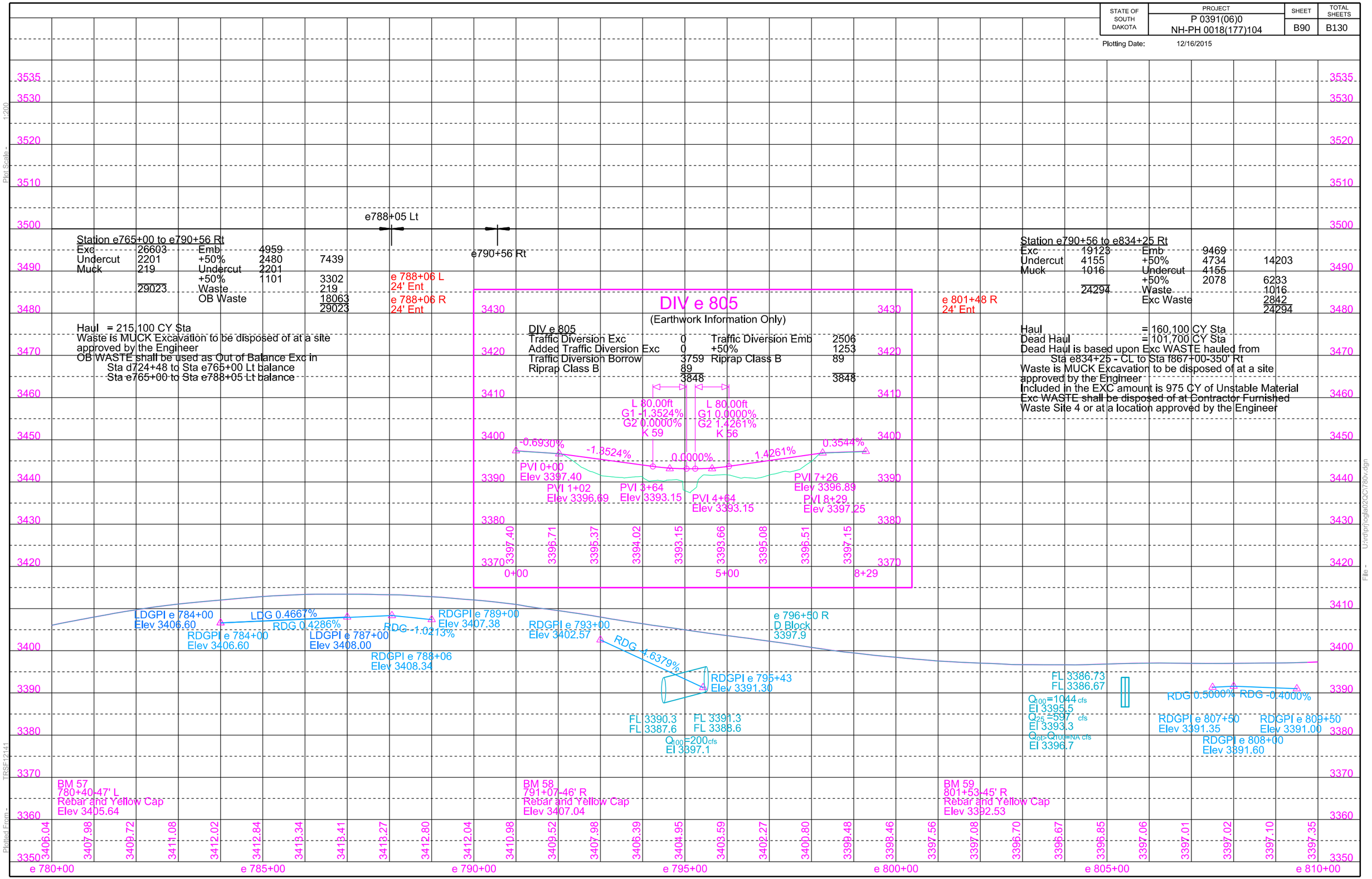
Parcel 61
e 790+01.21 to e 816+44.46 L
Temporary Easement for
Cut, Fill & Outlet Ditch containing
1.7 ac, more or less

Parcel A3
e 789+98.38 to e 807+25 R
Temporary Easement for
Cut, Fill & Traffic Diversion containing
1.0 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\dpr\jogla02\QCV780.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B90	B130

Plotting Date: 12/16/2015



Station e765+00 to e790+56 Rt

Exc	26603	Emb	4959	
Undercut	2201	+50%	2480	7439
Muck	219	Undercut	2201	
		+50%	1101	3302
	29023	Waste		219
		OB Waste		18063
				29023

Haul = 215,100 CY Sta
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
OB WASTE shall be used as Out of Balance Exc in
Sta d724+48 to Sta e765+00 Lt balance
Sta e765+00 to Sta e788+05 Lt balance

DIV e 805

Traffic Diversion Exc	0	Traffic Diversion Emb	2506
Added Traffic Diversion Exc	0	+50%	1253
Traffic Diversion Borrow	3759	Riprap Class B	89
Riprap Class B	89		
	3848		3848

Station e790+56 to e834+25 Rt

Exc	19123	Emb	9469	
Undercut	4155	+50%	4734	14203
Muck	1016	Undercut	4155	
		+50%	2078	6233
	24294	Waste		1016
		Exc Waste		2842
				24294

Haul = 160,100 CY Sta
Dead Haul = 101,700 CY Sta
Dead Haul is based upon Exc WASTE hauled from
Sta e834+25 - CL to Sta f867+00-350' Rt
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
Included in the EXC amount is 975 CY of Unstable Material
Exc WASTE shall be disposed of at Contractor Furnished Waste Site 4 or at a location approved by the Engineer

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\oglal02\CV780v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B91	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

e 816+59-60' L
Take Out 24"-46' CMP
(Incidental Work, Grading)

e 816+55-57' L (9 ac)
Install 24" - 58' CMP
& 2 Safety Ends

e 820+97
Take Out 30"-52' CMP
(Incidental Work, Grading)

e 820+97 (25 ac)
Install 30" - 76' RCP Arch
& 2 Sloped Ends

2+12.0-22.3' R to
2+74.7-22.1' R (xr e 816)
Install 18" - 58' CMP Arch
& 2 Safety Ends

2+12.0-22.3' R (xr e 816)
Install Bank and Channel
Protection Gabions
(4.5 CY)

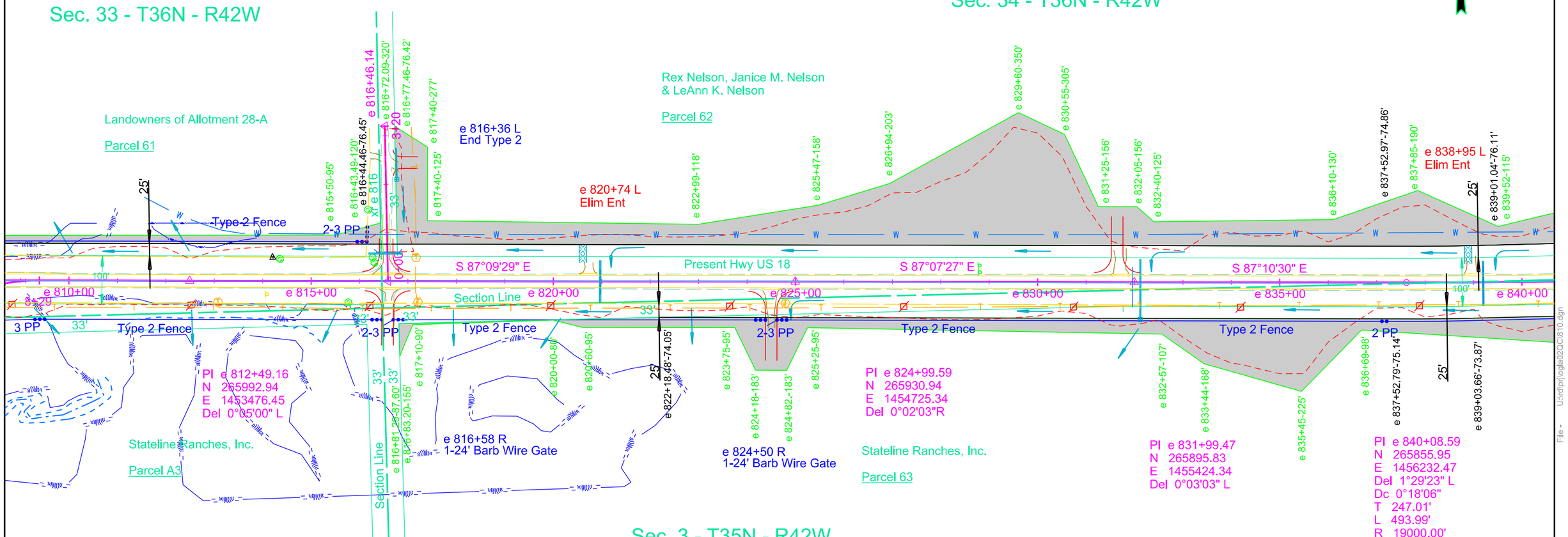
e 831+96
Take Out 18"-80' CMP
(Incidental Work, Grading)

e 832+12 (12 ac)
Install 24" - 110' RCP
& 2 Sloped Ends

e 832+12-74.4' R
Install Bank and Channel
Protection Gabions
(4.5 CY)

e 839+20
Take Out 18"-80' CMP
(Incidental Work, Grading)

e 839+20 (12 ac)
Install 24" - 80' RCP
& 2 Sloped Ends



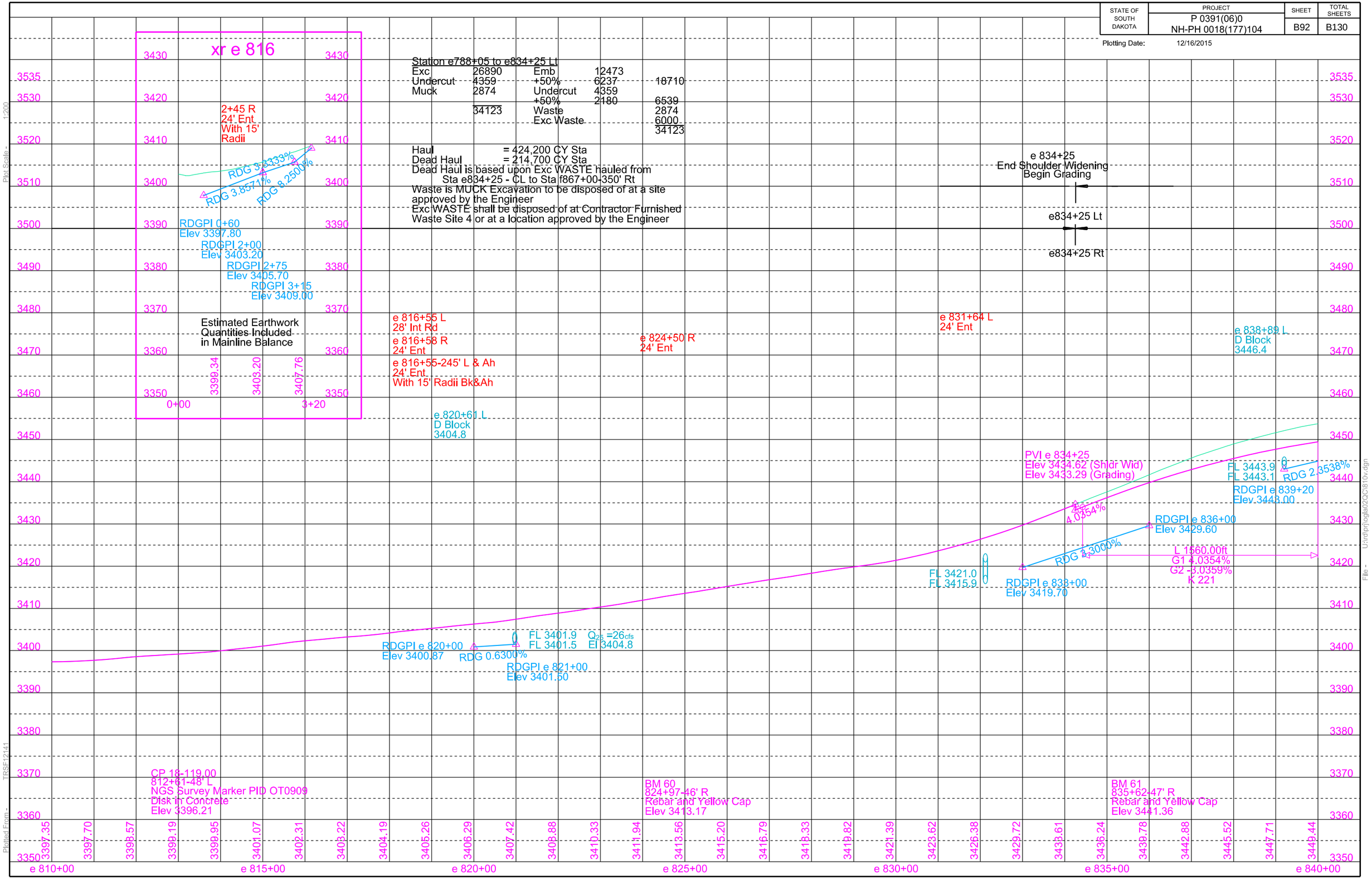
Parcel 62
e 816+72.09 to f 843+39.01 L
Temporary Easement for
Cut, Fill & Entrances containing
5.4 ac, more or less

Parcel 63
e 816+81.29 to f 843+38.58 R
Temporary Easement for
Cut, Fill & Entrance containing
2.5 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\drafp\logfa02\QC1810.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B92	B130

Plotting Date: 12/16/2015



Station e788+05 to e834+25 Lt

Exc	26890	Emb	12473	
Undercut	4359	+50%	6237	18710
Muck	2874	Undercut	4359	
		+50%	2180	6539
	34123	Waste		2874
		Exc Waste		6000
				34123

Haul = 424,200 CY Sta
Dead Haul = 214,700 CY Sta
Dead Haul is based upon Exc WASTE hauled from Sta e834+25 - CL to Sta f867+00-350' Rt
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
Exc WASTE shall be disposed of at Contractor Furnished Waste Site 4 or at a location approved by the Engineer

Plot Scale - 1:200
Plotted From - TPSF12141
File - U:\rdp\hogla02\QC\810v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B93	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR

f 853+00-57' R
Install 18" - 60' CMP
& 2 Safety Ends

f 857+61.0-68.1' L to
f 858+43.0-71.1' L
Install 18" - 74' CMP
& 2 Safety Ends

f 859+70
Take Out 60"-101' CMP
(Incidental Work, Grading)

f 859+66-25° Skew RHF (551 ac)
Install 66" - 170' RCP
& 2 Flared Ends

f 860+07.4-88.8' R
Install Bank and Channel
Protection Gabions
(17.0 CY)

f 860+91.0-63.5' L
f 861+66.5-58.5' L
Install 18" - 68' CMP
& 2 Safety Ends

f 861+65-40' L
Take Out 18"-41' CMP
(Incidental Work, Grading)

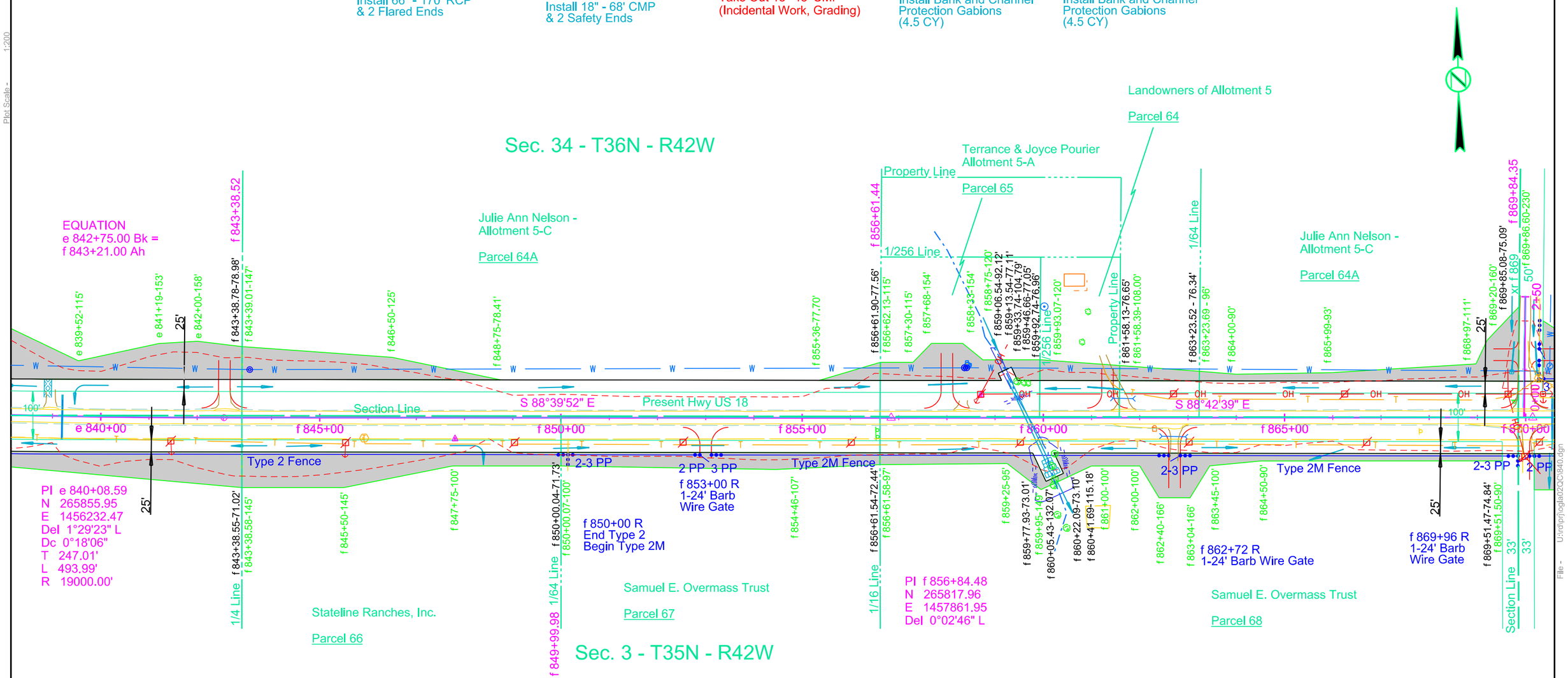
f 862+70-39' R
Take Out 18"-48' CMP
(Incidental Work, Grading)

0+96.6-26.6' L to
1+57.4-22.0' L (xr f 869)
Install 18" - 56' CMP Arch
& 2 Safety Ends

0+96.6-26.6' L (xr f 869)
Install Bank and Channel
Protection Gabions
(4.5 CY)

0+95.2-26.0' R to
1+58.4-21.7' R (xr f 869)
Install 18" - 58 CMP Arch
& 2 Safety Ends

0+95.2-26.0' R (xr f 869)
Install Bank and Channel
Protection Gabions
(4.5 CY)



Parcel 64A
f 843+38.78 to f 848+75 L
Temporary Easement for
Cut containing
0.5 ac, more or less

Parcel 66
e 843+38.55 to f 850+00.07 R
Temporary Easement for
Cut & Fill containing
0.8 ac, more or less

Parcel 67
f 850+00.04 to f 856+61.58 R
Temporary Easement for
Cut containing
0.5 ac, more or less

Parcel 64A
f 855+36 to f 856+62.13 L
Temporary Easement for
Cut containing
0.1 ac, more or less

Parcel 65
f 856+61.90 to f 859+93.07 L
Temporary Easement for
Cut, Fill & Entrance containing
0.4 ac, more or less

Parcel 68
f 856+61.54 to f 869+51.50 R
Temporary Easement for
Cut, Fill & Entrance containing
0.8 ac, more or less

Parcel 64
f 859+92.74 to f 861+58.39 L
Temporary Easement for
Cut & Entrance containing
0.1 ac, more or less

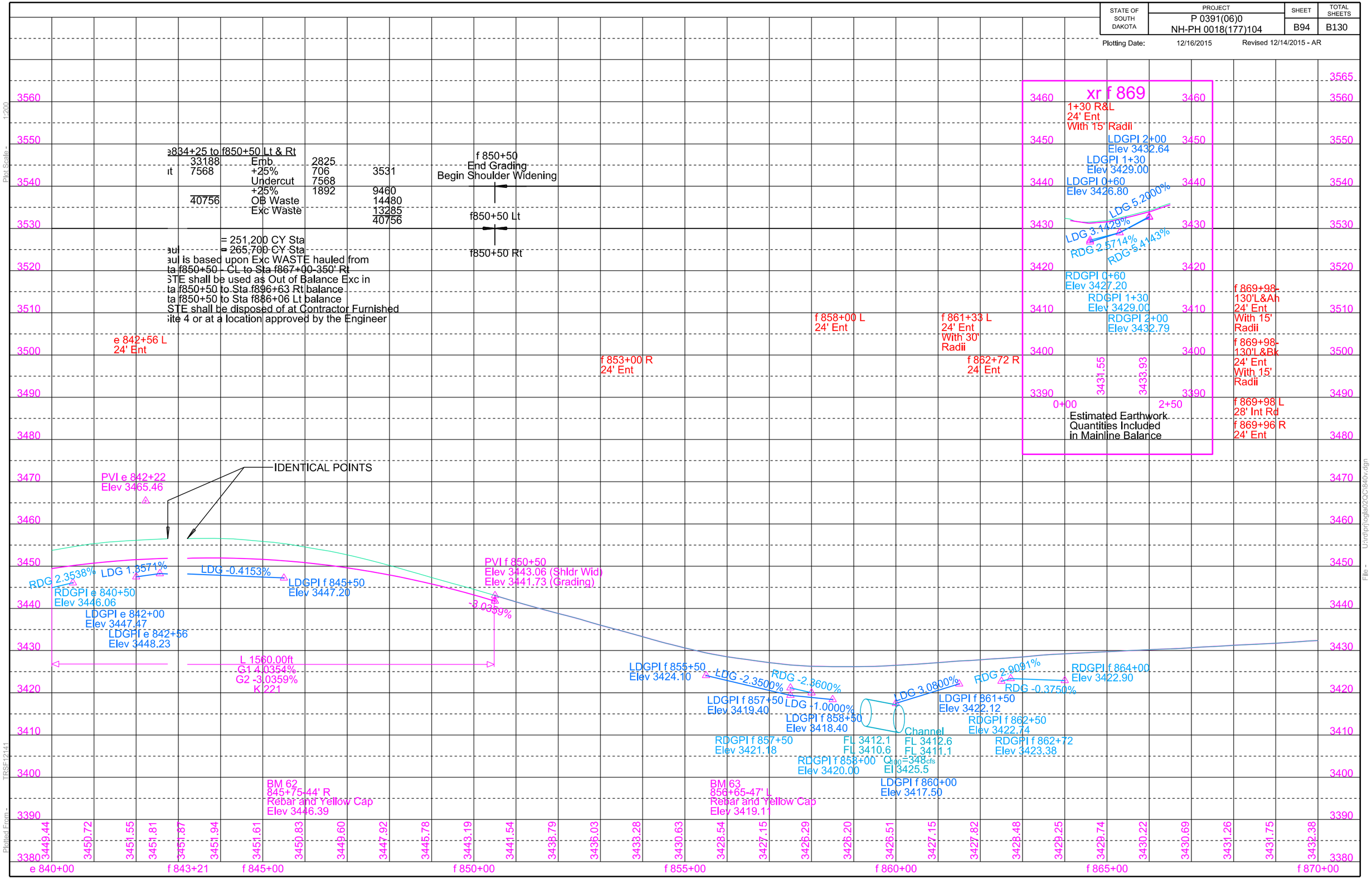
Parcel 64A
f 861+58.13 to f 863+23.69 L
Temporary Easement for
Cut & Entrance containing
0.1 ac, more or less

Parcel 64A
f 863+23.52 to f 869+86.60 L
Temporary Easement for
Cut & Entrance containing
0.5 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\trafprj\oglad2\GC840.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B94	B130

Plotting Date: 12/16/2015 Revised 12/14/2015 - AR



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B95	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

f 870+54
Take Out 18"-54' CMP
(Incidental Work, Grading)

f 870+55 (6 ac)
Install 24" - 76' RCP
& 2 Sloped Ends

f 870+55-45.0' R to f 870+53-115' R
Cut Outlet Ditch
(15 CY Exc Inc in Grading Est)

f 875+00
Take Out 30"-62' CMP
(Incidental Work, Grading)

f 875+00 (74 ac)
Install 42" - 78' RCP Arch
& 2 Flared Ends

f 875+00-46.9' R
Install Bank and Channel
Protection Gabions
(10.0 CY)

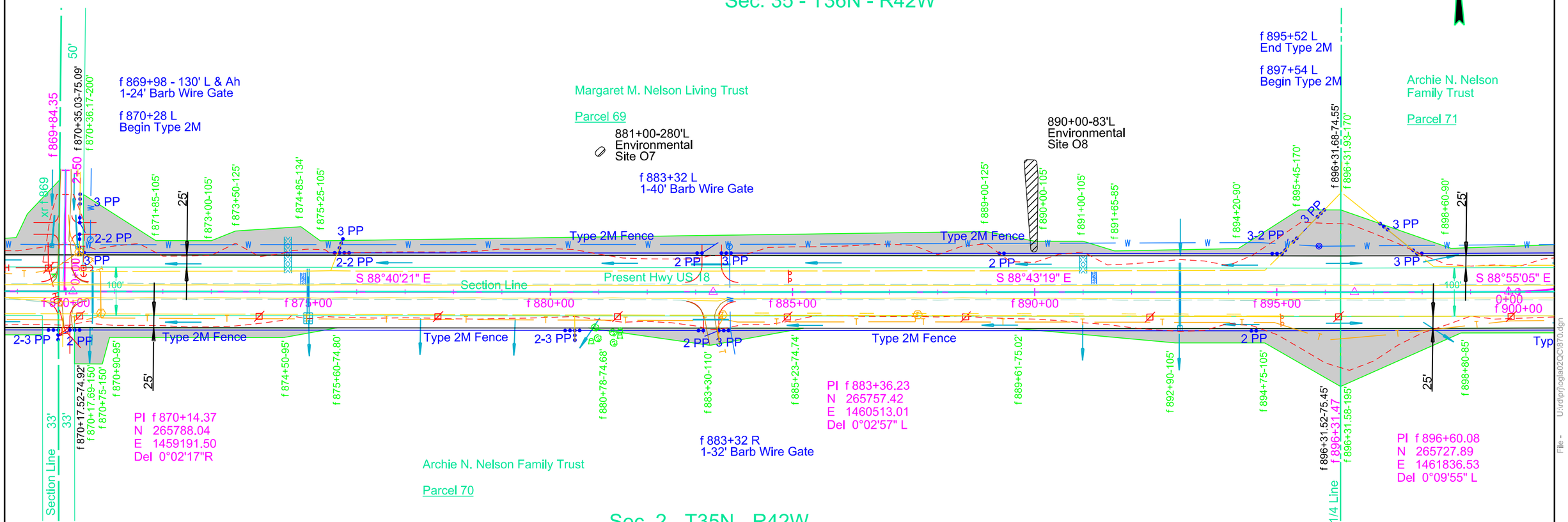
f 883+32-57' R
Install 18" - 66 CMP
& 2 Safety Ends

f 883+32-57' L (DA 35 Ac)
Install 24" - 68' CMP
& 2 Safety Ends

f 893+00
Take Out 18"-87' CMP
(Incidental Work, Grading)

f 893+00 (33 ac)
Install 30" - 116' RCP
& 2 Sloped Ends

f 893+00-70.8' R
Install Bank and Channel
Protection Gabions
(6.0 CY)



Parcel 69
f 870+35.03 to f 896+31.93 L
Temporary Easement for
Cut, Fill, Entrance
& Ditch Block containing
2.5 ac, more or less

Parcel 71
f 896+31.68 to f 922+26.26 L
Temporary Easement for
Cut, Fill, Inlet Ditch, Entrance &
Traffic Diversion containing
3.4 ac, more or less

Parcel 70
f 870+17.52 to f 875+60 R
Temporary Easement for
Cut, Fill, Entrance
& Outlet Ditch containing
0.3 ac, more or less

Parcel 70
f 880+78 to f 885+23 R
Temporary Easement for
Cut, Fill & Entrance containing
0.2 ac, more or less

Parcel 70
f 889+61 to f 896+31.58 R
Temporary Easement for
Cut & Fill containing
0.5 ac, more or less

Parcel 72
f 896+31.52 to f 913+79.61 R
Temporary Easement for
Cut, Fill & Outlet Ditch containing
2.5 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\oglau2\ch870.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B96	B130

Plotting Date: 12/16/2015

Station f850+50 to f886+06 Lt

Exc	4845	Emb	5447	
Undercut	3348	+50%	2724	8171
Muck	182	Undercut	3348	
OB Exc	5000	+50%	1674	5022
	13375	Waste		182
				13375

Haul = 66,700 CY Sta
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
OB Exc is Out Of Balance Waste from Sta e834+25 to Sta f850+50 Lt & Rt balance (5000 CY)

Station f850+50 to f896+63 Rt

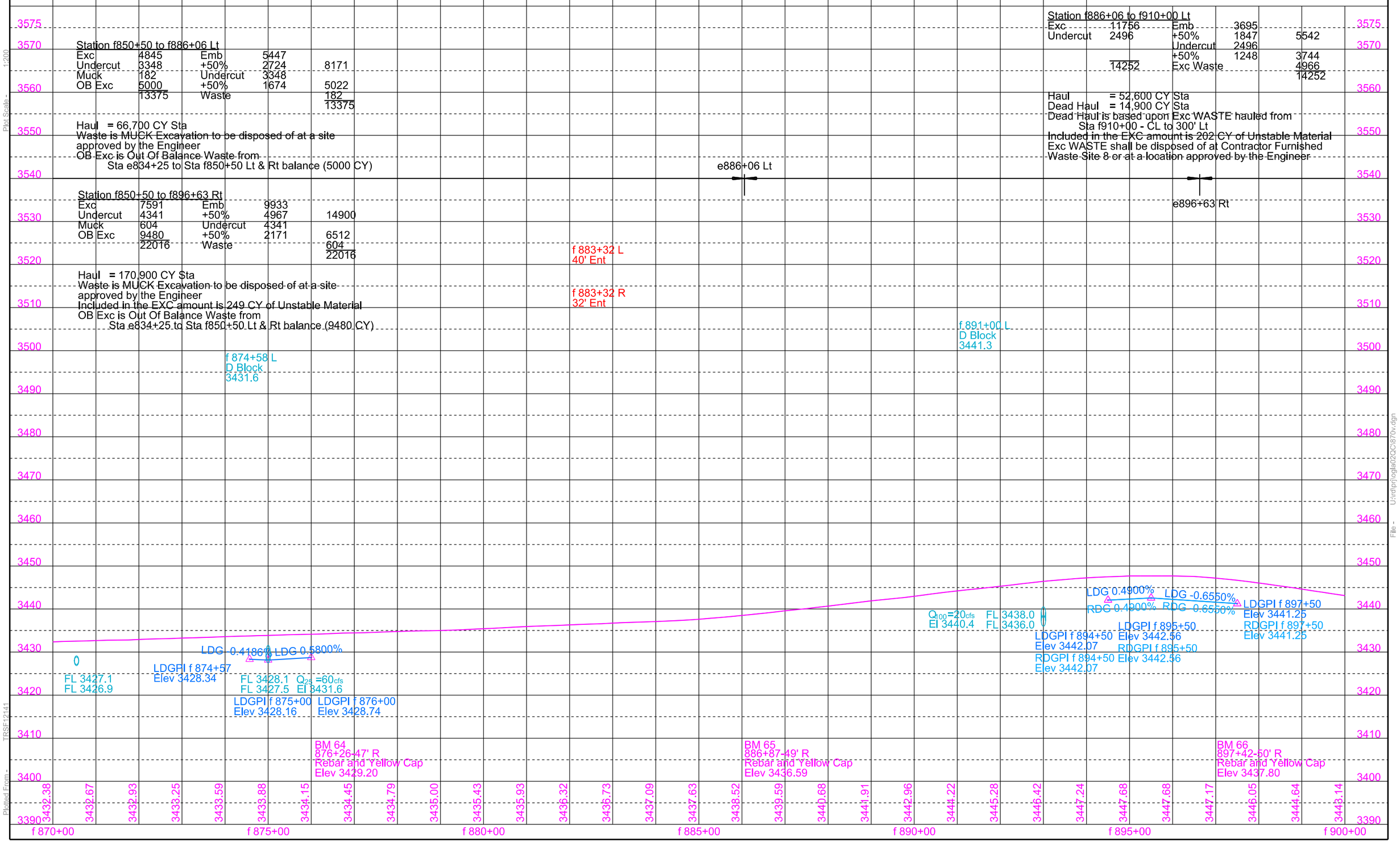
Exc	7591	Emb	9933	
Undercut	4341	+50%	4967	14900
Muck	604	Undercut	4341	
OB Exc	9480	+50%	2171	6512
	22016	Waste		604
				22016

Haul = 170,900 CY Sta
Waste is MUCK Excavation to be disposed of at a site approved by the Engineer
Included in the EXC amount is 249 CY of Unstable Material
OB Exc is Out Of Balance Waste from Sta e834+25 to Sta f850+50 Lt & Rt balance (9480 CY)

Station f886+06 to f910+00 Lt

Exc	11756	Emb	3695	
Undercut	2496	+50%	1847	5542
		Undercut	2496	
		+50%	1248	3744
	14252	Exc Waste		4966
				14252

Haul = 52,600 CY Sta
Dead Haul = 14,900 CY Sta
Dead Haul is based upon Exc WASTE hauled from Sta f910+00 - CL to 300' Lt
Included in the EXC amount is 202 CY of Unstable Material
Exc WASTE shall be disposed of at Contractor Furnished Waste Site 8 or at a location approved by the Engineer



Plot Scale - 1:200
Plotted From - TPSF12141
File - U:\rdp\hogla02\QC\870v.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B97	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

f 903+60
Take Out 5'x4'-42' RCBC
(Incidental Work, Grading)

f 903+33-23° Skew RHF (398 ac)
Install Twin 54" - 90' RCP Arch
w / Controlled Density Fill
(Spaced 8.4' C to C)
& 4 Flared Ends

f 903+53.7-48.7' R
Install Bank and Channel
Protection Gabions
(21.0 CY)

f 903+53.7-48.7' R to f 903+81-152' R
to f 903+55-433' R
Cut Outlet Ditch
(325 CY Exc Inc in Grading Est)

f 903+12.3-48.7' L to f 902+54-166' L
to f 902+61-382' L
Cut Inlet Ditch
(450 CY Exc Inc in Grading Est)

f 912+72
Take Out 6'x6'-40' RCBC
(Incidental Work, Grading)

f 912+45-51' R to 187' R
Cut Outlet Ditch
(140 CY Exc Inc in Grading Est)

f 912+45 (1.6 Sq. Mi)
Site 4
Alternate A
Install 8'x6' - 105' - 11 3/16"
Box Culvert (CIP)
Alternate B
Install 9'x6' - 104' - 0"
Box Culvert (Precast)
(See Section E)

f 919+98-37' L
Take Out 12"-50' CMP
(Incidental Work, Grading)

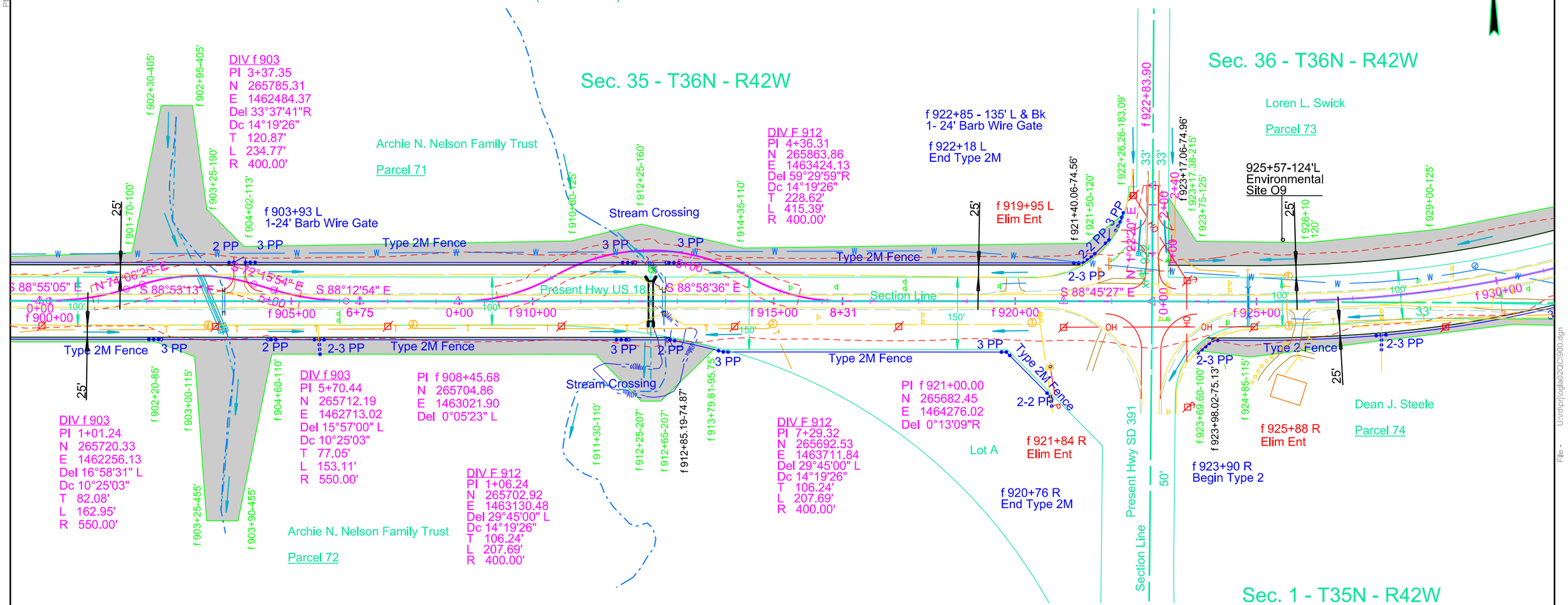
f 924+83
Take Out 24"-56' CMP
(Incidental Work, Grading)

f 924+83 (47 ac)
Install 36"-84' RCP Arch
& 2 Flared Ends

1+00.9-29.0' L to
1+68.3-24.4' L (xr f 922)
Install 18" - 60' CMP
& 2 Safety Ends

1+04.2-23.2' R to
1+68.0-22.8' R (xr f 922)
Install 18" - 52' RCP Arch (Cl 4)
& 2 Safety Ends

1+00.9-29.0' L (xr f 922)
Install Bank and Channel
Protection Gabions
(4.5 CY)



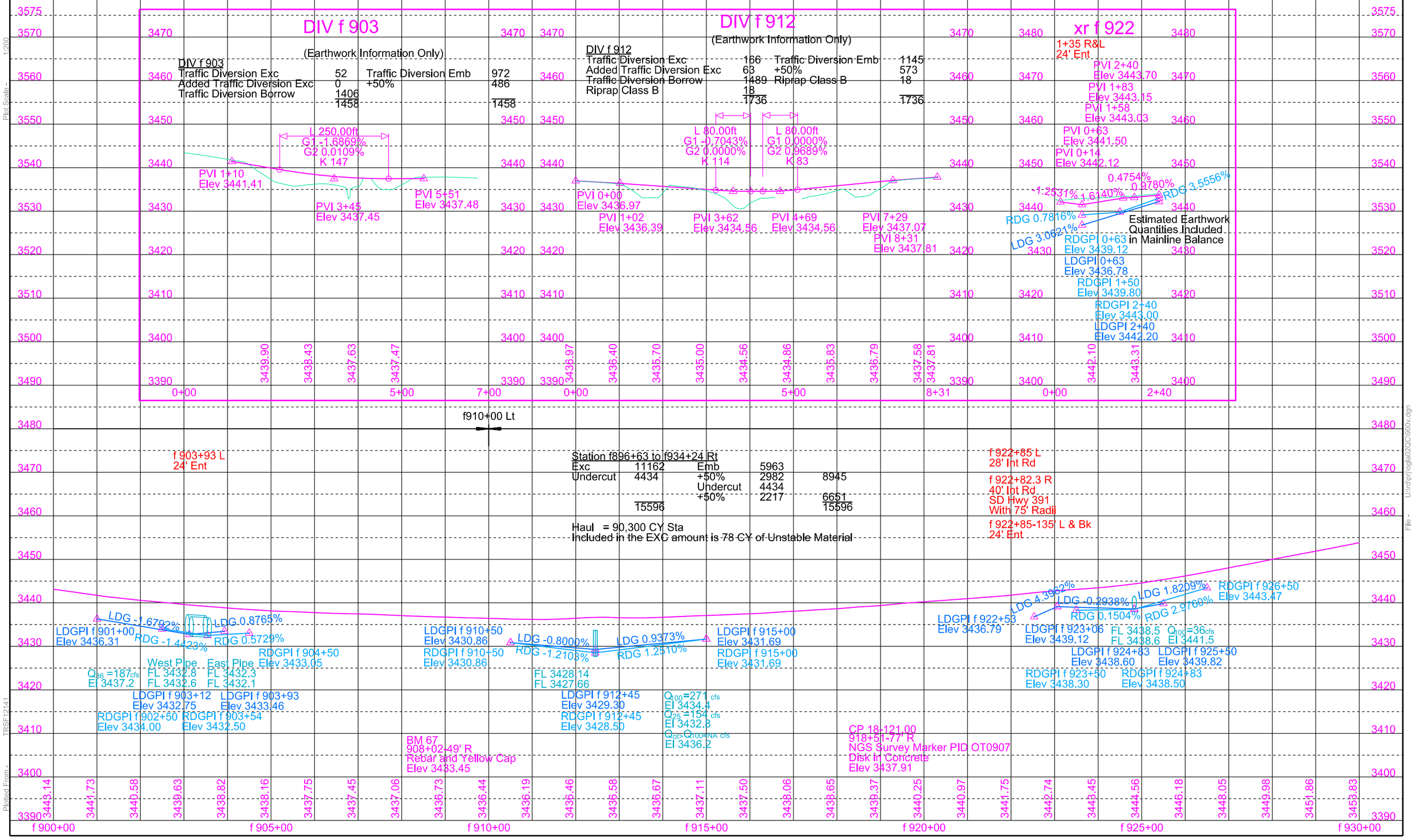
Parcel 73
f 923+17.06 to f 934+00 L
Temporary Easement for
Cut & Intersecting Road containing
1.1 ac, more or less

Parcel 74
f 923+69.60 to f 932+40 R
Temporary Easement for
Cut, Fill & Outlet Ditch containing
0.5 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\oglau2\ch900.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B98	B130

Plotting Date: 12/16/2015



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B99	B130

Plotting Date: 12/16/2015 Revised 08/18/2015 AR

f 930+71 - 65' R
to f 934+93 - 209' R
Obliterate Road
(4.7 Sta)

f 931+99
Take Out 24"-54' CMP
(Incidental Work, Grading)

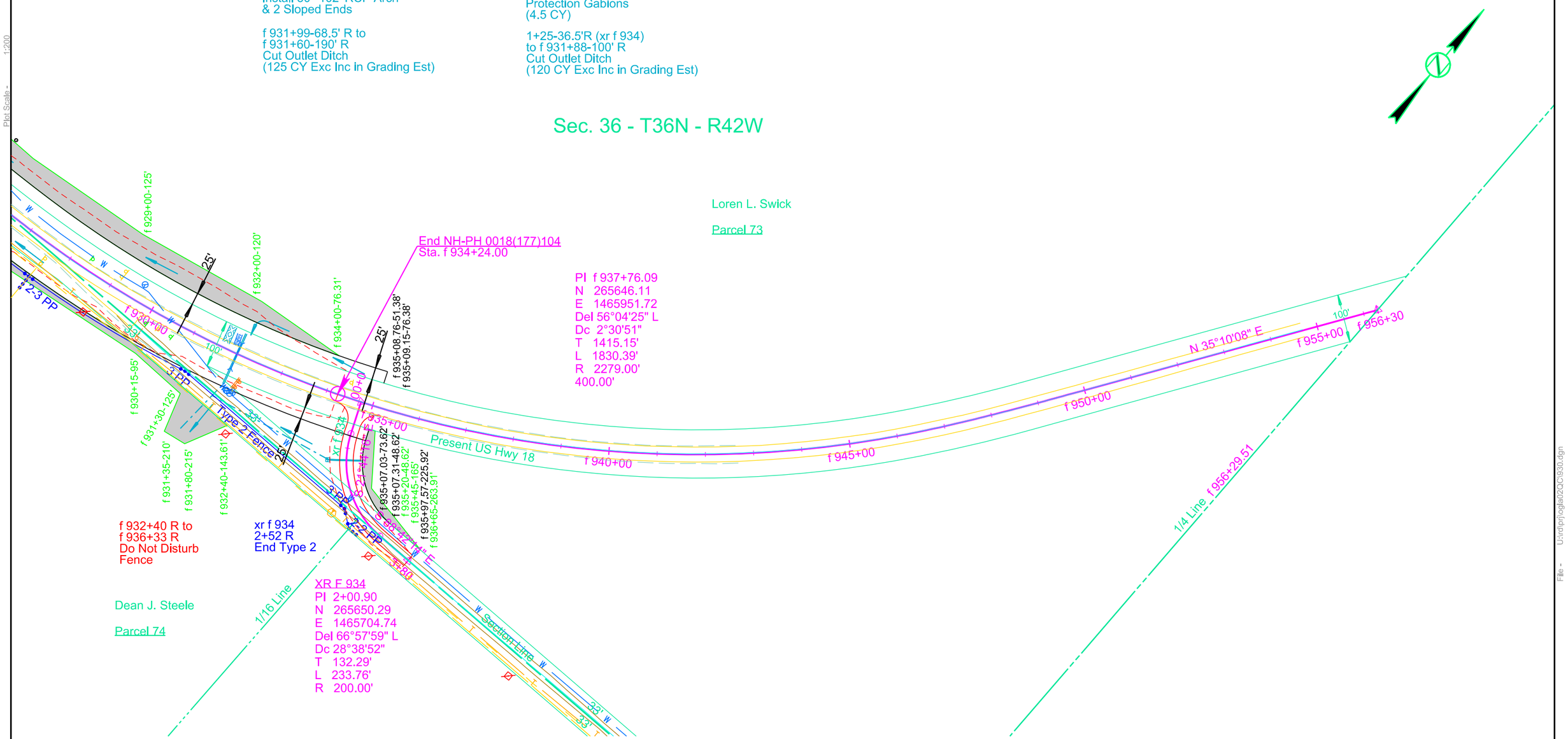
f 931+99 (29 ac)
Install 30"-102' RCP Arch
& 2 Sloped Ends

f 931+99-68.5' R to
f 931+60-190' R
Cut Outlet Ditch
(125 CY Exc Inc in Grading Est)

1+25 (xr f 934) (7 ac)
Install 24"-54' CMP
& 2 Safety Ends

1+25 - 36.5' R (xr f 934)
Install Bank and Channel
Protection Gabions
(4.5 CY)

1+25-36.5'R (xr f 934)
to f 931+88-100' R
Cut Outlet Ditch
(120 CY Exc Inc in Grading Est)



Parcel 73
f 935+07.03 to f 936+65 R
Temporary Easement for
Intersecting Road containing
0.1 ac, more or less

Plot Scale - 1:200
Plotted From - TRSF12141
File - U:\rdprj\ogla\02\0\930.dgn

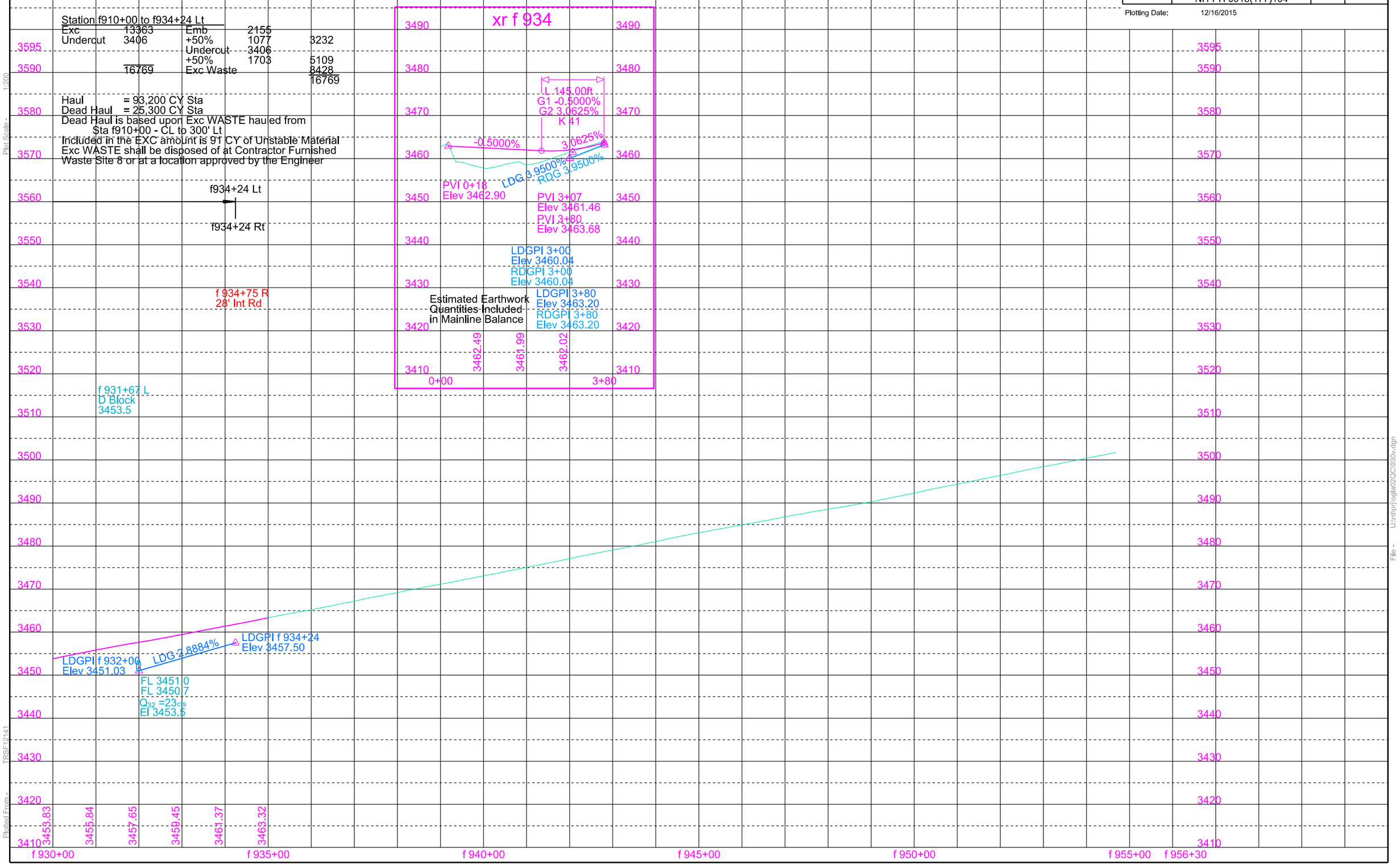
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B100	B130

Plotting Date: 12/16/2015

Station f910+00 to f934+24 Lt

Exc	13363	Emb	2155	
Undercut	3406	+50%	1077	3232
		Undercut	3406	
		+50%	1703	5109
	16769	Exc Waste		8428
				16769

Haul = 93,200 CY Sta
Dead Haul = 25,300 CY Sta
Dead Haul is based upon Exc WASTE hauled from Sta f910+00 - CL to 300' Lt
Included in the EXC amount is 91 CY of Unstable Material
Exc WASTE shall be disposed of at Contractor Furnished Waste Site 8 or at a location approved by the Engineer



Plot Scale - 1:200
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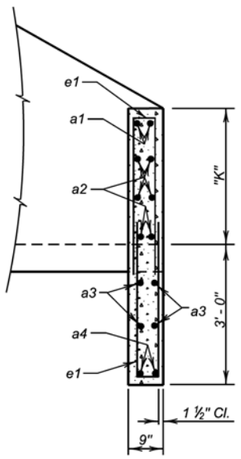
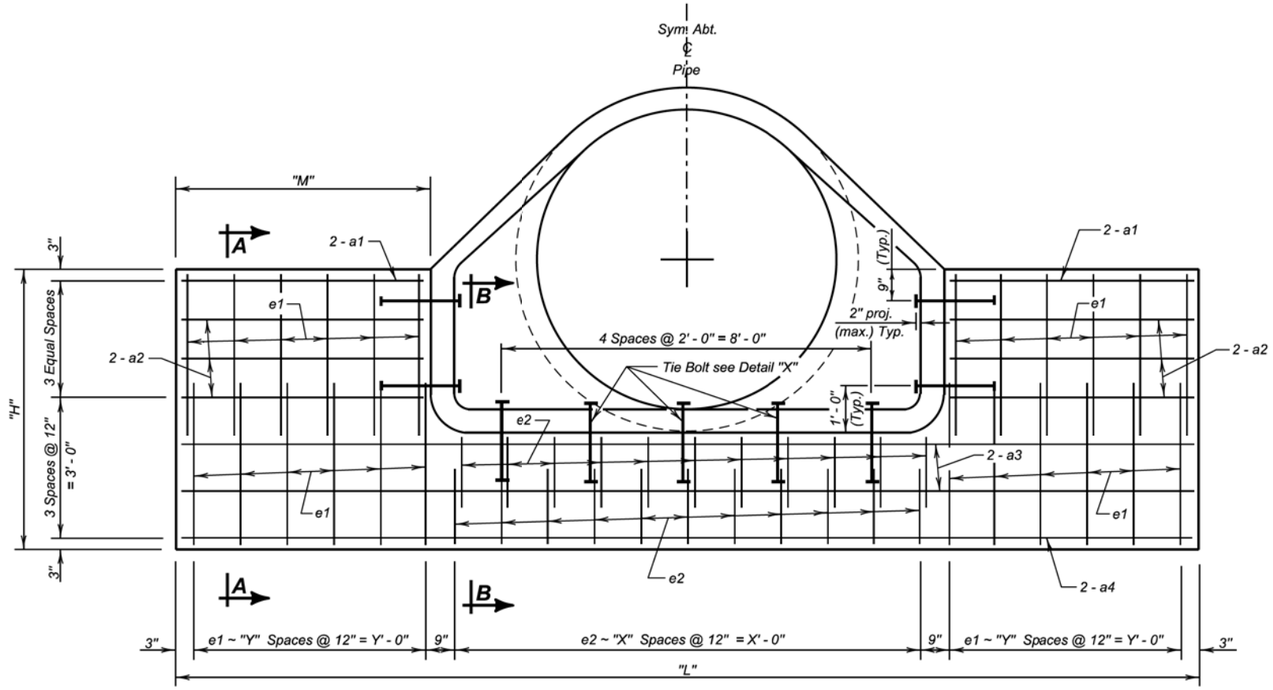
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B101	B130

Plotting Date: 09/02/2015



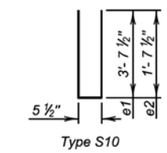
SEC. A - A



ELEVATION
(Inlet or Outlet Headwall)

REINFORCING SCHEDULE
(For One Inlet or One Outlet Headwall)

Mk.	No.	Size	Length	Type
a1	4	5	M - 3"	Str.
a2	12	4	M - 3"	Str.
a3	4	4	L - 3"	Str.
a4	2	5	L - 3"	Str.
e1	4Y + 4	4	7' - 9"	S10
e2	2X + 2	4	3' - 9"	S10



Type S10

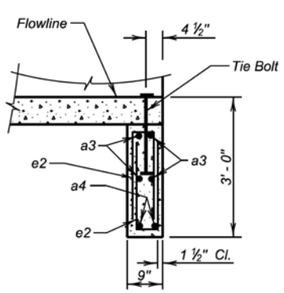
NOTE:
All dimensions are out to out of bars.

SPECIFICATIONS -

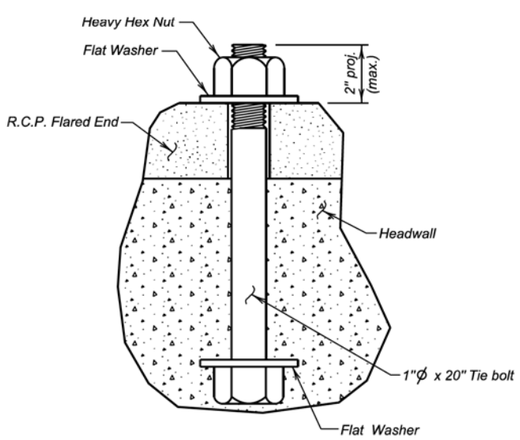
Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

GENERAL NOTES -

1. Concrete shall be Class M6 in conformance with Section 462.
2. Reinforcing Steel shall conform to ASTM A615 Grade 60.
3. Use 1 ½" clear cover on all reinforcing steel except as shown.
4. All exposed edges shall be chamfered ¾".
5. Tie Bolts shall be 1"Ø x 20" A307 bolts with heavy hex nuts and 2 washers. Bolts, nuts and washers shall be galvanized in accordance with ASTM A153 or ASTM F2329 as applicable. Nine bolts, or equivalent as approved by the Engineer, are required for each headwall. Embed bolts in concrete headwall as detailed.
6. Drilling holes thru RCP Flared End Sections will not be allowed. Provide 1 ¼"Ø holes in RCP Flared End sections for tie bolts. Sleeves, if used, shall be made of a corrosion resistant material.
7. Headwall dimensions and quantities shown are based on S. D. Standard Plate No. 450.10. For RCP Flared Ends with differing dimensions, adjust headwall as required and submit revised details to the Office of Bridge Design, thru proper channels, for approval. Minimum headwall depth below Flowline is 3'- 0". Length "L" is based on a 2 :1 dirt spill with toe of spill at RCP Flared End opening. Payment will be for plans quantities unless changes are ordered by the Engineer.
8. All costs for furnishing and installing the galvanized Tie Bolts shall be incidental to the other contract items.



SEC. B - B



DETAIL "X"

HEADWALL DIMENSIONS

Pipe Dia.	"H"	"K"	"L"	"M"	"X"	"Y"
72"	6' - 0"	3' - 0"	21' - 0"	5' - 6"	9	5
78"	6' - 0"	3' - 0"	22' - 0"	5' - 8 ½"	10	5
84"	6' - 0"	3' - 0"	22' - 0"	5' - 5 ½"	10	5
90"	6' - 5"	3' - 5"	25' - 0"	6' - 5 ½"	11	6

INFORMATIONAL QUANTITIES
(for one headwall)

ITEM	Class M6 Concrete	Reinforcing Steel	★Structure Excavation, Misc.
UNIT	Cu. Yd.	Lb.	Cu. Yd.
72" R.C.P.	2.5	337	1.5
78" R.C.P.	2.6	349	1.5
84" R.C.P.	2.6	346	1.5
90" R.C.P.	3.1	399	1.7

★Quantity based on neat line excavation to the dimensions of the headwall below the bottom of the pipe. Payment will be for plans quantity regardless of actual volume excavated.

STANDARD HEADWALL DETAILS
(WITH 3'- 0" CUTOFF WALL)
FOR
72" TO 90" R.C.P. FLARED ENDS
0° SKEW
S. D. DEPT. OF TRANSPORTATION
NOVEMBER 2014

1 OF 1

PLANS BY :
OFFICE OF BRIDGE DESIGN, SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

DESIGNED BY	DRAWN BY	CHECKED BY	
SHAN02QC	MG		Kevin N. Goeden BRIDGE ENGINEER

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_Standard_Headwall_Details.dgn

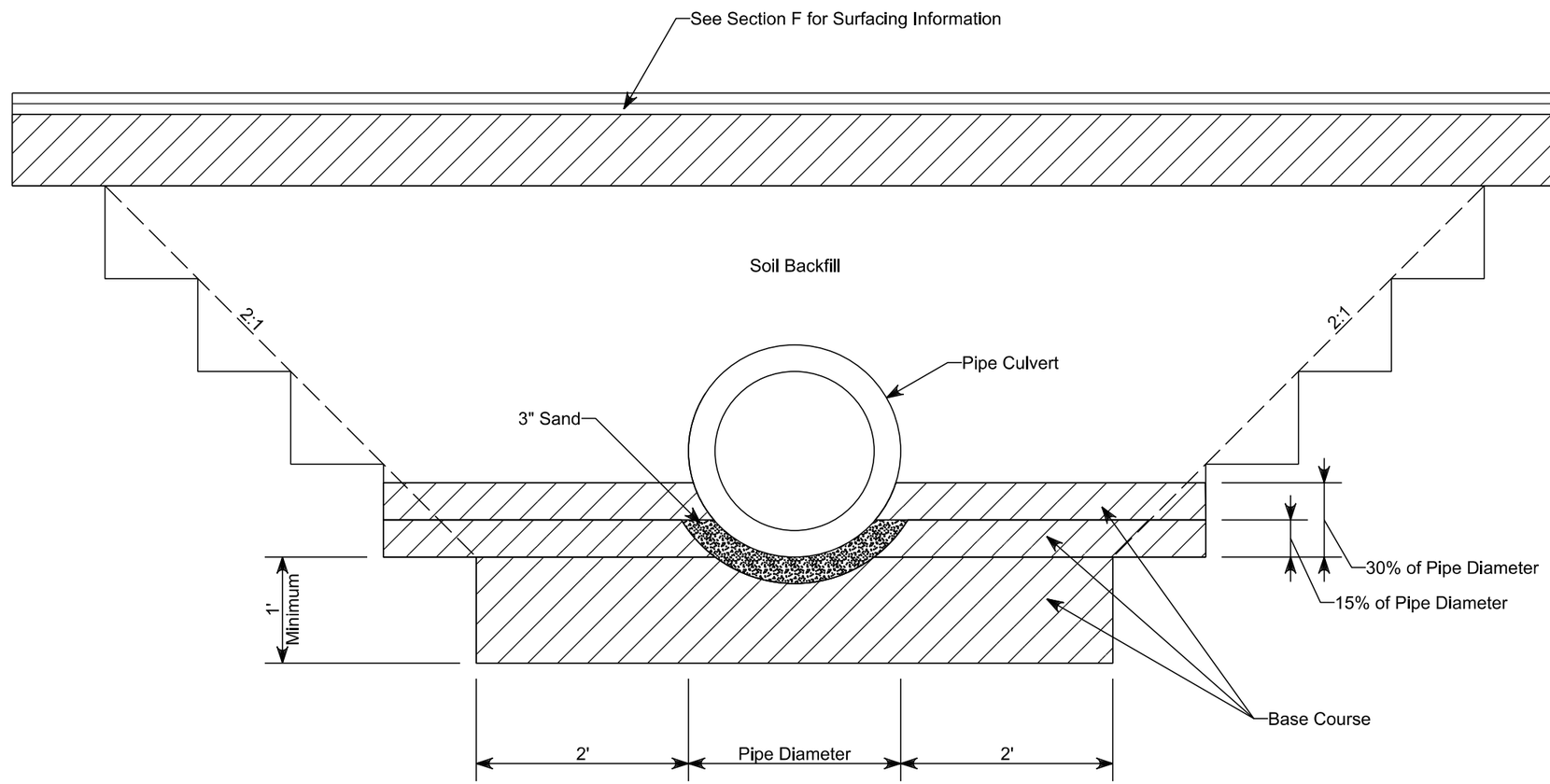
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B102	B130

Plotting Date: 09/02/2015

SHALLOW PIPE INSTALLATION DETAIL

(See Section B Notes for Additional Information)

Mainline Single Pipe Installation



Plot Scale - 1:200
Plotted From - TRSF12139
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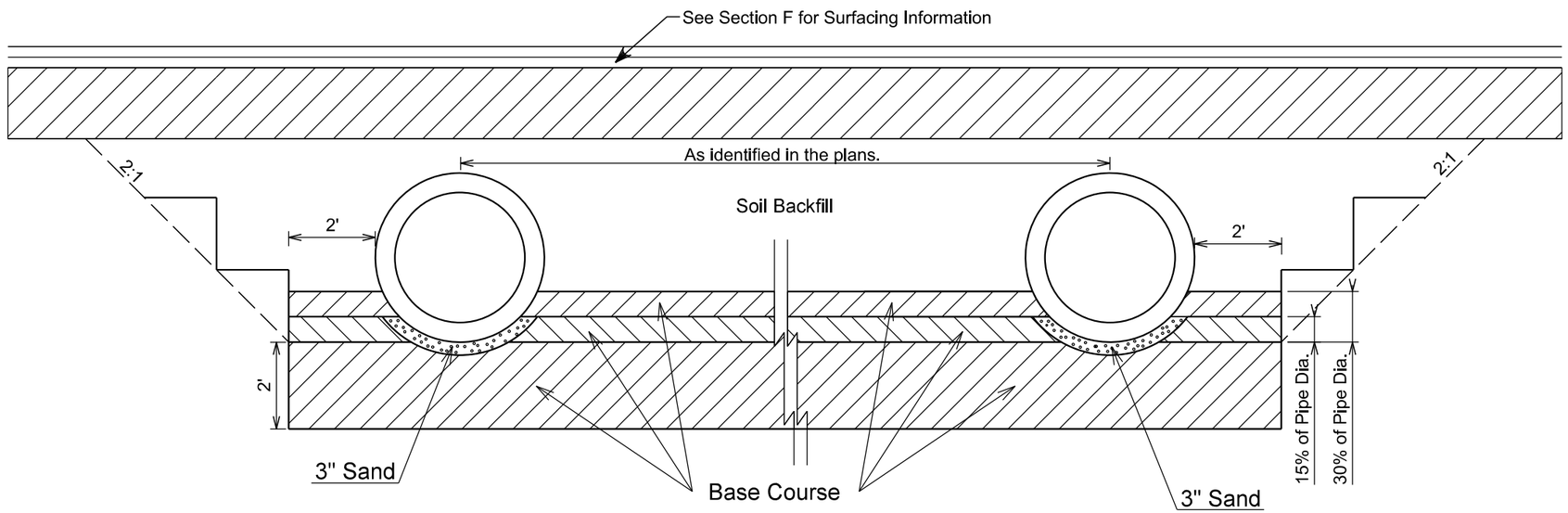
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B103	B130

Plotting Date: 09/02/2015

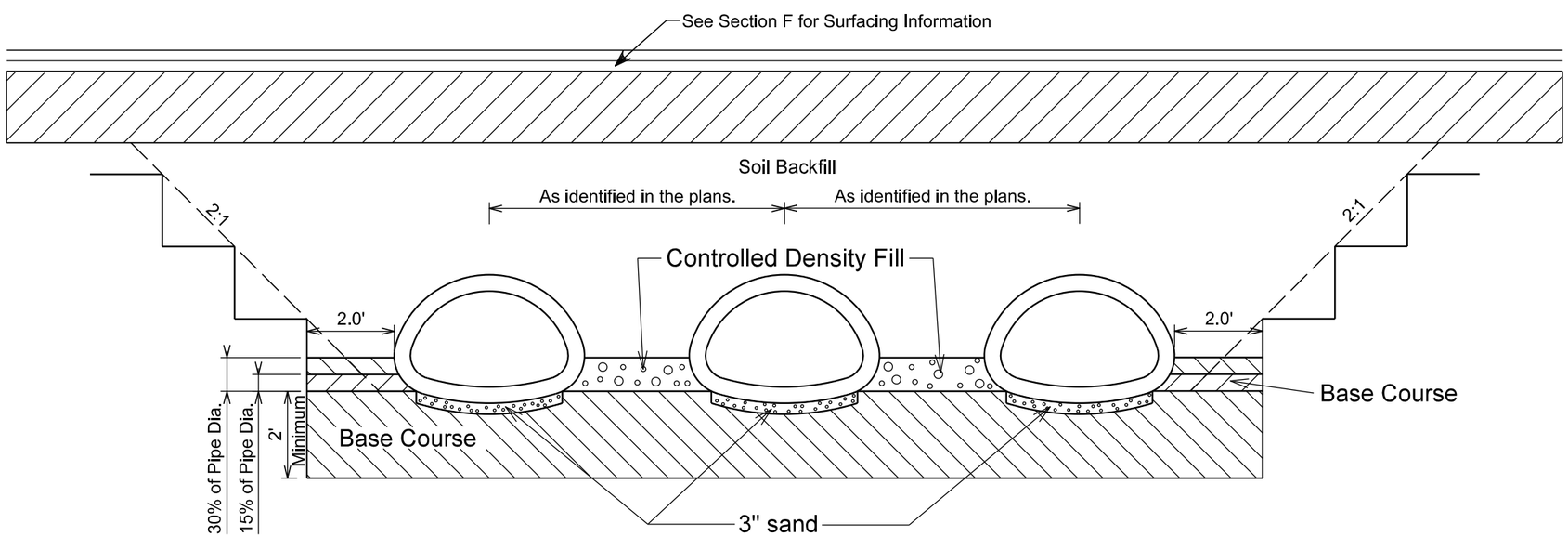
SHALLOW PIPE INSTALLATION DETAIL

(See Section B Notes for Additional Information)

Mainline Multiple Pipe Installation



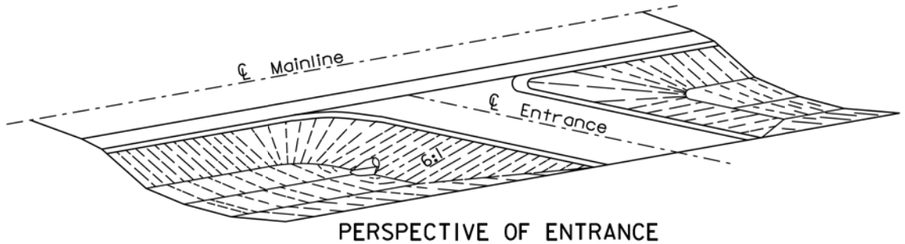
Mainline Multiple Pipe Installation With Controlled Density Fill



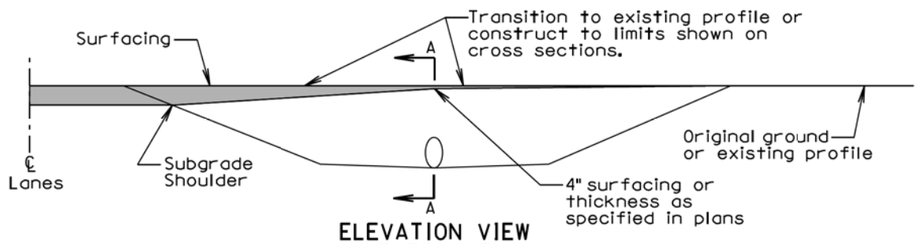
Plot Scale - 1:200

Plotted From - TRSF12139

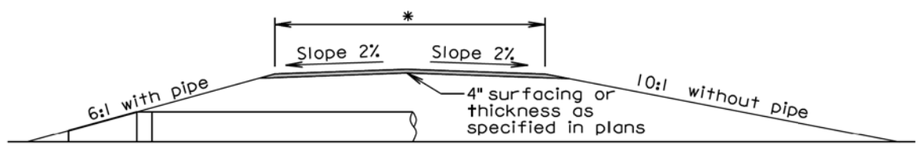
File - ...\Cross Pipe Replacement Detail2.dgn



PERSPECTIVE OF ENTRANCE



ELEVATION VIEW (ENTRANCE)



SECTION A-A (ENTRANCE)

*The finished surfacing width is stated elsewhere in the plans. The subgrade width is 4' wider than the finished surfacing width unless stated otherwise in the plans.

GENERAL NOTES:

The ditch section shown above in the perspective and elevation view is only for illustrative purposes.

A 6:1 inslope shall be constructed for an entrance when a pipe is required. A 10:1 inslope shall be constructed when a pipe is not required.

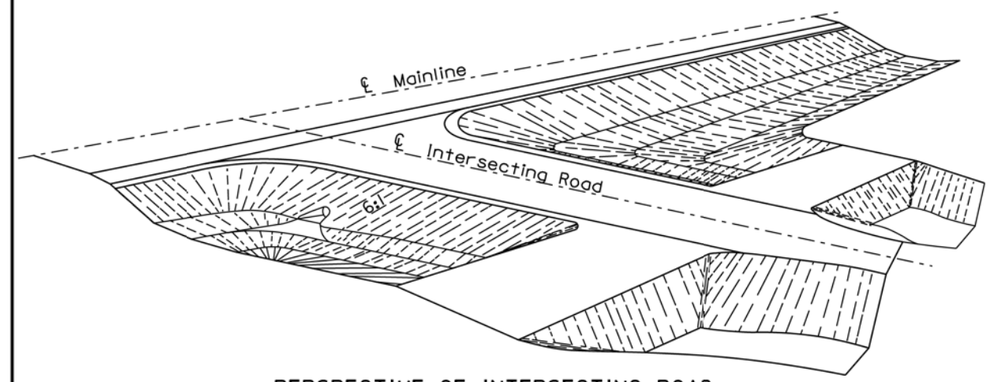
Pipe lengths shall be adjusted if necessary during construction to obtain the 6:1 slopes. For grading projects, the pipe lengths are estimated typically using a 4" thickness of surfacing directly over the subgrade above the pipe.

The transition area between the mainline inslope and the approach inslope for entrances shall be rounded to eliminate an abrupt transition.

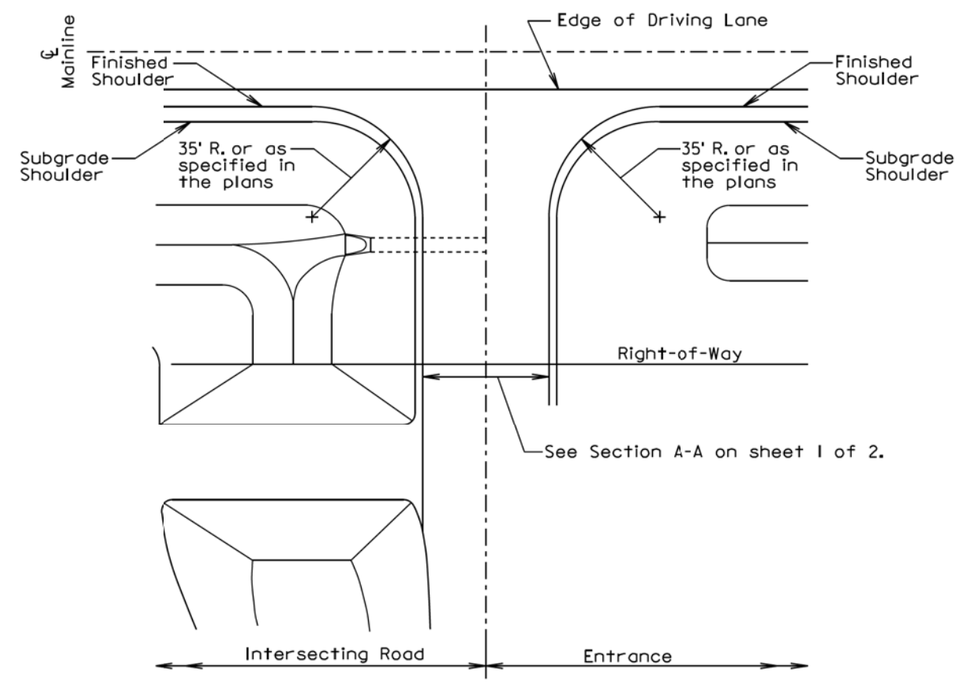
The turning radii shall be 35' for intersecting roads and entrances unless stated otherwise in the plans.

September 6, 2013

Published Date: 3rd Qtr. 2015	SDDOT	INTERSECTING ROADS AND ENTRANCES	PLATE NUMBER 120.01
			Sheet 1 of 2



PERSPECTIVE OF INTERSECTING ROAD

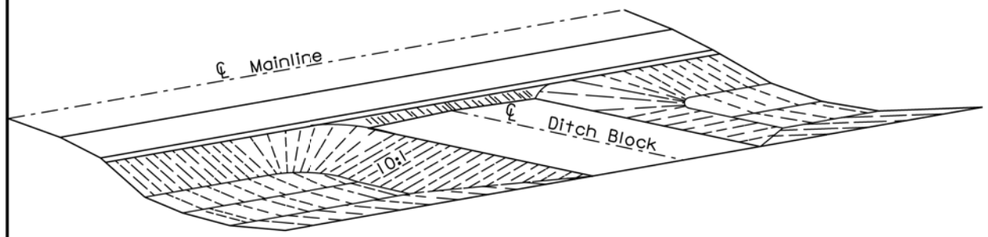


PLAN VIEW

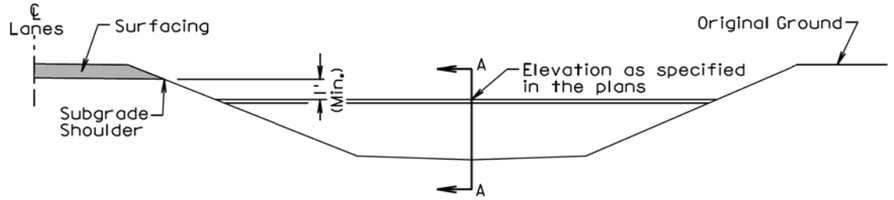
September 6, 2013

Published Date: 3rd Qtr. 2015	SDDOT	INTERSECTING ROADS AND ENTRANCES	PLATE NUMBER 120.01
			Sheet 2 of 2

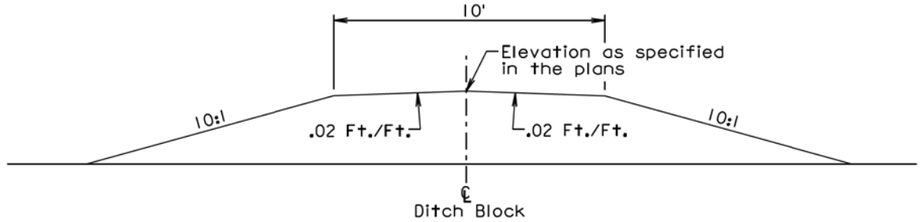
Plot Scale - 1:200
- Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn



PERSPECTIVE OF DITCH BLOCK



ELEVATION VIEW



SECTION A-A

GENERAL NOTES:

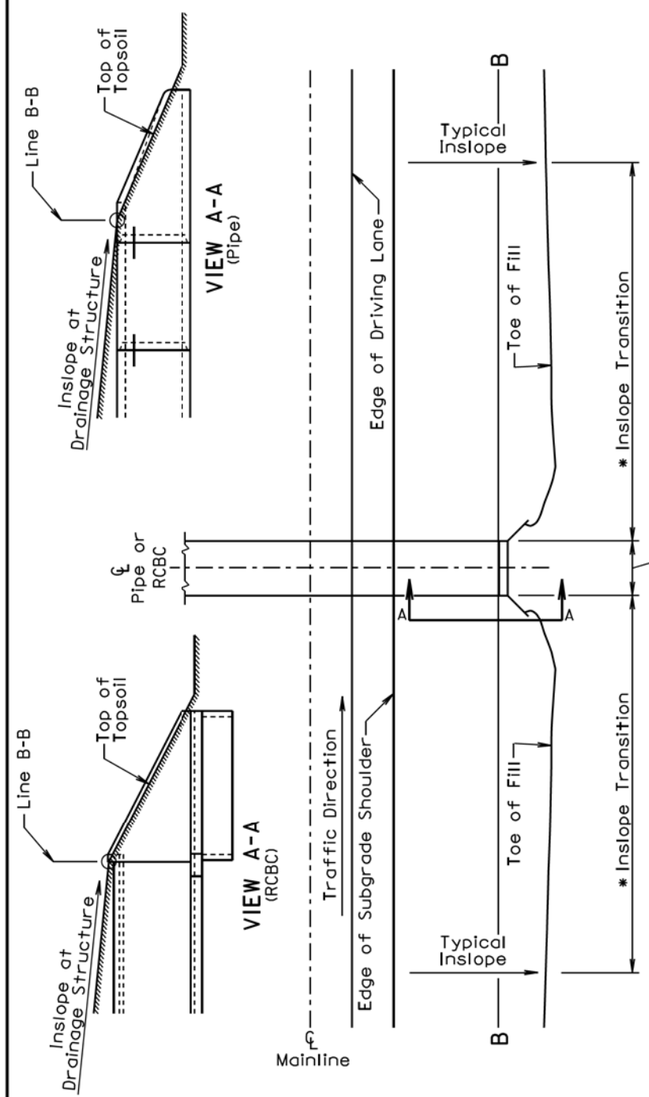
The ditch section shown above in the perspective and elevation view is only for illustrative purposes.

The inslopes of the ditch block shall be 10:1 or as specified in the plans.

The transition area between the mainline inslope and the ditch block inslope shall be rounded to eliminate an abrupt transition.

February 14, 2011

Published Date: 3rd Qtr. 2015	SDDOT	DITCH BLOCK	PLATE NUMBER 120.02 Sheet 1 of 1



TYPE 1 INSLOPE TRANSITION

GENERAL NOTES:

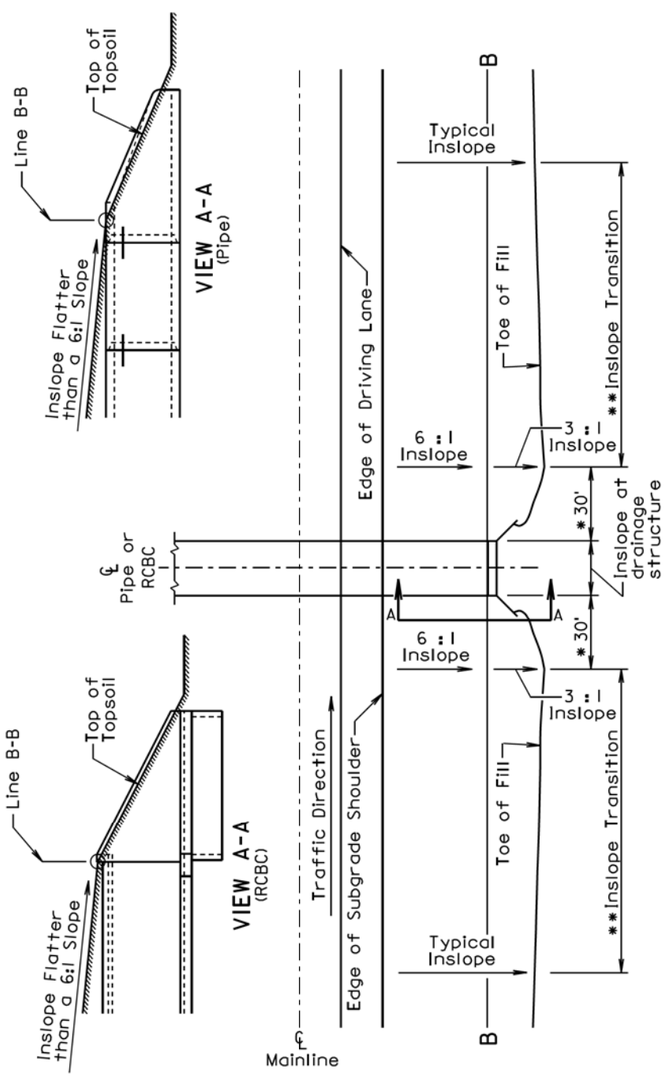
This Type 1 Inslope Transition is used when the specified inslope at the drainage structure is flatter than the typical inslope and the inslope at the drainage structure is between a 4:1 slope and 6:1 slope.

Line B-B represents the clear zone line, the location where soil intercepts the parapet on an RCBC, the location where the soil intercepts the top of the pipe adjacent to the opening of the pipe end section, or may represent a change in slope.

* Transition from the typical inslope to the inslope at the drainage structure. Within the clear zone (area from edge of subgrade shoulder to line B-B) use 100' length for each 1:1 slope change.
Example: transition from a 4:1 to a 6:1 would require a 200' length transition. The typical inslope outside of the clear zone shall be transitioned gradually to the slope necessary adjacent to the RCBC wing wall or pipe culvert end section within the transition length necessary for the transition within the clear zone.

February 14, 2011

Published Date: 3rd Qtr. 2015	SDDOT	INSLOPE TRANSITIONS AT PIPE CULVERTS OR REINFORCED CONCRETE BOX CULVERTS	PLATE NUMBER 120.05 Sheet 1 of 2



TYPE 2 INSLOPE TRANSITION

GENERAL NOTES:

This Type 2 Inslope Transition is used when the specified inslope at the pipe or RCBC is flatter than a 6:1 slope.

Line B-B represents the clear zone line, the location where soil intercepts the parapet on an RCBC, the location where the soil intercepts the top of the opening of the pipe adjacent to the opening of the pipe end section, or may represent a change in slope.

* Transition from Inslope at drainage structure to a 6 :1 inslope and 3:1 inslope.

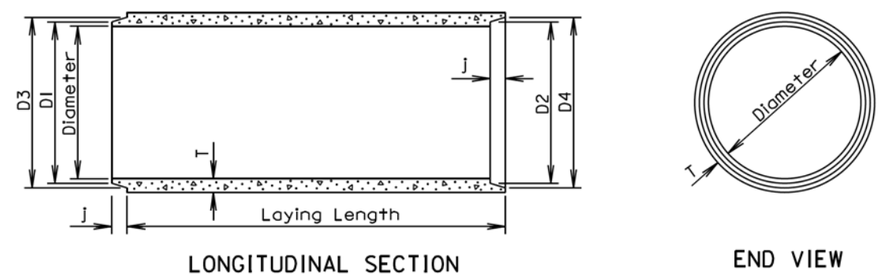
** Transition from typical inslope to the inslopes adjacent to the drainage structure. Within the clear zone (area from edge of subgrade shoulder to line B-B) use 100' length for each 1:1 slope change. Example: transition from a 4:1 to a 6:1 would require a 200' length transition. The typical inslope outside of the clear zone shall be transitioned to a 3:1 inslope within the transition length necessary for the transition within the clear zone.

February 14, 2011

Published Date: 3rd Qtr. 2015	SDDOT	INSLOPE TRANSITIONS AT PIPE CULVERTS OR REINFORCED CONCRETE BOX CULVERTS	PLATE NUMBER 120.05 Sheet 2 of 2

TOLERANCES IN DIMENSIONS

Diameter: ±1.5% for 24" Dia. or less and ±1% or 3/8" whichever is more for 27" Dia. or greater.
Diameters at joints: ± 3/16" for 30" Dia. or less and ± 1/4" for 36" or greater.
Length of joint (J): ± 1/4".
Wall thickness (T): not less than design T by more than 5% or 3/16", whichever is greater.
Laying length: shall not underrun by more than 1/2".



LONGITUDINAL SECTION

END VIEW

GENERAL NOTES:

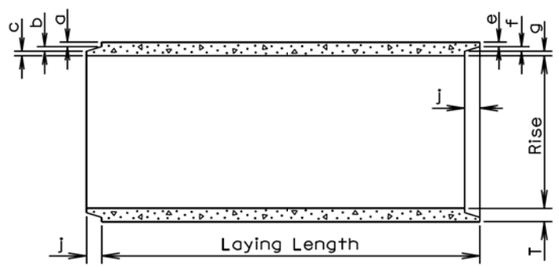
Construction of R. C. P. shall conform to the requirements of Section 990 of the Specifications.

Not more than 2 four-foot sections shall be permitted near the ends of any culvert. Four-foot lengths shall be used only to secure the required length of culvert.

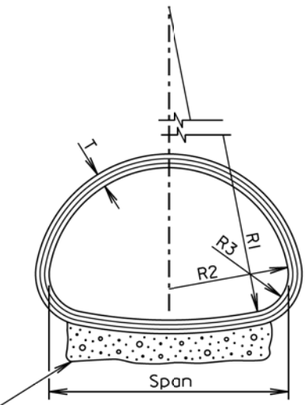
Diam. (in.)	Approx. Wt. /Ft. (lb.)	T (in.)	J (in.)	D1 (in.)	D2 (in.)	D3 (in.)	D4 (in.)
12	92	2	1 3/4	13 1/4	13 5/8	13 7/8	14 1/4
15	127	2 1/4	2	16 1/2	16 7/8	17 1/4	17 5/8
18	168	2 1/2	2 1/4	19 5/8	20	20 3/8	20 3/4
21	214	2 3/4	2 1/2	22 7/8	23 1/4	23 3/4	24 1/8
24	265	3	2 3/4	26	26 3/8	27	27 3/8
27	322	3 1/4	3	29 1/4	29 5/8	30 1/4	30 5/8
30	384	3 1/2	3 1/4	32 3/8	32 3/4	33 1/2	33 7/8
36	524	4	3 3/4	38 3/4	39 1/4	40	40 1/2
42	685	4 1/2	4	45 1/8	45 5/8	46 1/2	47
48	867	5	4 1/2	51 1/2	52	53	53 1/2
54	1070	5 1/2	4 1/2	57 7/8	58 3/8	59 3/8	59 7/8
60	1296	6	5	64 1/4	64 3/4	66	66 1/2
66	1542	6 1/2	5 1/2	70 5/8	71 1/8	72 1/2	73
72	1810	7	6	77	77 1/2	79	79 1/2
78	2098	7 1/2	6 1/2	83 3/8	83 7/8	85 5/8	86 1/8
84	2410	8	7	89 3/4	90 1/4	92 1/8	92 5/8
90	2740	8 1/2	7	95 3/4	96 1/4	98 1/8	98 5/8
96	2950	9	7	102 1/8	102 5/8	104 1/2	105
102	3075	9 1/2	7 1/2	109	109 1/2	111 1/2	112
108	3870	10	7 1/2	115 1/2	116	118	118 1/2

June 26, 2015

Published Date: 3rd Qtr. 2015	SDDOT	REINFORCED CONCRETE PIPE	PLATE NUMBER 450.01 Sheet 1 of 1



LONGITUDINAL SECTION



END VIEW

TOLERANCES IN DIMENSIONS

Radial dimensions at joints: ± 1/8" for 65" span or less and ± 1/4" for longer spans.
Rise and Span: ±2% of tabular values.
Length of Joint (J): ± 1/4".
Wall thickness (T): not less than design T by more than 5% or 3/16", whichever is greater.
Laying length: shall not underrun by more than 1/2".

Gravel Bedding Material shall be supplied for 102" to 169" spans. It shall be placed to a thickness of 6" (Min.) x 85% of the Span x Length of culvert and shall conform to the gradation requirements for gravel surfacing except material may be screened or may be plan provided material.

* Size (in.)	Approx. Wt./Ft. (lb.)	Rise (in.)	Span (in.)	T (in.)	a (in.)	b (in.)	c (in.)	j (in.)	e (in.)	f (in.)	g (in.)	R1 (in.)	R2 (in.)	R3 (in.)
18	170	13 1/2	22	2 1/2	1 3/8	3/8	3/4	2	1 1/8	3/8	1	27 1/2	13 3/4	5 1/4
24	320	18	28 1/2	3 1/2	1 5/8	1/2	1 3/8	3	1 3/8	1/2	1 5/8	40 11/16	14 3/4	4 5/8
30	450	22 1/2	36 1/4	4	1 13/16	5/8	1 9/16	3 1/2	1 9/16	5/8	1 13/16	51	18 3/4	6 1/8
36	600	26 5/8	43 3/4	4 1/2	2	3/4	1 3/4	4	1 3/4	3/4	2	62	22 1/2	6 1/2
42	740	31 5/16	51 1/8	4 1/2	2	3/4	1 3/4	4	1 3/4	3/4	2	73	26 1/4	7 3/4
48	890	36	58 1/2	5	2 1/4	3/4	2	5	2	3/4	2 1/4	84	30	8 7/8
54	1100	40	65	5 1/2	2 1/2	3/4	2 1/4	5	2 1/4	3/4	2 1/2	92 1/2	33 3/8	10
60	1400	45	73 1/2	6	3 5/16	3/4	1 15/16	5	2 3/4	3/4	2 1/2	105	37 1/2	11
72	1900	54	88	7	3 13/16	1	2 3/16	6	3 1/4	1	2 3/4	126	45	13 5/16
84	2500	62	102	8	4 1/8	1	2 7/8	6	3 1/2	1	3 1/2	162 1/2	52	14 1/2
96	3300	78	122 3/8	9	4 1/2	1	3 1/2	7	4	1	4	218	62	20
108	4200	88	138 1/2	10	5	1	4	7	4 1/2	1	4 1/2	269	70	22
120	5100	96 7/8	154	11	5 1/2	1	4 1/2	7	5	1	5	301 3/8	78	24
132	5100	106 1/2	168 3/4	10		1	4	7	4 1/2	1	4 1/2	329	85 5/8	26 7/8

* Equivalent Diameter of Circular R. C. P.

GENERAL NOTES:

Construction of R.C.P. Arch shall conform to the requirements of Section 990 of the Specifications. Not more than 2 four-foot sections shall be permitted near the ends of any culvert. Four-foot lengths shall be used only to secure the required length of culvert.

June 26, 2015

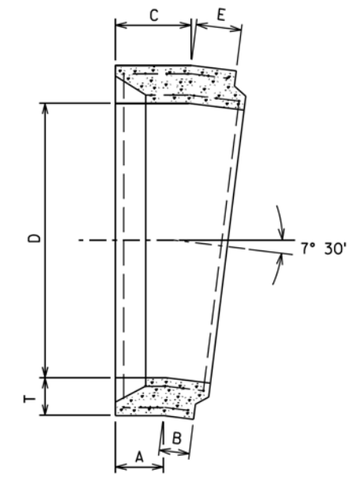
Published Date: 3rd Qtr. 2015

SDDOT

REINFORCED CONCRETE PIPE ARCH

PLATE NUMBER 450.02

Sheet 1 of 1



D (in.)	Laying Length at Center of Pipe (in.)	Laying Length at Outside of Curve (in.)	T (in.)	A (in.)	B (in.)	C (in.)	E (in.)	Radius of Curve (ft.)	Weight of Section (lbs.)
12	7 3/4	8	2	4 3/4	2	5 3/4	3	4.9	70
15	11 1/4	12 1/2	2 1/4	5 1/4	4 3/4	6 1/2	6	7.2	120
18	12 1/8	13 5/8	2 1/2	5 1/2	5 1/8	7	6 5/8	7.7	170
21	9 1/2	11 1/4	2 3/4	5 1/2	2 1/4	7 1/4	4	6.1	170
24	9 13/16	11 3/4	3	5 9/16	2 5/8	7 1/2	4 1/4	6.2	215
27	9 11/16	12 1/8	3 1/4	5 7/16	2 5/16	7 5/8	4 1/2	6.2	260
30	10	12 3/8	3 1/2	5 5/16	2 5/16	7 11/16	4 11/16	6.4	320
33	11 3/16	13 7/8	3 3/4	5 15/16	2 9/16	8 5/8	5 1/4	7.1	420
36	12 3/16	15 1/16	4	6 1/2	2 5/16	9 3/8	5 11/16	7.7	530
42	14 1/16	17 1/2	4 1/2	6 13/16	3 13/16	10 5/16	7 3/16	8.9	800
48	16 1/16	20 1/4	5	7 15/16	4 11/16	11 3/4	8 1/2	10.5	1190
54	18 1/16	22 5/16	5 1/2	7 5/8	6 3/16	11 7/8	10 7/16	11.5	1600
60	20 1/2	25 1/4	6	8 5/8	7 1/8	13 3/8	11 7/8	13.0	2210
66	21 5/8	26 15/16	6 1/2	9	7 3/8	14 5/16	12 5/8	13.8	2790
72	22 5/8	28 1/4	7	9 3/8	7 5/8	13 1/4	15	14.4	3420

March 31, 2000

Published Date: 3rd Qtr. 2015

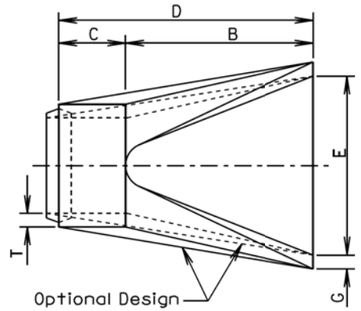
SDDOT

REINFORCED CONCRETE PIPE SHORT RADIUS BEND

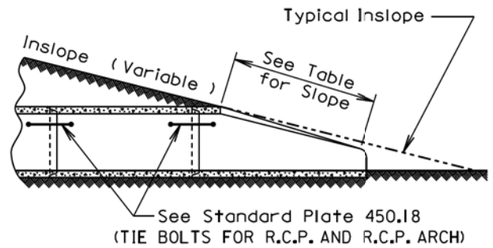
PLATE NUMBER 450.03

Sheet 1 of 1

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn



TOP VIEW

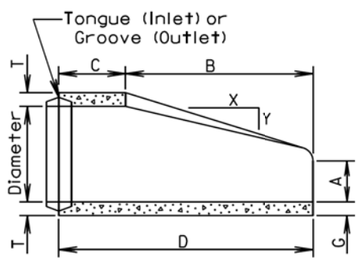


SLOPE DETAIL

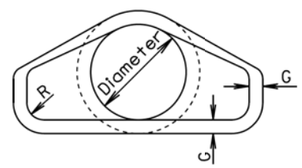
GENERAL NOTES:

Lengths of concrete pipe shown on plan sheets are between flared ends only.

Construction of R.C.P. Flared End shall conform to the requirements of Section 990 of the Specifications.



LONGITUDINAL SECTION



END VIEW

Dia. (in.)	Approx. Wt. of Section (lbs.)	Approx. Slope (X to Y)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	G (in.)	R (in.)
12	530	2.4:1	2	4	24	48 7/8	72 7/8	24	2	1 1/2
15	740	2.4:1	2 1/4	6	27	46	73	30	2 1/4	1 1/2
18	990	2.3:1	2 1/2	9	27	46	73	36	2 1/2	1 1/2
21	1280	2.4:1	2 3/4	9	36	37 1/2	73 1/2	42	2 3/4	1 1/2
24	1520	2.5:1	3	9 1/2	43 1/2	30	73 1/2	48	3	1 1/2
27	1930	2.5:1	3 1/4	10 1/2	49 1/2	24	73 1/2	54	3 1/4	1 1/2
30	2190	2.5:1	3 1/2	12	54	19 3/4	73 3/4	60	3 1/2	1 1/2
36	4100	2.5:1	4	15	63	34 3/4	97 3/4	72	4	1 1/2
42	5380	2.5:1	4 1/2	21	63	35	98	78	4 1/2	1 1/2
48	6550	2.5:1	5	24	72	26	98	84	5	1 1/2
54	8240	2:1	5 1/2	27	65	33 1/4	98 1/4	90	5 1/2	1 1/2
60	8730	1.9:1	6	35	60	39	99	96	5	1 1/2
66	10710	1.7:1	6 1/2	30	72	27	99	102	5 1/2	1 1/2
72	12520	1.8:1	7	36	78	21	99	108	6	1 1/2
78	14770	1.8:1	7 1/2	36	90	21	111	114	6 1/2	1 1/2
84	18160	1.6:1	8	36	90 1/2	21	111 1/2	120	6 1/2	1 1/2
90	20900	1.5:1	8 1/2	41	87 1/2	24	111 1/2	132	6 1/2	6

June 26, 2015

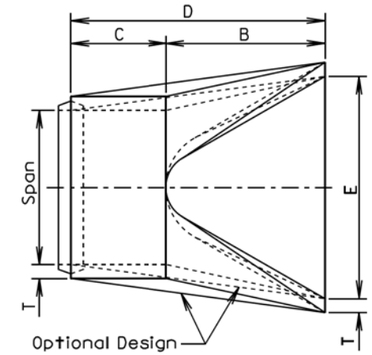
Published Date: 3rd Qtr. 2015

SDDOT

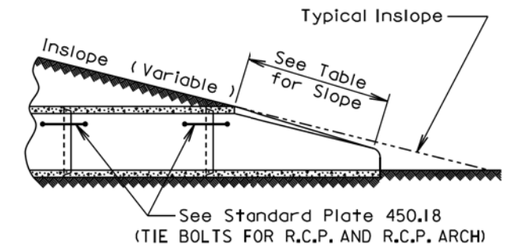
R. C. P. FLARED ENDS

PLATE NUMBER 450.10

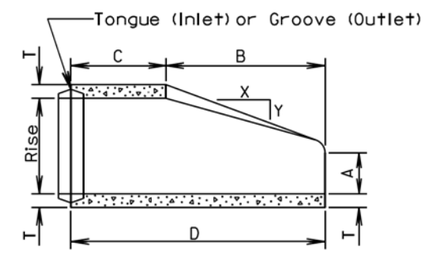
Sheet 1 of 1



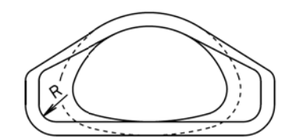
TOP VIEW



SLOPE DETAIL



LONGITUDINAL SECTION



END VIEW

GENERAL NOTES:

Lengths of concrete pipe shown on plan sheets are between flared ends only.

Construction of R.C.P. Arch Flared End shall conform to the requirements of Section 990 of the Specifications.

* Size (in.)	Approximate Weight of Section (lbs.)	Rise (in.)	Span (in.)	Slope (X:Y)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	R (in.)
18	1100	13 1/2	22	3:1	2 1/2	7	27	45	72	36	2
24	1750	18	28 1/2	3:1	3 1/2	8 1/2	39	33	72	48	3
30	3300	22 1/2	36 1/4	3:1	4	9 1/2	50	46	96	60	3
36	4350	26 5/8	43 3/4	3:1	4 1/2	11 1/8	60	36	96	72	6
42	5250	31 5/16	51 1/8	3:1	4 1/2	15 13/16	60	36	96	78	6
48	6400	36	58 1/2	3:1	5	21	60	36	96	84	6
54	7850	40	65	3:1	5 1/2	25 1/2	60	36	96	90	6
60	9500	45	73 1/2	3:1	6	31	60	36	96	96	6
72	13550	54	88	2:1	7	31	60	39	99	120	6
84	17950	62	102	2:1	8	28 1/2	83	19	102	144	6

*Equivalent Diameter of Circular R.C.P.

June 26, 2015

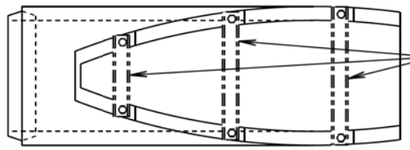
Published Date: 3rd Qtr. 2015

SDDOT

R. C. P. ARCH FLARED ENDS

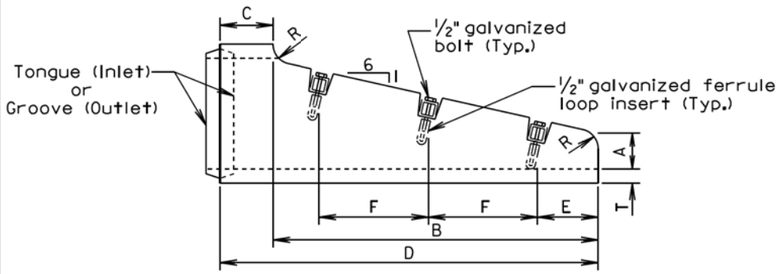
PLATE NUMBER 450.11

Sheet 1 of 1

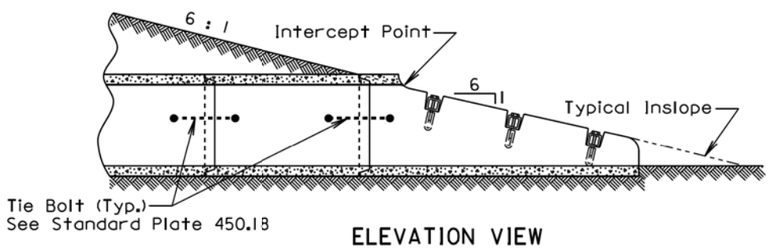


If bars are specified in the plans then provide HSS 2.5X2.5X.1875 Structural Steel Tubing in conformance with ASTM A500, Grade B or 3" Diameter Schedule 40 Pipe in conformance with ASTM A53, Grade B.

TOP VIEW



SIDE VIEW



ELEVATION VIEW

Dia. (in.)	T (in.)	R (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)	No. Sections	No. Bars
FOR CIRCULAR PIPE										
15	2 1/4	3	6	48	9	57	6	18	1	3
18	2 1/2	3	6	69	9	78	9	24	1	3
*24	3	3	6	111	9	120	6	24	1 or 2	5
FOR ARCH PIPE										
**18	2 1/2	1	6	39	33	72	6	24	1	2

*The use of 2 sections must be an approved design.
**Equivalent Diameter of Circular R. C. P.

GENERAL NOTES:

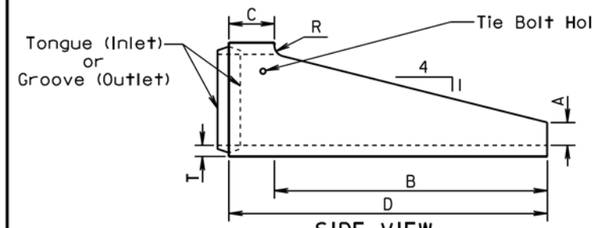
The length of concrete pipe shown on the plans is between safety ends.

Safety ends without bars are acceptable with or without the bar notches.

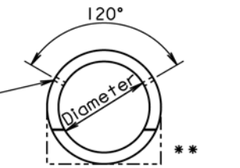
Bars shall be galvanized after fabrication in accordance with ASTM A123.

August 31, 2013

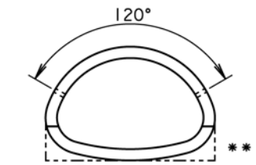
Published Date: 3rd Qtr. 2015	SDDOT	R. C. P. SAFETY ENDS WITH OR WITHOUT BARS	PLATE NUMBER 450.12 Sheet 1 of 1



SIDE VIEW



END VIEW
"CIRCULAR"



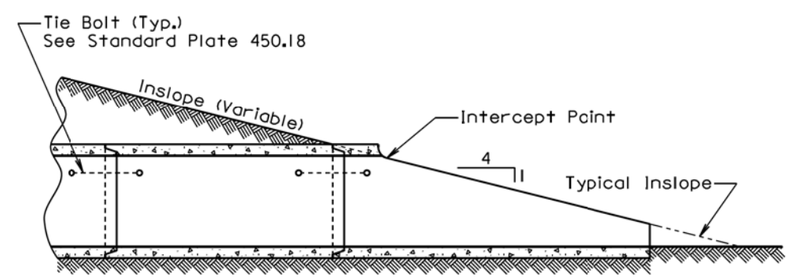
END VIEW
"ARCH"

Dia. (in.)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	R (in.)
FOR CIRCULAR PIPE						
24	3	6	72	12	84	3
30	3 1/2	7 1/2	90	12	102	3 1/2
FOR ARCH PIPE						
* 24	3	6	48	12	60	3
* 30	3 1/2	7 1/2	60	12	72	3 1/2
* 36	4 1/2	8 5/8	66	30	96	0
* 42	4 1/2	10	77 1/4	18 3/4	96	0

ALTERNATE

Dia. (in.)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	R (in.)
FOR CIRCULAR PIPE						
24	3	9	72	12	84	0
30	3 1/2	11	90	12	102	0
FOR ARCH PIPE						
* 24	3	9	48	12	60	0
* 30	3 1/2	11	60	12	72	0

* Equivalent Diameter of Circular R.C.P.
** Acceptable Flat Bottom Alternate.



SECTION
(Along Centerline of Pipe)

GENERAL NOTE:

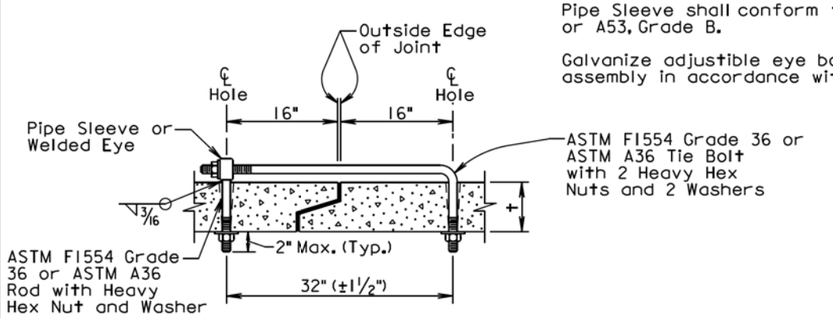
The length of concrete pipe shown in the construction plans is between sloped ends.

September 22, 2006

Published Date: 3rd Qtr. 2015	SDDOT	R. C. P. SLOPED ENDS	PLATE NUMBER 450.13 Sheet 1 of 1

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn

Wall "t" (in.)	Rod Dia. (in.)	Pipe Sleeve Dia. (nominal)
≤ 3¼	⅝	¾
3½-6½	¾	1
≥ 7	1	1¼



ADJUSTABLE EYE BOLT TIE

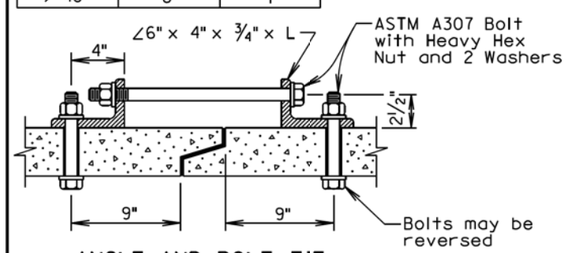
GENERAL NOTES:

Tie bolts shall conform to ASTM F1554 Grade 36 or ASTM A36. Nuts shall be heavy hex conforming to ASTM A563. Washers shall conform to ASTM F436.

Pipe Sleeve shall conform to ASTM A500 or A53, Grade B.

Galvanize adjustible eye bolt tie assembly in accordance with ASTM A153.

Pipe Dia. (in.)	"L" (in.)	Bolt Dia. (in.)
≤ 48	4	¾
> 48	6	1



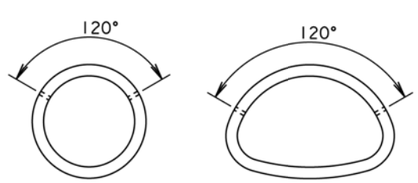
ANGLE AND BOLT TIE

GENERAL NOTES:

Angles shall conform to ASTM A36.

Bolts shall conform to ASTM A307. Nuts shall be heavy hex conforming to ASTM A563. Washers shall conform to ASTM F436.

Galvanize angles, bolts, nuts, and washers in accordance with ASTM A153.



END VIEW "CIRCULAR"

END VIEW "ARCH"

GENERAL NOTES:

In lieu of the tie bolts detailed above other types of tie bolt connections may be installed as approved by the Office of Bridge Design.

All pipe sections of R.C.P. and R.C.P. Arch shall be tied with tie bolts except for pipe located between drop inlets, manholes, and junction boxes. All pipe sections of pipes that only enter or exit drop inlets, manhole, and junction boxes shall be tied with tie bolts.

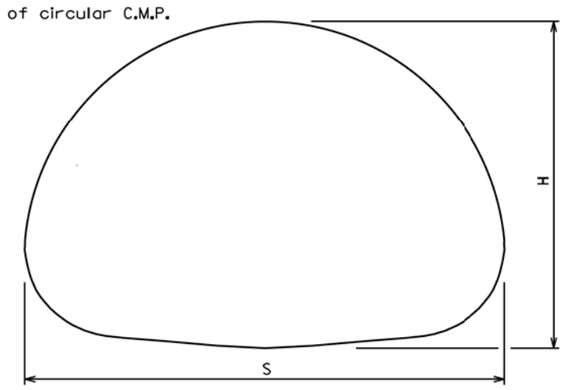
There will be no separate measurement or payment for the tie bolts. The cost for furnishing and installing the tie bolts shall be incidental to the contract unit price per foot for the corresponding bid item for R.C.P. or R.C.P. Arch.

February 28, 2013

Published Date: 3rd Qtr. 2015	SDDOT	TIE BOLTS FOR R.C.P. AND R.C.P. ARCH	PLATE NUMBER 450.18 Sheet 1 of 1

	2⅔" x ½" CORRUGATIONS			3" X 1" CORRUGATIONS		
* Dia. (in.)	S Span (in.)	H Rise (in.)	Area (Sq. Ft.)	S Span (in.)	H Rise (in.)	Area (Sq. Ft.)
15	17	13	1.1			
18	21	15	1.6			
21	24	18	2.2			
24	28	20	2.8			
30	35	24	4.4			
36	42	29	6.4	40	31	7.0
42	49	33	8.7	46	36	9.4
48	57	38	11.4	53	41	12.3
54	64	43	14.3	60	46	15.6
60	71	47	17.6	66	51	19.3
66	77	52	21.3	73	55	23.2
72	83	57	25.3	81	59	27.4
78				87	63	32.1
84				95	67	37.0
90				103	71	42.4
96				112	75	48.0
102				117	79	54.2
108				128	83	60.8
114				137	87	67.4
120				142	91	74.5

* Equivalent diameter of circular C.M.P.



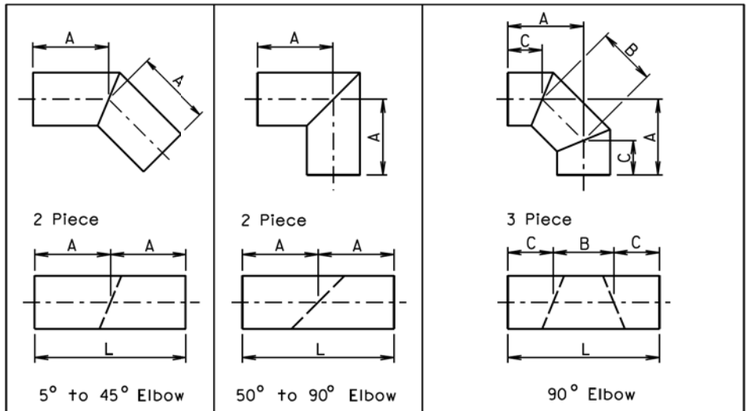
GENERAL NOTE:

All dimensions measured from inside crest.

March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	CORRUGATED METAL PIPE ARCH CULVERT	PLATE NUMBER 450.30 Sheet 1 of 1

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn



Diameter	A	L	Diameter	A	L	Diameter	A	B	C	L
Inches	Feet	Feet	Inches	Feet	Feet	Inches	Inches			Feet
12	1	2	12	2	4	12	25½	11	18½	4
15	1	2	15	2	4	15	26½	12	18	4
18	1	2	18	2	4	18	27	14	17	4
21	2	4	21	2	4	21	27	15	16½	4
24	2	4	24	2	4	24	27½	16	16	4
27	2	4	27	2	4	27	27½	17	15½	4
30	2	4	30	3	6	30	40	19	26½	6
33	2	4	33	3	6	33	40	20	26	6
36	2	4	36	3	6	36	40½	21	25½	6
42	2	4	42	3	6	42	41	23	24½	6
48	2	4	48	4	8	48	53½	26	35	8
54	3	6	54	4	8	54	54	28	34	8
60	3	6	60	4	8	60	54½	31	32½	8
66	3	6	66	4	8	66	54	33	31½	8
72	3	6	72	5	10	72	67½	36	42	10
78	3	6	78	5	10	78	68	39	40½	10
84	3	6	84	5	10	84	68½	41	39½	10
90	3	6	90	6	12	90	70	46	37	10
96	3	6	96	6	12	96	82	46	49	12

FABRICATED ELBOW LENGTHS FOR ALL CORRUGATIONS

GENERAL NOTES:

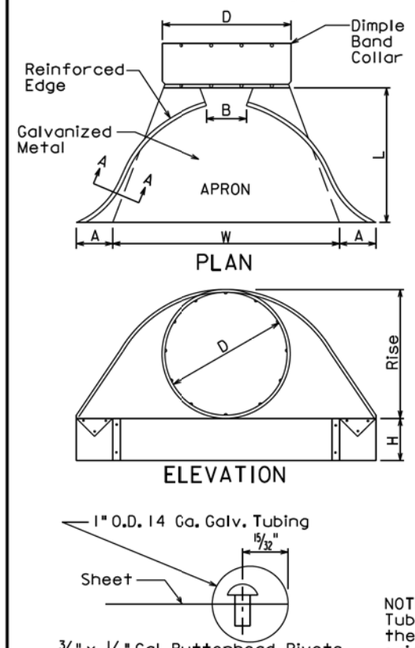
All dimensions shown are nominal.

L = Linear Feet of C.M.P. required to fabricate fitting.

June 26, 2001

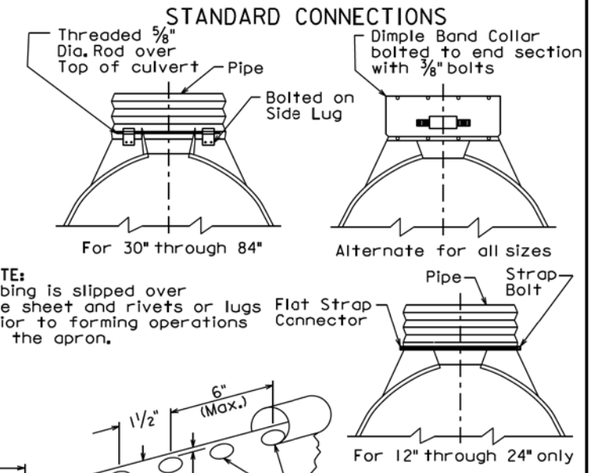
Published Date: 3rd Qtr. 2015	SDDOT	C.M.P. FABRICATED LENGTHS FOR ELBOWS	PLATE NUMBER 450.32 Sheet 1 of 1

Alternate Type Connector Sections may be used with approval of the Engineer.

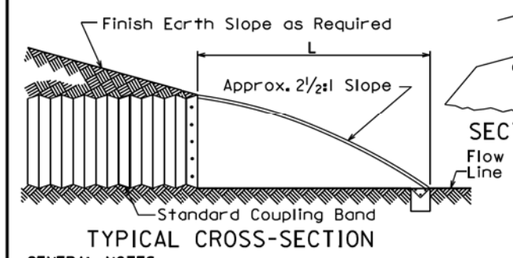


Dia. D (in.)	Ga.	DIMENSIONS (in.) A	B	H	L	W	Approx. Slope	Body
12	16	6	6	6	21	24	2½:1	1 Pc.
15	16	7	8	6	26	30	2½:1	1 Pc.
18	16	8	10	6	31	36	2½:1	1 Pc.
21	16	9	12	6	36	42	2½:1	1 Pc.
24	16	10	13	6	41	48	2½:1	1 Pc.
30	14	12	16	8	46	60	2½:1	1 Pc.
36	14	14	19	9	51	72	2½:1	2 Pc.
42	12	16	22	11	60	84	2½:1	2 Pc.
48	12	18	27	12	69	90	2¼:1	2 Pc.
54	12	18	30	12	78	102	2:1	3 Pc.
60	12	18	33	12	84	114	1¾:1	3 Pc.
66	12	18	36	12	87	120	1½:1	3 Pc.
72	12	18	39	12	87	126	1⅓:1	3 Pc.
78	12	18	42	12	87	132	1¼:1	3 Pc.
84	12	18	45	12	87	138	1⅙:1	3 Pc.

STANDARD CONNECTIONS



NOTE:
Tubing is slipped over the sheet and rivets or lugs prior to forming operations of the apron.



GENERAL NOTES:

All 3 pc. bodies shall have 12 Ga. sides and 10 Ga. center panels. Width of center panels shall be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams tightly joined by 3/8" Dia. galvanized rivets or bolts.

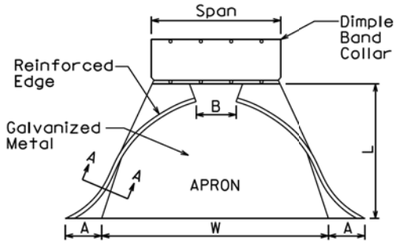
For 60" through 84" sizes, reinforced edges shall be supplemented with galvanized stiffener angles. The angles will be 2" x 2" x 1/4" for 60" through 72" diameters and 2½" x 2½" x 1/4" for 78" and 84" diameters. The angles shall be attached by 3/8" diameter galvanized nuts and bolts.

Rivets and Bolts shall be 3/8" Dia. Min. for 10 Ga. and 12 Ga. sheet, and 5/16" Dia. Min. for 14 Ga. and 16 Ga. sheets. Tighten nuts with torque wrench to 25 lbs. torque.

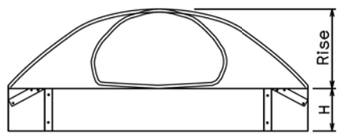
March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	C.M.P. FLARED ENDS	PLATE NUMBER 450.35 Sheet 1 of 1

Alternate Type Connector Sections may be used with approval of the Engineer.



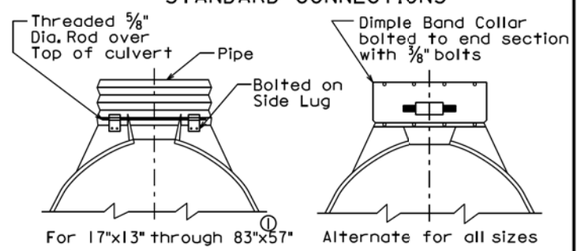
PLAN



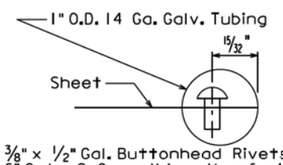
ELEVATION

Span x Rise (in.)x(in.)	Equiv. Dia. (in.)	Ga.	APPROX. DIMENSIONS (in.) A	B	H	L	W	Approx. Slope	Body
17x13	15	16	7	9	6	19	30	2½:1	1 Pc.
21x15	18	16	7	10	6	23	36	2½:1	1 Pc.
24x18	21	16	8	12	6	28	42	2½:1	1 Pc.
28x20	24	16	9	14	6	32	48	2½:1	1 Pc.
35x24	30	14	10	16	6	39	60	2½:1	1 Pc.
42x29	36	14	12	18	8	46	75	2½:1	1 Pc.
49x33	42	12	13	21	9	53	85	2½:1	2 Pc.
57x38	48	12	16	26	12	63	90	2½:1	2 Pc.
64x43	54	12	18	30	12	70	102	2¼:1	2 Pc.
71x47	60	12	18	33	12	77	114	2¼:1	3 Pc.
77x52	66	12	18	36	12	77	126	2:1	3 Pc.
83x57	72	12	18	39	12	77	133	2:1	3 Pc.

STANDARD CONNECTIONS



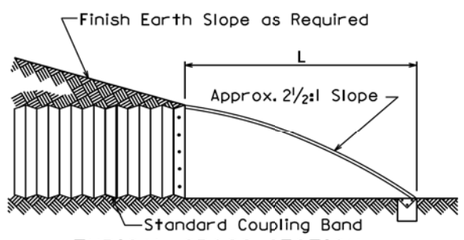
① For 17" through 28" span pipe-arches a flat strap connector may be used in place of the rod connection. Strap connector shall be 1" wide, 12 ga. strap with standard 6" long x ½" dia. bond bolt and nut.



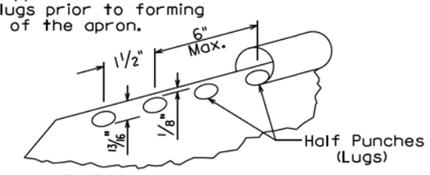
⅜" x ½" Gal. Buttonhead Rivets spaced 6" C. to C. Overall length of rivets=0.78"

TUBING ATTACHMENT DETAILS
SECTION A-A

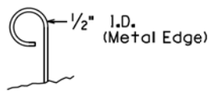
NOTE:
Tubing is slipped over the sheet and rivets or lugs prior to forming operations of the apron.



TYPICAL CROSS-SECTION



SECTION A-A (alternate)



SECTION A-A (alternate)

GENERAL NOTES:

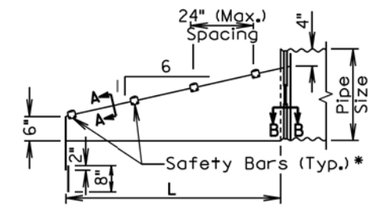
All 3 pc. bodies shall have 12 Ga. sides and 10 Ga. center panels. Width of center panels shall be greater than 20% of the pipe periphery. Multiple panel bodies shall have lap seams tightly joined by ⅜" Dia. galvanized rivets or bolts.

For 77" x 52" and 83" x 57" sizes, reinforced edges shall be supplemented with galvanized stiffener angles. The angles will be 2" x 2" x ¼" for both the 77" x 52" size and the 83" x 57" size. The angles shall be attached by ⅜" Dia. galvanized nuts and bolts.

Rivets and Bolts shall be ⅜" Dia. Min. for 10 Ga. and 12 Ga. sheet, and 5/16" Dia. Min. for 14 Ga. and 16 Ga. sheets. Tighten nuts with torque wrench to 25 lbs. torque.

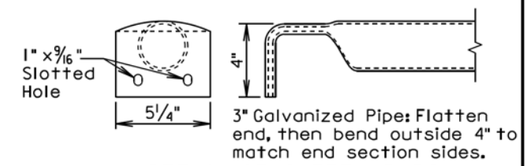
March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	C.M.P. ARCH FLARED ENDS	PLATE NUMBER 450.36 Sheet 1 of 1

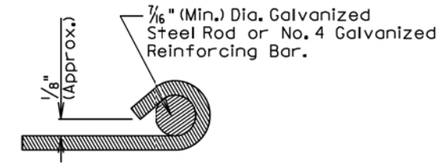


ELEVATION VIEW

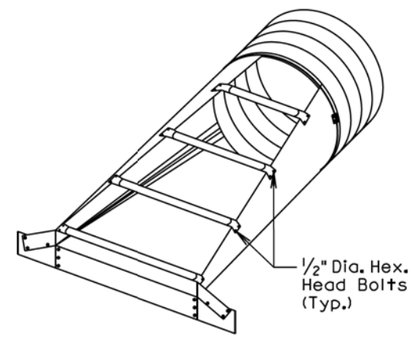
* Number of bars required will vary depending on the length of the end section.



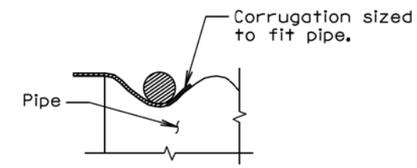
DETAIL OF SAFETY BARS



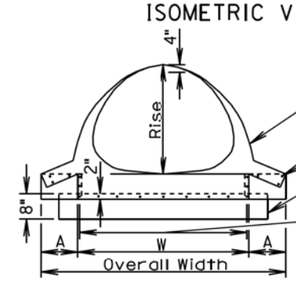
SECTION A-A



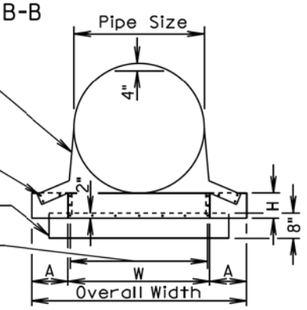
ISOMETRIC VIEW



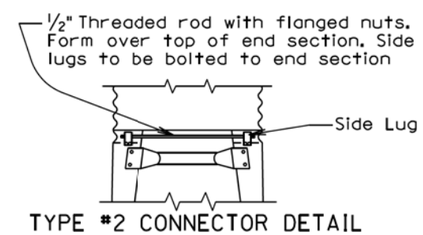
SECTION B-B



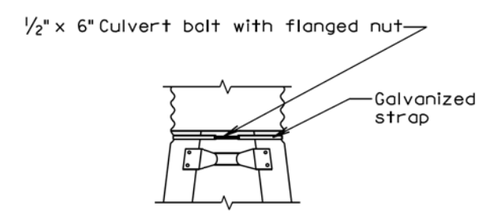
FRONT VIEW



FRONT VIEW



TYPE #2 CONNECTOR DETAIL
(For 30" and Larger)
(For 21" X 15" and Larger)



TYPE #1 CONNECTOR DETAIL
(For 15" Through 24")

June 26, 2015

Published Date: 3rd Qtr. 2015	SDDOT	C. M. P. SAFETY ENDS	PLATE NUMBER 450.38 Sheet 1 of 2

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn

ARCH C.M.P. SAFETY ENDS										
Equv. Dia. (Inch)	(Inches)		Min. Thick.		Dimensions (Inches)				L Dimensions	
	Span	Rise	Inch	Gage	A	H	W	Overall Width	Slope	Length (Inch)
18	21	15	.064	16	8	6	27	43	6:1	30
21	24	18	.064	16	8	6	30	46	6:1	48
24	28	20	.064	16	8	6	34	50	6:1	60
30	35	24	.079	14	12	9	41	65	6:1	84
36	42	29	.109	12	12	9	48	72	6:1	114
42	49	33	.109	12	16	12	55	87	6:1	138
48	57	38	.109	12	16	12	63	95	6:1	168
54	64	43	.109	12	16	12	70	102	6:1	198
60	71	47	.109	12	16	12	77	109	6:1	222
72	83	57	.109	12	16	12	89	121	6:1	282

CIRCULAR C.M.P. SAFETY ENDS								
Pipe Dia. (Inch)	Min. Thick.		Dimensions (Inches)				L Dimensions	
	Inch	Gage	A	H	W	Overall Width	Slope	Length (Inch)
15	.064	16	8	6	21	37	6:1	30
18	.064	16	8	6	24	40	6:1	48
21	.064	16	8	6	27	43	6:1	66
24	.064	16	8	6	30	46	6:1	84
30	.109	12	12	9	36	60	6:1	120
36	.109	12	12	9	42	66	6:1	156
42	.109	12	16	12	48	80	6:1	192
48	.109	12	16	12	54	86	6:1	228
54	.109	12	16	12	60	92	6:1	264
60	.109	12	16	12	66	98	6:1	300

GENERAL NOTES:

Safety ends shall be fabricated from galvanized steel conforming to the requirements of the Specifications.

Safety bars shall be fabricated from steel schedule 40 pipe in conformance with ASTM A53, grade B or HSS 3.5X.216 in conformance with ASTM A500, grade B.

Slotted holes for safety bar attachment shall be provided for all end sections.

Attachment to circular pipes 15" through 24" diameter shall be made with Type #1 straps. All other sizes shall be attached with Type #2 rods and lugs.

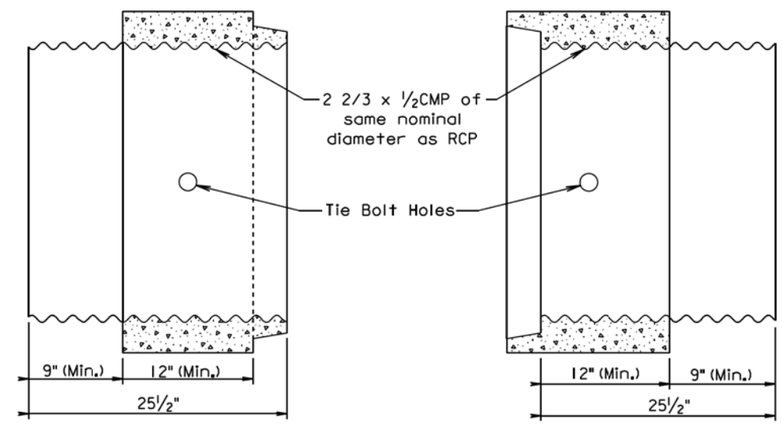
When stated in the plans, optional toe plate extension shall be punched and bolted to end section apron lip with 3/8" diameter galvanized bolts. Steel for toe plate extension shall be same gauge as end section. Dimensions shall be overall width less 6" by 8" high.

Installation shall be performed in accordance with the Specifications.

Cost of all work and materials required for fabrication and installation of safety ends shall be incidental to the bid items for the various sizes of safety ends.

June 26, 2015

Published Date: 3rd Qtr. 2015	SDDOT	C. M. P. SAFETY ENDS	PLATE NUMBER 450.38
			Sheet 2 of 2



INLET
(CMP to RCP Transition)

OUTLET
(RCP to CMP Transition)

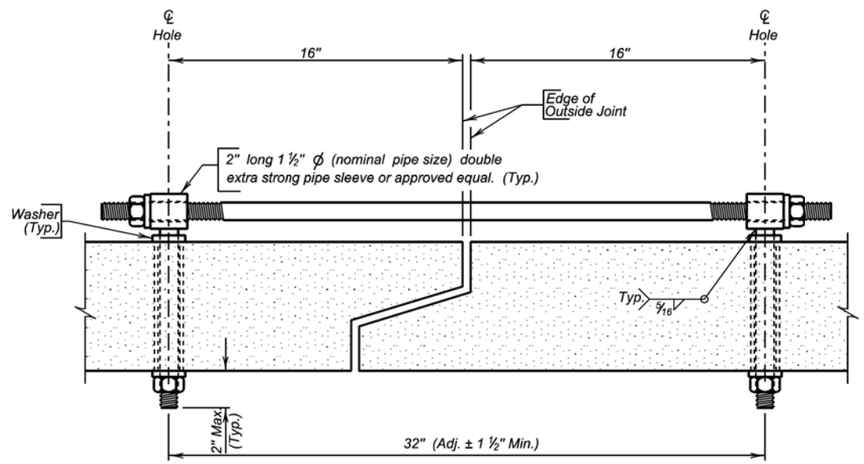
GENERAL NOTE:

Arch pipe transitions shall be fabricated similar to the round transition shown above.

March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	C.M.P. TO R.C.P. TRANSITION AND R.C.P. TO C.M.P. TRANSITION	PLATE NUMBER 450.50
			Sheet 1 of 1

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn



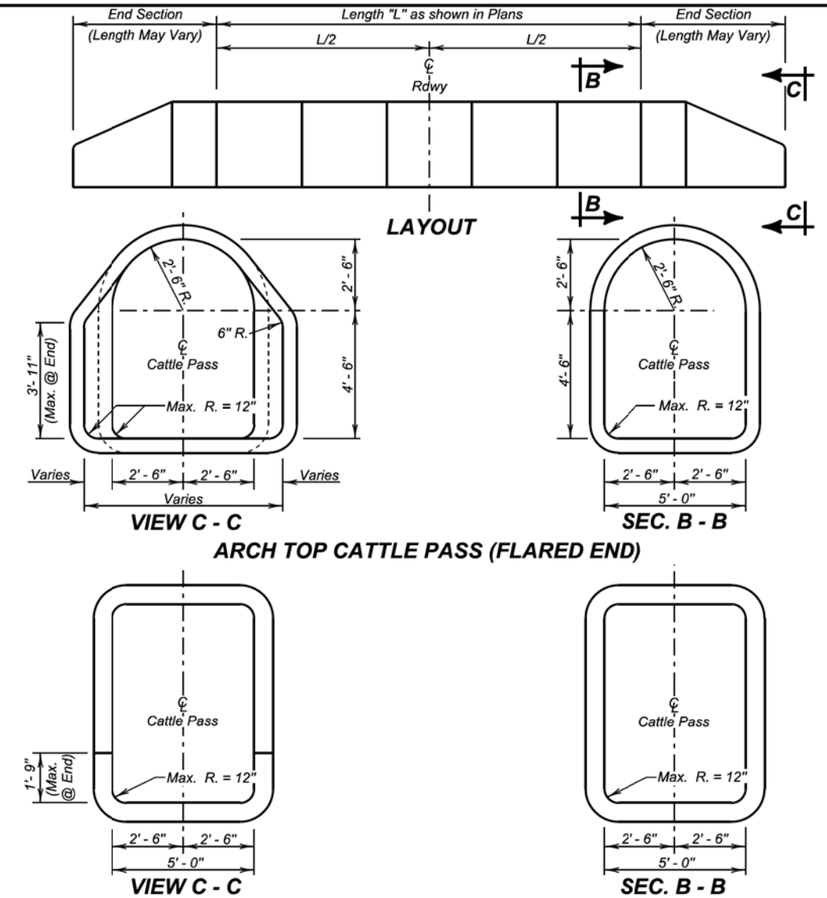
TIE BOLT ASSEMBLY

GENERAL NOTES:

1. All holes for tie bolts shall be cast-in-place,16 inches from outside edge of joint. Cast in inserts or sleeves, if used, shall be made of a corrosion resistant material.
2. Ties shall be 1 inch Ø and conform to the requirements of ASTM A36. Nuts shall be heavy hex in conformance with ASTM A563. Washers shall conform to ASTM F436, Type 1. The welded pipe sleeve shall conform to ASTM A53, Grade B.
3. Welding and weld inspection shall be in conformance with AWS/ANSI D1.1 - (Current Year) Structural Welding Code - Steel.
4. Tie Bolt Assembly shall be galvanized in accordance with ASTM A153.
5. Tie Bolt Assembly details may vary from that shown, but alternate tie bolt assemblies are subject to testing to demonstrate equal strength. Submit details, through proper channels, to the Office of Bridge Design for approval.
6. All costs for furnishing and installing the precast box culvert tie bolt assembly shall be incidental to the contract unit price per Foot for "Precast Concrete Box Culvert, Furnish".

December 23, 2012

Published Date: 3rd Qtr. 2015	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1



GENERAL NOTES:

1. Unless otherwise specified elsewhere in the plans, cattle pass may be either cast-in-place or precast. For cast-in-place cattle pass details, see Standard Plate 560.33.
2. Precast cattle pass shall be on the current approved list available through proper channels from the SDDOT Office Of Bridge Design. To qualify for addition to the approved list, submit a checked design, done by South Dakota Registered Professional Engineers, and shop plans to the Office of Bridge Design for approval. Design shall be in accordance with the current ediiion of the AASHTO LRFD Bridge Design Specifications.
3. The provisions of Sections 450 and 990 of the Specifications pertaining to Reinforced Concrete Pipe shall apply to the furnishing and installing of the precast cattle pass.
4. Shapes other than that shown will be allowed. Submit details to the Office of Bridge Design for approval.
5. Minimum section length shall be 4 feet.
6. Lift holes shall be plugged with a grout in conformance with Section 460.2 K. of the Specifications.
7. Each section shall be tied to adjacent sections with tie bolts conforming to Standard Plate 560.01.
8. All costs associated with furnishing and installing the cattle pass, whether cast-in-place or precast, shall be incidental to the corresponding furnish and install bid items for "5' x 7' Reinforced Concrete Cattle Pass" and "5' x 7' Reinforced Concrete Cattle Pass End Section".

June 26, 2015

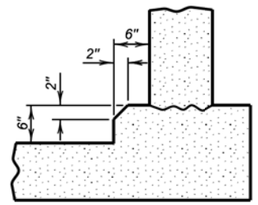
Published Date: 3rd Qtr. 2015	SDDOT	PRECAST 5' X 7' CATTLE PASS	PLATE NUMBER 560.31
			Sheet 1 of 1

SPECIFICATIONS:

1. Design Specifications: AASHTO LRFD Bridge Design Specification, 2012 Edition.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, Current Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

GENERAL NOTES:

1. Design Live Load: HL 93 and construction load consisting of one 7' - 6" gage axle with gross weight = 95,850 pounds. The construction load shall not be applied until a minimum of 4 feet of fill has been placed over the Box Culvert. Other construction loads in excess of legal load must be submitted through proper channels to the Office of Bridge Design for analysis.
2. The design of the barrel section is based on a minimum fill height of 2 feet and includes all subsequent fill heights up to and including the maximum fill height of 15 feet (S3).
3. Design Material Strengths: Concrete f'c = 4500 p.s.i.
   Reinforcing Steel f's = 60000 p.s.i.
4. All concrete shall conform to Section 460.
5. All reinforcing steel shall conform to ASTM A615 Grade 60.
6. All exposed edges shall be chamfered ¾ inch.
7. Use 1 inch clear cover on all reinforcing steel EXCEPT as shown.
8. The Contractor shall imprint on the struciure the date of construction as specified and detailed on Standard Plate 460.02.
9. Care shall be taken to establish Working Points (W. P.) as shown on the wings.
10. Circled numbers in PLAN and ELEVATION views are section I.D. Numbers (see SDDOT Materials Manual).
11. The Specified Density method shall be used for the compaction of earth embankment and box culvert backfill material.
12. Unless otherwise specified elsewhere in the plans, cattle passes may either be cast-in-place or precast. For precast cattle pass details, see Standard Plate 560.31.
13. All costs associated with furnishing and installing the cattle pass, whether cast-in-place or precast, shall be incidental to the corresponding furnish and install bid items for "5' x 7' Reinforced Concrete Cattle Pass" and "5' x 7' Reinforced Concrete Cattle Pass End Section".



OPTIONAL FILLET DETAIL

(At Bottom Slab)

Note: Contractor may form the optional full fillet, with 2 inch Chamfer, as detailed. The cost of the additional concrete shall be borne by the Contractor.

OPTIONAL POUR - BOTTOM SLAB

The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length shall be full width of the bottom slab. Care shall be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option shall be borne by the Contractor.

INFORMATIONAL QUANTITIES

ITEM	UNIT	CATTLE PASS END SECTIONS (2)	CATTLE PASS BARREL
Class A45 Concrete	Cu. Yd.	13.5	0.650 L
Reinforcing Steel	Lb.	2194	✳103.381 L + 201.433
Structure Excavation	Cu. Yd.	5.3	0.177 L

✳ Quantity includes z1 bars for one construction joint. When additional construction joints are required adjust quantity of reinforcing steel. Additional reinforcing steel required = 65.709 x (No. of construction joints - 1).

June 26, 2015

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LEGEND FOR PLACING RE-STEEL

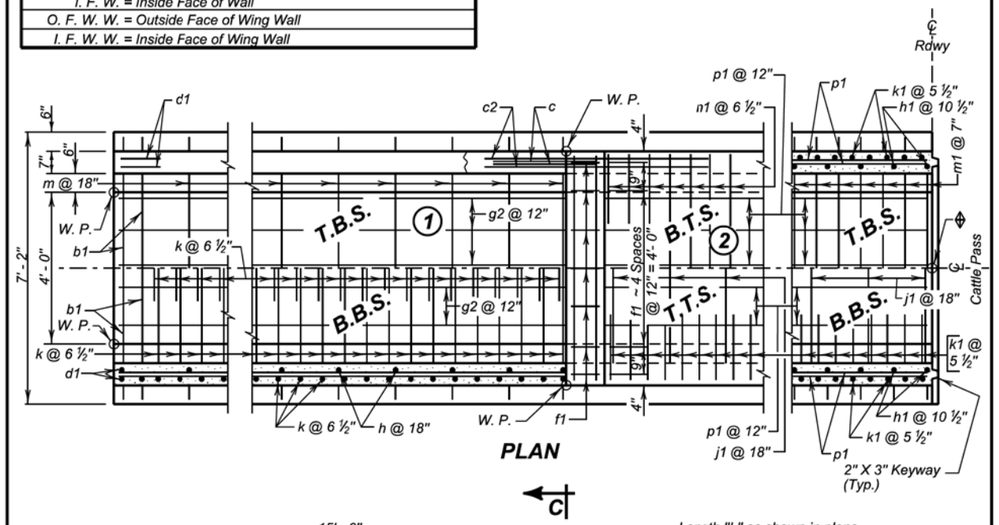
T. T. S. = Top of Top Slab
B. T. S. = Bottom of Top Slab
T. B. S. = Top of Bottom Slab
B. B. S. = Bottom of Bottom Slab
O. F. W. = Outside Face of Wall
I. F. W. = Inside Face of Wall
O. F. W. W. = Outside Face of Wing Wall
I. F. W. W. = Inside Face of Wing Wall

NOTES:

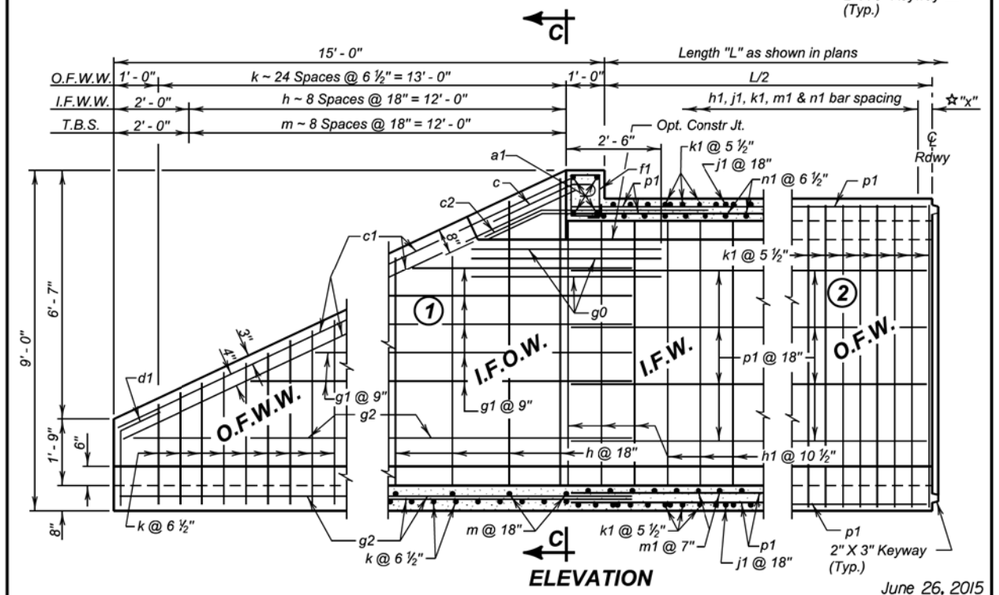
Place z1 bars through construction joint between barrels as shown on Standard Plate 460.10.

☆ Maximum dimension "x" equal to one-half of bar spacing.

⊕ Station referred to in plans.



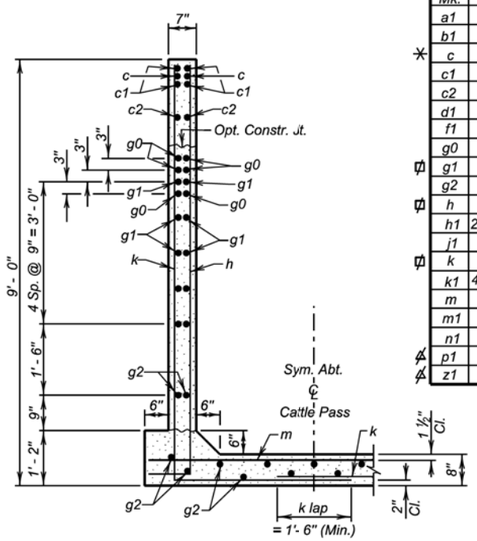
PLAN



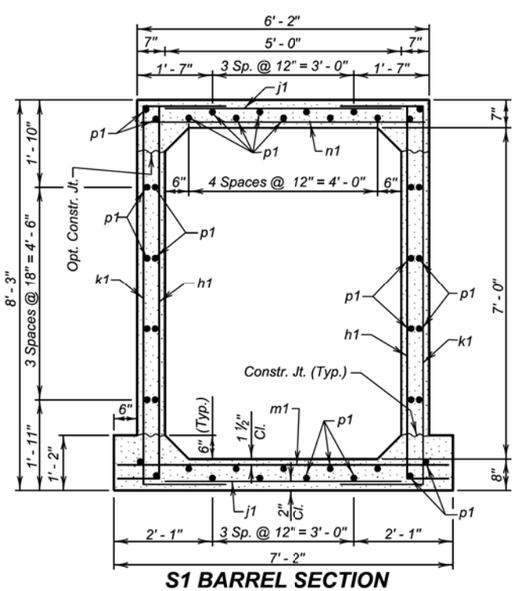
ELEVATION

June 26, 2015

Published Date: 3rd Qtr. 2015 | SDDOT | CAST-IN-PLACE 5' X 7' CATTLE PASS | PLATE NUMBER 560.33 | Sheet 2 of 3



SEC. C - C



S1 BARREL SECTION

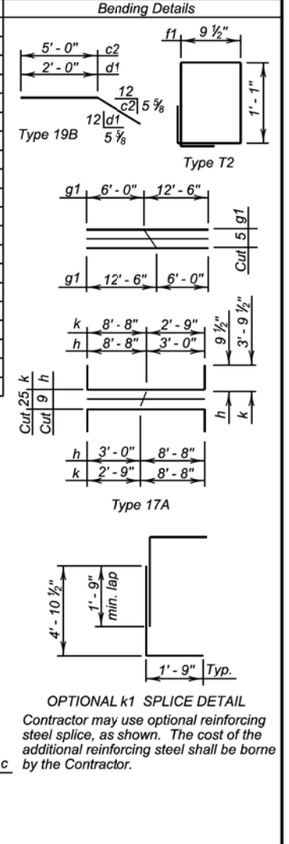
(15' - 0" Maximum Fill)

REINFORCING SCHEDULE

(For 2 Barrel Sections & 2 Ends)

	Mk.	ϕ No.	Size	Length	Type
	a1	8	6	6' - 0"	Str.
	b1	8	6	7' - 0"	Str.
✳	c	8	5	4' - 6"	1A
	c1	16	5	15' - 6"	Str.
	c2	8	5	7' - 0"	19B
	d1	8	5	3' - 9"	19B
	f1	14	4	4' - 6"	T2
	g0	24	5	5' - 0"	Str.
⌀	g1	20	4	18' - 6"	Str.
	g2	34	4	15' - 9"	Str.
⌀	h	18	4	13' - 3"	17A
	h1	2.28(L + 2)	4	8' - 9"	17A
	j1	1.33L	4	5' - 0"	Str.
⌀	k	50	4	19' - 0"	17A
	k1	4.36(L + 2)	4	11' - 6"	17
	m	18	4	7' - 0"	Str.
	m1	1.71L	5	7' - 0"	Str.
	n1	1.85L	5	6' - 0"	Str.
∡	p1	84	4	L/2 + 9"	Str.
∡	z1	⊛	5	3' - 6"	Str.

Bending Details



OPTIONAL k1 SPLICE DETAIL

Contractor may use optional reinforcing steel splice, as shown. The cost of the additional reinforcing steel shall be borne by the Contractor.

NOTES:

All dimensions are out to out of bars.

⌀ See cutting diagram.

✳ Bend in field as necessary to fit.

Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.

∡ When "L" exceeds 118'- 0" additional construction joints are required. Divide length "L" into sections not to exceed 59' - 0". Minimum section length is 20' - 0". Number of p1 bars required is 42 x (no. of sections). Adjust length of p1 bars to provide 1½ inches clear at end of bars. Number of z1 bars required is 18 x (no. of construction joints).

ϕ Round number of bars up to the nearest whole number, except round h1, k1, and j1 up to the nearest even whole number.

⊛ 18 z1 bars required at each construction joint.

June 26, 2015

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SDDOT

CAST-IN-PLACE 5' X 7' CATTLE PASS

PLATE NUMBER 560.33

Sheet 3 of 3

SPECIFICATIONS

1. Design Specifications: AASHTO Specifications for Highway Bridges, 1996 Edition (Service Load).
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, Current Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

GENERAL NOTES

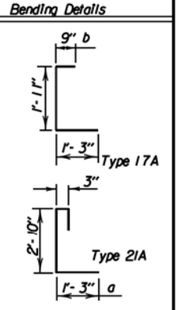
1. Design Loading: HS20-44 AASHTO.
2. Cattle Guards shall be constructed in accordance with Section 610.
3. All concrete shall be Class M6 in accordance with Section 462.
4. All reinforcing steel shall conform to ASTM A615, Grade 60.
5. Use 1½" clear cover on all reinforcing steel except as shown.
6. All structural steel shall conform to ASTM A709, Grade 36. The End Welded Deformed Bar Anchors shall conform to ASTM A496. The ½" ϕ x 6" Concrete Anchors shall conform to Section 970.2 B. All bolts and washers shall conform to ASTM A307, except that lock washers shall conform to ASI B18.21.1.
7. ¾" ϕ Concrete Inserts shall be internally threaded for use with a standard galvanized A307 Bolt and shall be of such design that when installed in the concrete it will be capable of sustaining a safe working load in tension of 5500 pounds. The Inserts shall be galvanized or made of a corrosion resistant material.
8. The Armor Angles, Connecting Channels and Bearing Plates shall be painted with a paint system which conforms to Section 412.2 and shall be applied in accordance with the manufacturer's recommendations. The top coat shall be green in color, conforming to Federal Standard 24108.
9. If Cattle Guard must be installed to conform to a grade other than a zero grade, all elements of the Cattle Guard foundation shall be built normal to the grade.
10. Alternate designs will be considered; submit detailed drawings and specifications of the proposed similar cattle guard through proper channels to the Office of Bridge Design for approval.
11. In lieu of concrete Inserts and A307 Bolts, a ¾" dia. A307 rod threaded full length may be drilled and epoxied into the hardened concrete. The diameter of the drilled holes in the concrete for the threaded rod shall not be less than ⅛" nor more than ⅜" greater than the overall diameter of the threaded rod and the depth shall be a minimum of ten rod diameters.
12. The epoxy resin mixture for bonding the threaded rod in place shall conform to requirements for bonding steel to hardened concrete and be on the Department's current approved list.
13. The epoxy resin adhesive shall be mixed and applied as recommended by the manufacturer. Special attention must be given to the elimination of voids by using effective grouting procedures as approved by the Engineer.
14. Soil Bearing Pressure shall be a minimum of 3000 psf as approved by the Engineer.

REINFORCING SCHEDULE

(For Two Foundations)

	Mk.	No.	Size	Length	Type
10' GUARD	a	22	4	5'- 4"	21A
	b	22	4	3'- 11"	17A
	c	22	4	9'- 9"	Str.
	f	18	4	1'- 9"	Str.
12' GUARD	a	26	4	5'- 4"	21A
	b	26	4	3'- 11"	17A
	c	22	4	11'- 9"	Str.
	f	22	4	1'- 9"	Str.
14' GUARD	a	30	4	5'- 4"	21A
	b	30	4	3'- 11"	17A
	c	22	4	13'- 9"	Str.
	f	26	4	1'- 9"	Str.
20' GUARD	a	42	4	5'- 4"	21A
	b	42	4	3'- 11"	17A
	c	22	4	19'- 9"	Str.
	f	38	4	1'- 9"	Str.
24' GUARD	a	50	4	5'- 4"	21A
	b	50	4	3'- 11"	17A
	c	22	4	23'- 9"	Str.
	f	46	4	1'- 9"	Str.
30' GUARD	a	62	4	5'- 4"	21A
	b	62	4	3'- 11"	17A
	c	22	4	29'- 9"	Str.
	f	58	4	1'- 9"	Str.

Bending Details



NOTE: All dimensions are out to out of bars.

INFORMATIONAL QUANTITIES

(For Two Foundations)

	ITEM	UNIT	QUANTITY					
			10' GUARD	12' GUARD	14' GUARD	20' GUARD	24' GUARD	30' GUARD
	Class M6 Concrete	Cu. Yd.	2.8	3.3	3.9	5.5	6.6	8.3
	Reinforcing Steel	Lb.	300	359	418	594	712	888
✳	Structural Steel	Lb.	487	524	561	671	745	856

✳ Includes Armor Angles with Bar Anchors, Bearing Plates with Concrete Anchors, Connecting Channels, Bolts and Washers; excludes Concrete Inserts.

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SDDOT

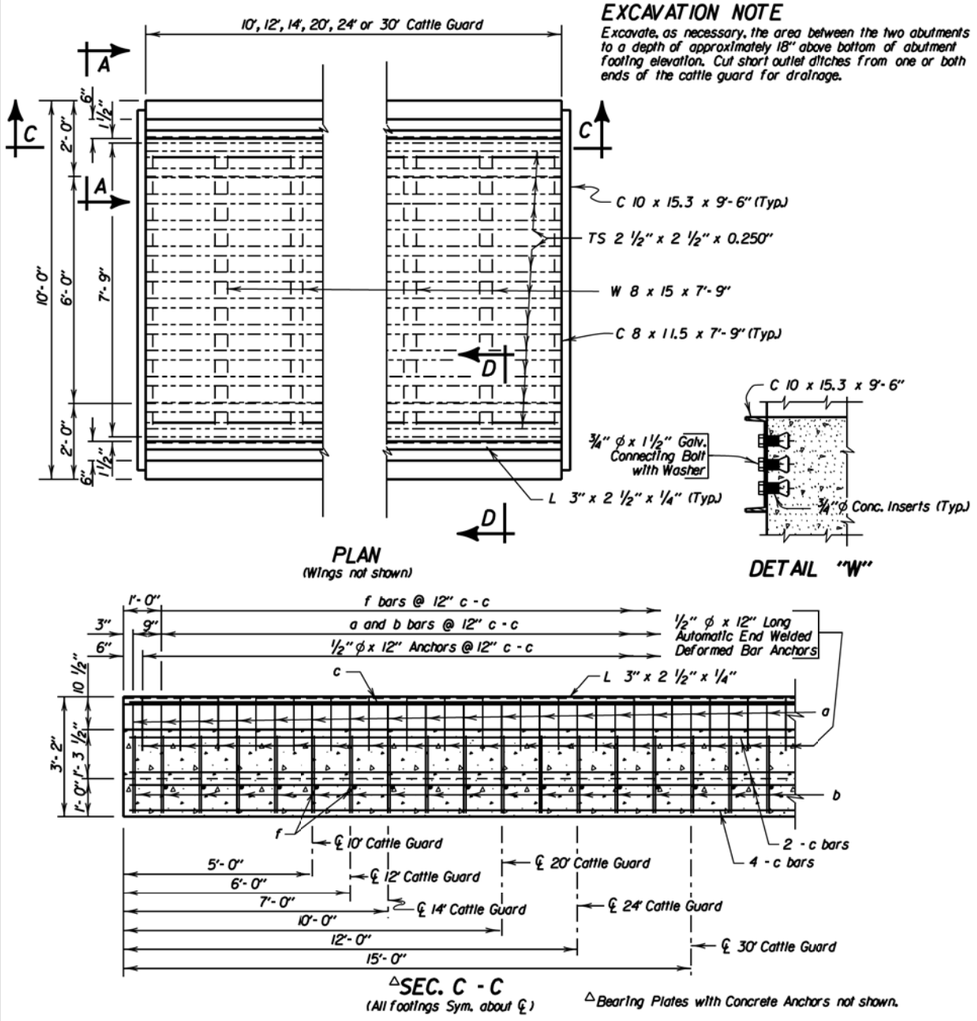
CAST-IN-PLACE CATTLE GUARD FOUNDATIONS

PLATE NUMBER 610.01

Sheet 1 of 3

EXCAVATION NOTE

Excavate, as necessary, the area between the two abutments to a depth of approximately 18" above bottom of abutment footing elevation. Cut short outlet ditches from one or both ends of the cattle guard for drainage.



BILL OF MATERIALS
(For Two Foundations)

ITEM	UNIT	QUANTITY					
		10' GUARD	12' GUARD	14' GUARD	20' GUARD	24' GUARD	30' GUARD
Bearing ℙ (6" Width)	Each	4	4	4	4	4	4
Bearing ℙ (12" Width)	Each	8	10	12	18	22	28
Connecting Channels	Each	2	2	2	2	2	2
Clamping Bolts	Each	20	24	28	40	48	60
Connecting Bolts	Each	24	24	24	24	24	24

June 26, 2015

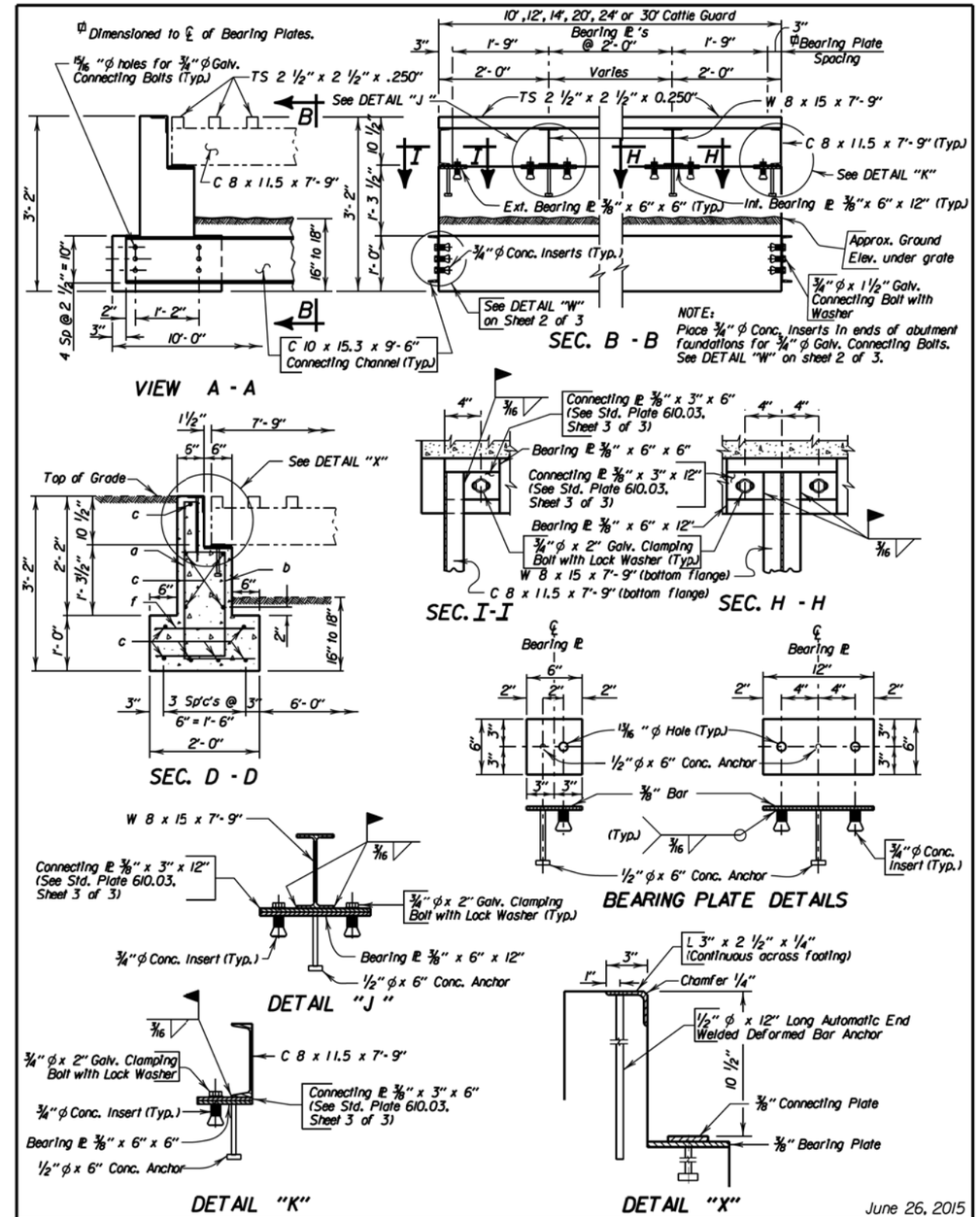
Published Date: 3rd Qtr. 2015

SDDOT

CAST-IN-PLACE CATTLE GUARD FOUNDATIONS

PLATE NUMBER 610.01

Sheet 2 of 3



June 26, 2015

Published Date: 3rd Qtr. 2015

SDDOT

CAST-IN-PLACE CATTLE GUARD FOUNDATIONS

PLATE NUMBER 610.01

Sheet 3 of 3

SPECIFICATIONS

1. Design Specifications: AASHTO Specifications for Highway Bridges, 1996 Edition (Service Load).
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, Current Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

GENERAL NOTES

1. Design Loading: HS20-44 AASHTO.
2. Cattle Guards shall be constructed in accordance with Section 610.
3. All concrete shall be Class M6 in accordance with Section 462.
4. All reinforcing steel shall conform to ASTM A615, Grade 60.
5. Use 1 1/2" clear cover on all reinforcing steel except as shown.
6. All structural steel shall conform to ASTM A709, Grade 36. The End Welded Deformed Bar Anchors shall conform to ASTM A496. The 1/2"ϕ x 6" Concrete Anchors shall conform to Section 970.2 B. All bolts, nuts, and washers shall conform to ASTM A307, except that lock washers shall conform to AISI B18.21.1.
7. Welding and weld inspection shall be in accordance with AWS D1.1(Current Year).
8. 3/4"ϕ Concrete Inserts shall be internally threaded for use with a standard galvanized A307 Bolt and shall be of such design that when installed in the concrete it will be capable of sustaining a safe working load in tension of 5500 pounds. The Inserts shall be galvanized or made of a corrosion resistant material.
9. The Armor Angles, Connecting Plates, Connecting Channels, and Bearing Plates shall be painted with a paint system which conforms to Section 412.2 and shall be applied in accordance with the manufacturer's recommendations. The top coat shall be green in color, conforming to Federal Standard 24108.
10. If Cattle Guard must be installed to conform to a grade other than a zero grade, all elements of the Cattle Guard foundation shall be built normal to the grade.
11. Alternate designs will be considered; submit detailed drawings and specifications of the proposed similar cattle guard through proper channels to the Office of Bridge Design for approval.
12. Soil Bearing Pressure shall be a minimum of 3000 psf as approved by the Engineer.

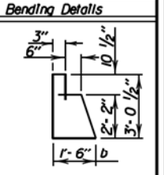
MAKEUP QUANTITIES FOR PRECAST FOUNDATION UNITS

TYPE OF UNIT	BEARING PLATES 6" Width	BEARING PLATES 12" Width	M6 CONC. (Cu. Yds.)	APPROX. WEIGHT OF UNIT (lb.)	CHANNEL CONN. PLATES
6'-0"	2	2	0.9	3760	2
8'-0"	2	3	1.2	4990	2
10'-0"	2	4	1.5	6270	2

REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type
6'-0" Unit	b	6	4	9'-0"	21A
	e	7	4	5'-8"	Str.
8'-0" Unit	b	7	4	9'-0"	21A
	e	7	4	7'-8"	Str.
10'-0" Unit	b	9	4	9'-0"	21A
	e	7	4	9'-8"	Str.

Bending Details



Type 21A

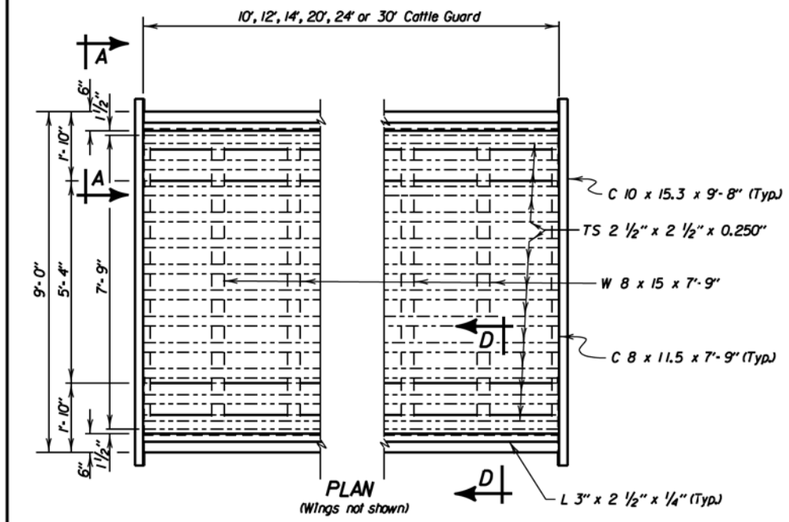
NOTE: All dimensions are out to out of bars.

BILL OF MATERIALS FOR CATTLE GUARD FOUNDATIONS

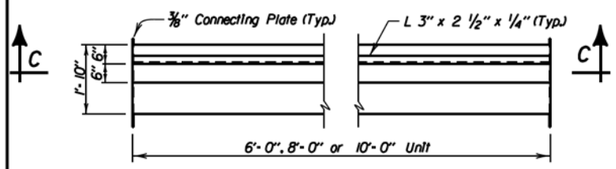
WIDTH OF CATTLE GUARD	PRECAST FOUNDATION UNITS 6'-0"	8'-0"	10'-0"	CONN. CHANNELS	CLAMP. BOLTS	CONN. BOLTS
10'			2	2	20	24
12'	4			2	24	36
14'	2	2		2	28	36
20'			4	2	40	36
24'		6		2	48	48
30'			6	2	60	48

June 26, 2015

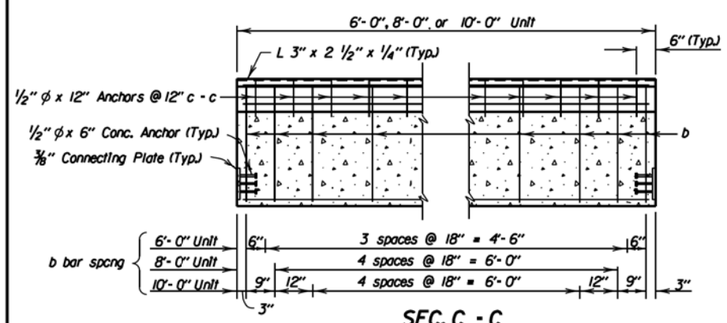
Published Date: 3rd Qtr. 2015 | SDDOT | PRECAST CATTLE GUARD FOUNDATIONS | PLATE NUMBER 610.02 | Sheet 1 of 3



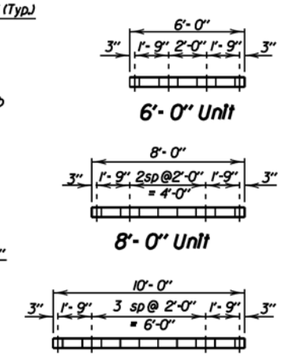
PLAN
(Wings not shown)



PLAN OF PRECAST FOUNDATION UNITS
(Bearing Plates not shown)



SEC. C - C
(Bearing Plates with Conc. Anchors not shown)



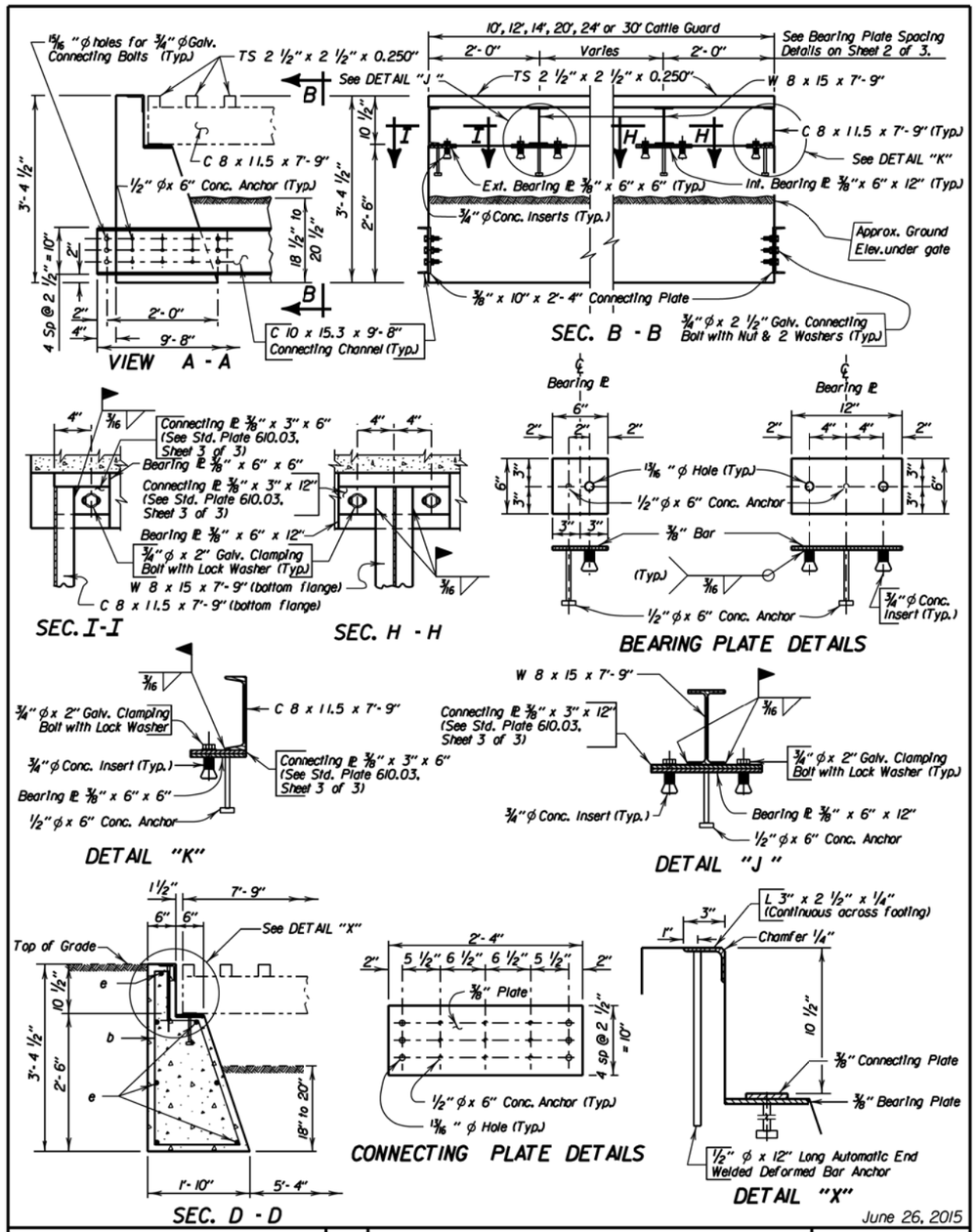
EXCAVATION NOTE

Excavate, as necessary, the area between the two abutments to a depth of approximately 18" above bottom of abutment footing elevation. Cut short outlet ditches from one or both ends of the cattle guard for drainage.

BEARING PLATE SPACING DETAILS
(All dimensions refer to ℄ of Bearing Plates)

June 26, 2015

Published Date: 3rd Qtr. 2015 | SDDOT | PRECAST CATTLE GUARD FOUNDATIONS | PLATE NUMBER 610.02 | Sheet 2 of 3



June 26, 2015

Published Date: 3rd Qtr. 2015	SDDOT	PRECAST CATTLE GUARD FOUNDATIONS	PLATE NUMBER 610.02 Sheet 3 of 3

SPECIFICATIONS

1. Design Specifications: AASHTO Specifications for Highway Bridges, 1996 Edition (Service Load).
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, Current Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

GENERAL NOTES

1. Design Loading: HS20-44 AASHTO.
2. Cattle Guards shall be constructed in accordance with Section 610.
3. All structural steel shall conform to ASTM A709, Grade 36. Structural tubing shall conform to ASTM A500, Grade B. All bolts and nuts shall be galvanized and shall conform to ASTM A307. All lock washers shall be galvanized and shall conform to AISI B18.21.1.
4. Welding and weld inspection shall be in accordance with AWS D1.1-(Current Year).
5. Cattle Guard Grate, Wings, and Connecting Plates shall be painted with a paint system which conforms to Section 412.2 and shall be applied in accordance with the manufacturer's recommendations. The top coat shall be green in color, conforming to Federal Standard 24108.
6. Grate Sections may be combined to obtain larger grate widths. Refer to Detail of Multiple Installation Joint on this sheet when larger grate widths are required.
7. Cattle Guard Grate & Wing Details shall be used in conjunction with Cast-In-Place or Precast Cattle Guard Foundation Details on Std. Plate 610.01 or 610.02 when Cattle Guard Foundations are required.
8. Alternate designs will be considered; submit detailed drawings and specifications of the proposed similar cattle guard grate or wing through proper channels to the Office of Bridge Design for approval.

INFORMATIONAL QUANTITIES

ITEM	UNIT	QUANTITY			
		10' GRATE	12' GRATE	14' GRATE	2-WINGS
Structural Steel	Lb.	1496	1783	2070	114

BILL OF MATERIALS FOR CATTLE GUARD GRATES

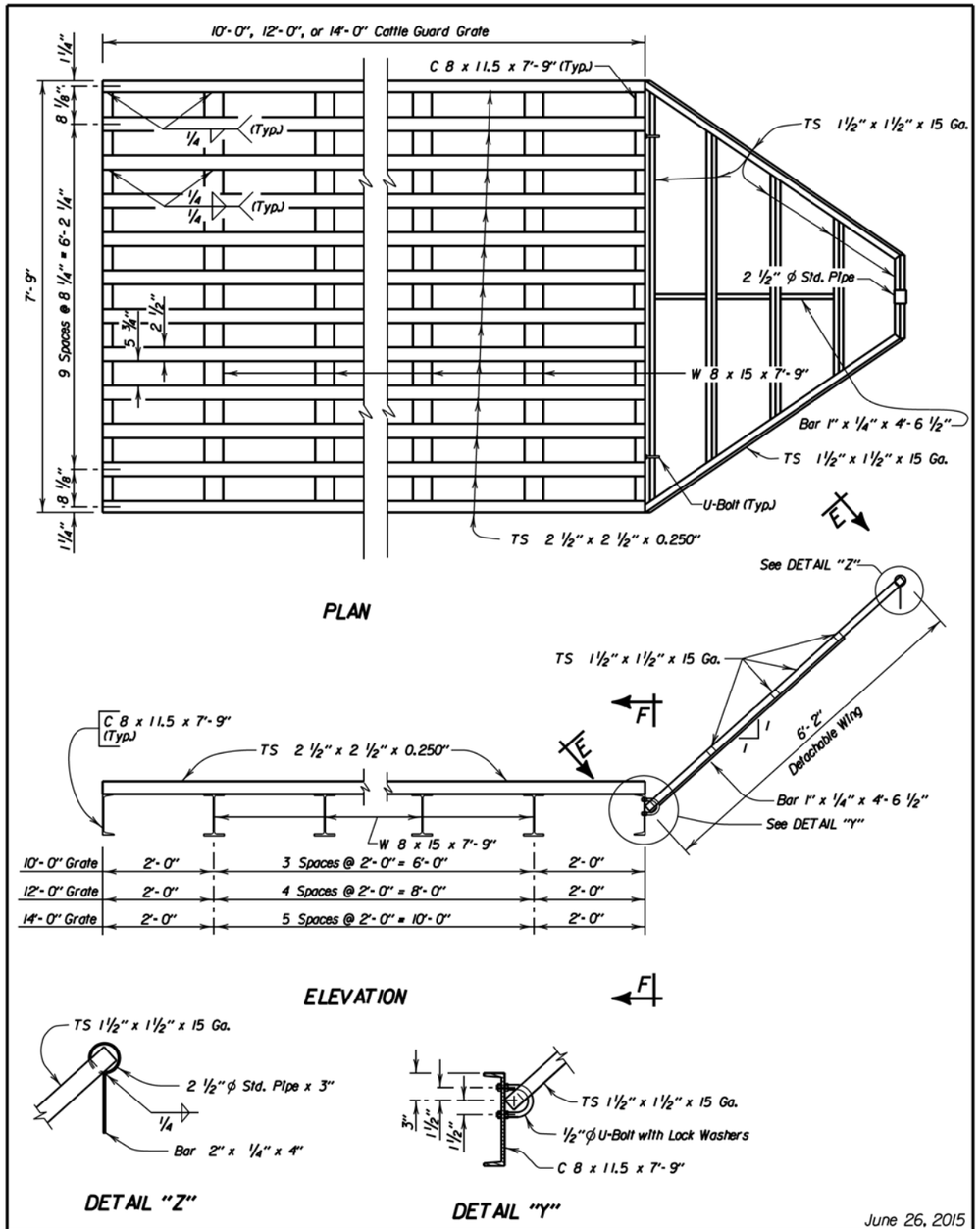
WIDTH OF CATTLE GUARD	CATTLE GUARD GRATE			CONNECTING PLATES		GRATE CONN. BOLTS
	10'-0"	12'-0"	14'-0"	6"	12"	
10'	1			4	8	---
12'		1		4	10	---
14'			1	4	12	---
20'	2			4	18	6
24'		2		4	22	6
30'	3			4	28	12

June 26, 2015

Published Date: 3rd Qtr. 2015	SDDOT	CATTLE GUARD GRATE AND WING	PLATE NUMBER 610.03 Sheet 1 of 3

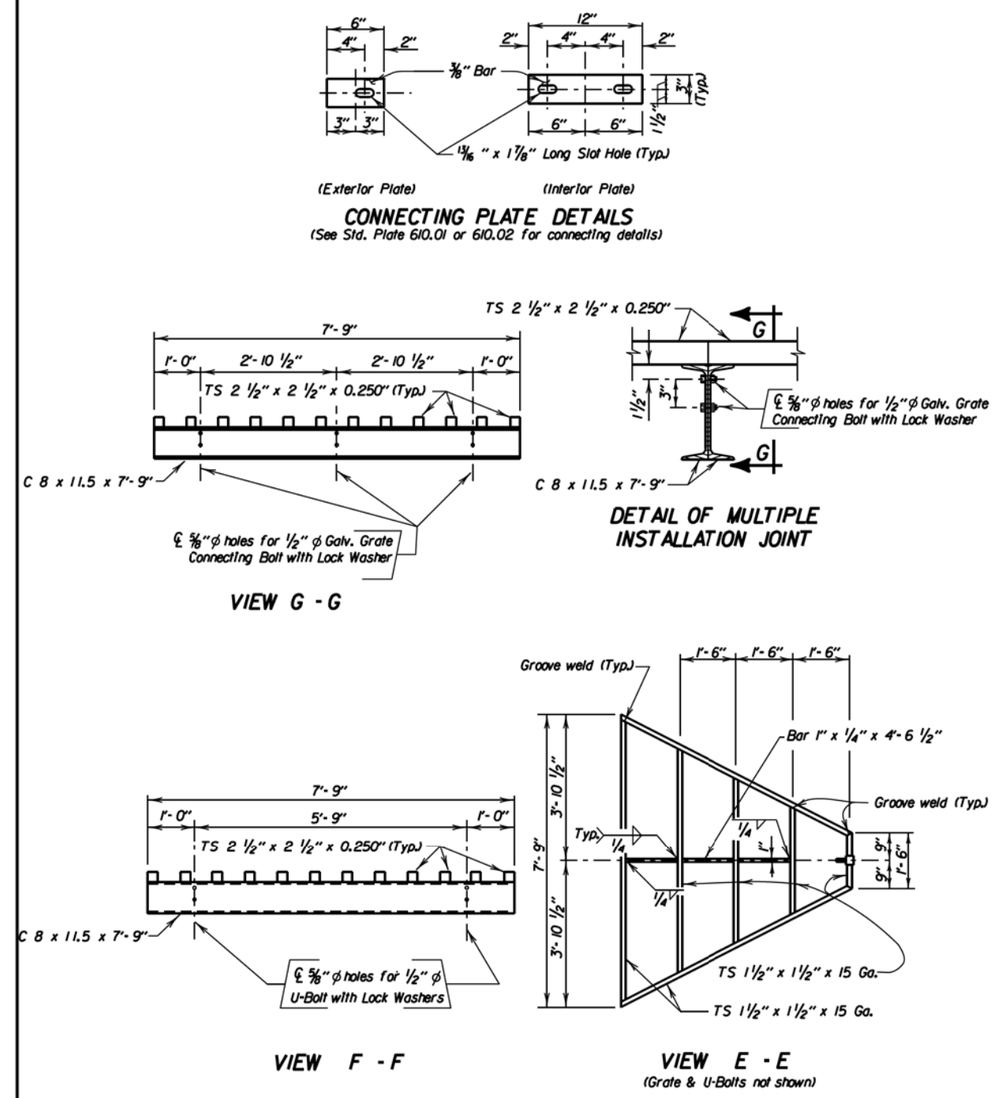
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0391(06)0 NH-PH 0018(177)104	B120	B130

Plotting Date: 09/02/2015



June 26, 2015

Published Date: 3rd Qtr. 2015	SDDOT	CATTLE GUARD GRATE AND WING	PLATE NUMBER 610.03
			Sheet 2 of 3



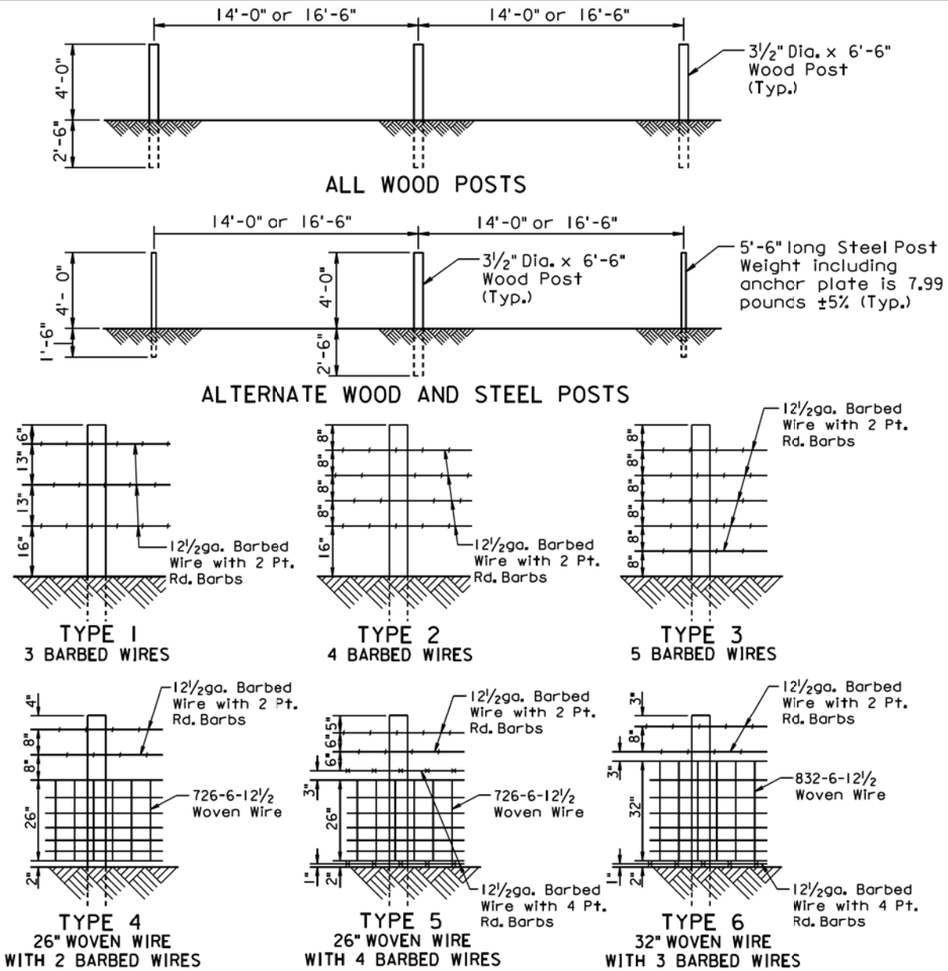
June 26, 2015

Published Date: 3rd Qtr. 2015	SDDOT	CATTLE GUARD GRATE AND WING	PLATE NUMBER 610.03
			Sheet 3 of 3

Plot Scale - 1:200

Plotted From - TRSF12139

File - ...\02QC_SectionB_Standard_Plates.dgn



TYPE OF FENCE		LINE POST SPACING	BARBED WIRE		WOVEN WIRE
TYPE	DESCRIPTION		WIRE GAGE	NUMBER AND SHAPE OF BARBS	STYLE OR DESIGN NO.
1	3 Barbed Wires	16'-6"	12½	2 Point Round	—
2	4 Barbed Wires	16'-6"	12½	2 Point Round	—
3	5 Barbed Wires	16'-6"	12½	2 Point Round	—
4	26" Woven Wire with 2 Barbed Wires	14'-0"	12½	2 Point Round	726-6-12½
5	26" Woven Wire with 4 Barbed Wires	14'-0"	12½	2 wires with 2 Pt. Rd. 2 wires with 4 Pt. Rd.	726-6-12½
6	32" Woven Wire with 3 Barbed Wires	14'-0"	12½	2 wires with 2 Pt. Rd. 1 wire with 4 Pt. Rd.	832-6-12½

GENERAL NOTES:

Fence types designated on the plans that are followed by the letter S shall have smooth (barbless) wires.

When type 5S or 6S is designated the bottom wire may be barbed, smooth, or left off.

All degrees of curvature stated for fence are at centerline of roadway.

September 14, 2009

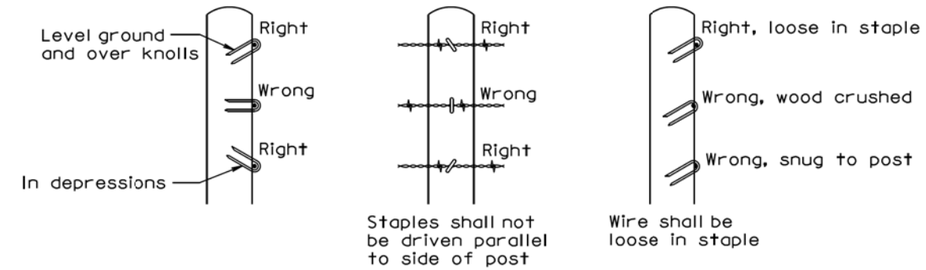
Published Date: 3rd Qtr. 2015

SDDOT

RIGHT-OF-WAY FENCE

PLATE NUMBER 620.01

Sheet 1 of 1



STAPLE INSTALLATION

GENERAL NOTES:

The Right-of-Way fence shall consist of barbed wire or a combination of woven wire and barbed wire. The barbed wire and/or woven wire shall be fastened to all wood posts or fastened to alternating wood and steel posts. Only wood posts shall be used for brace panels. Gates shall be of the type designated in the plans or as otherwise directed by the Engineer. Fence shall be constructed conforming to the details on the standard plates and in the plans unless otherwise directed by the Engineer.

Right-of-Way fence on Interstate Projects shall be constructed one foot within the Interstate Right-of-Way lines except at bridge openings, cattle passes, and as otherwise directed by the Engineer.

Right-of-Way fence other than on Interstate Projects shall be constructed within one foot of the Right-of-Way on the Landowner's side except at bridge openings, cattle passes, and as otherwise directed by the Engineer.

Barbs shall be fabricated from zinc coated 14 ga. wire. Two point barbs shall be wrapped twice around one main strand at 4" spacings and the four point barbs shall be interlocked and wrapped around both main strands at 5" spacings.

The gages of wire and wood post lengths and sizes are the minimum acceptable unless otherwise specified in the plans. The tolerances for steel posts shall be as stated in AASHTO M281. Woven wire shall conform to design and specifications of ASTM A116 and barbed wire shall conform to ASTM A121.

December 23, 2004

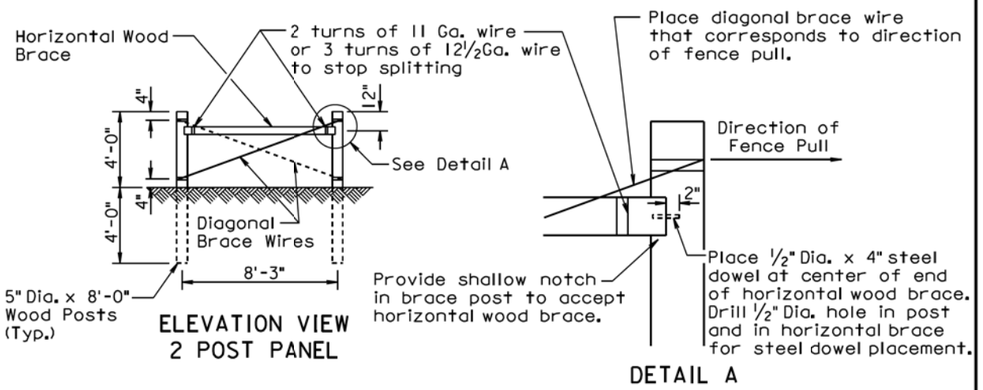
Published Date: 3rd Qtr. 2015

SDDOT

STAPLE INSTALLATION AND GENERAL RIGHT-OF-WAY FENCE NOTES

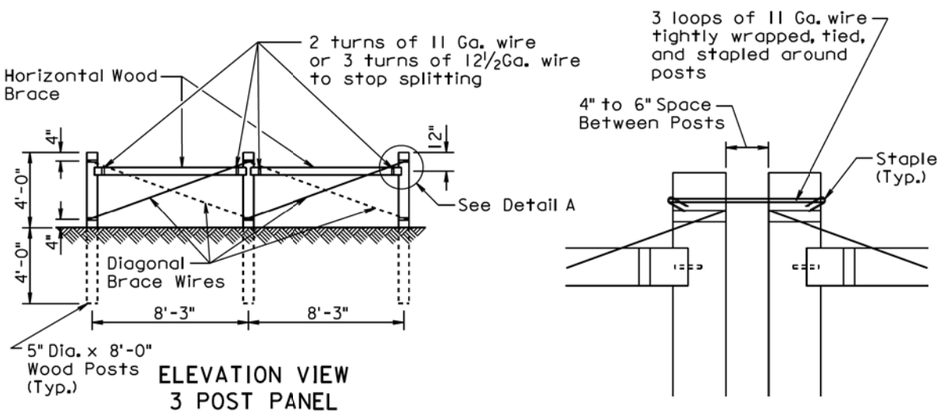
PLATE NUMBER 620.02

Sheet 1 of 1



ELEVATION VIEW
2 POST PANEL

DETAIL A



ELEVATION VIEW
3 POST PANEL

DETAIL B

GENERAL NOTES:

Two Post Panels shall be installed at least every 1320' between corners.

Two Post Panels shall be installed at any sharp vertical angle crest points and as directed by the Engineer.

Horizontal wood braces shall consist of 4" dia. x 8' wood posts or rough 4" x 4" x 8' timbers.

Diagonal brace wires shall be fabricated with 4 strands of 9 Ga. galvanized wire twisted tight. The diagonal brace wires shall be installed in accordance with the direction of the fence pull. Two diagonal brace wires are required if fence pull is in both directions.

December 23, 2004

Published Date: 3rd Qtr. 2015	SDDOT	BRACE PANELS AND APPLICATIONS OF BRACE PANELS	PLATE NUMBER 620.03
			Sheet 1 of 3

SPACING OF 2 POST PANELS WITHIN CURVES	
DEGREE OF CURVE	SPACING OF 2 POST PANEL
less than 3°15'	** 1320'
3°15' and greater	**At P.C., P.T., and at every 1320' between P.C. and P.T.

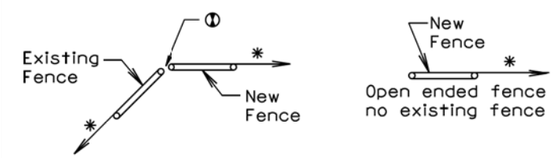
GENERAL NOTE:

All degrees of curvature stated for fence are at centerline of roadway.

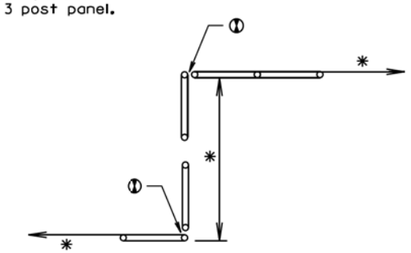
* If fence length is less than 600' to next corner use a 2 post panel.
If fence length is greater than 600' to next corner use a 3 post panel.

** Fence lengths greater than 1320' and less than 2640' place 2 Post Panel approximately at midpoint.

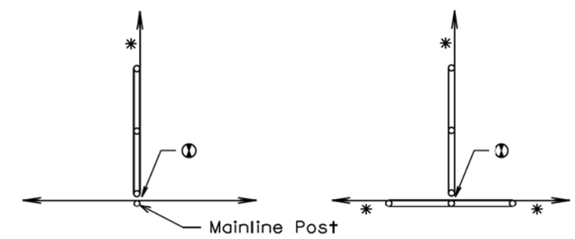
① See Detail B on Sheet 1 of 3.



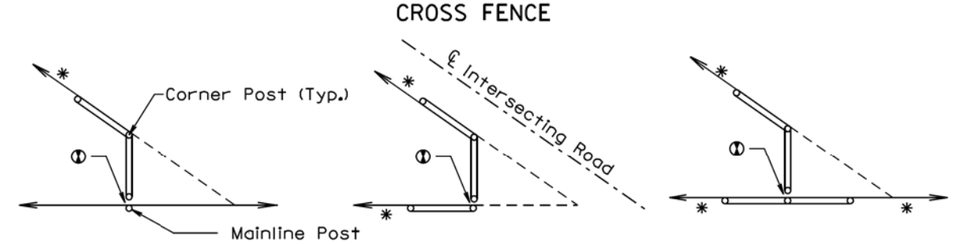
BEGIN OR END FENCE
(where new fence ties into existing fence)



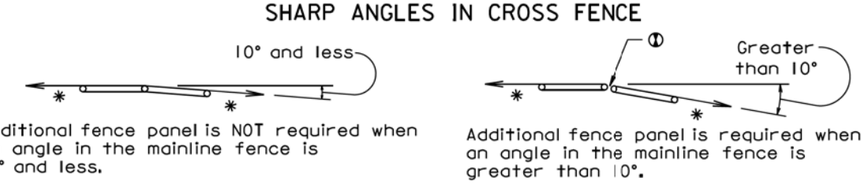
SHORT JOGS IN FENCE



CROSS FENCE



SHARP ANGLES IN CROSS FENCE



Additional fence panel is NOT required when an angle in the mainline fence is 10° and less.

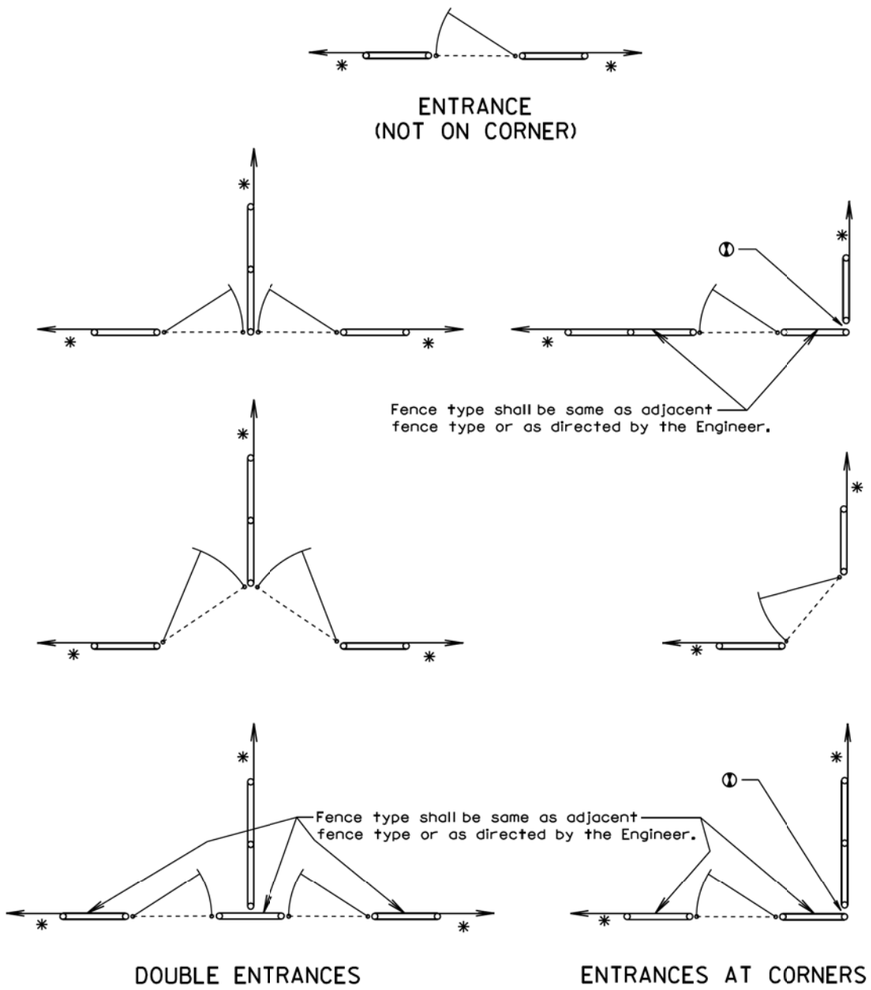
Additional fence panel is required when an angle in the mainline fence is greater than 10°.

ANGLES IN MAINLINE FENCE

December 23, 2004

Published Date: 3rd Qtr. 2015	SDDOT	BRACE PANELS AND APPLICATIONS OF BRACE PANELS	PLATE NUMBER 620.03
			Sheet 2 of 3

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn



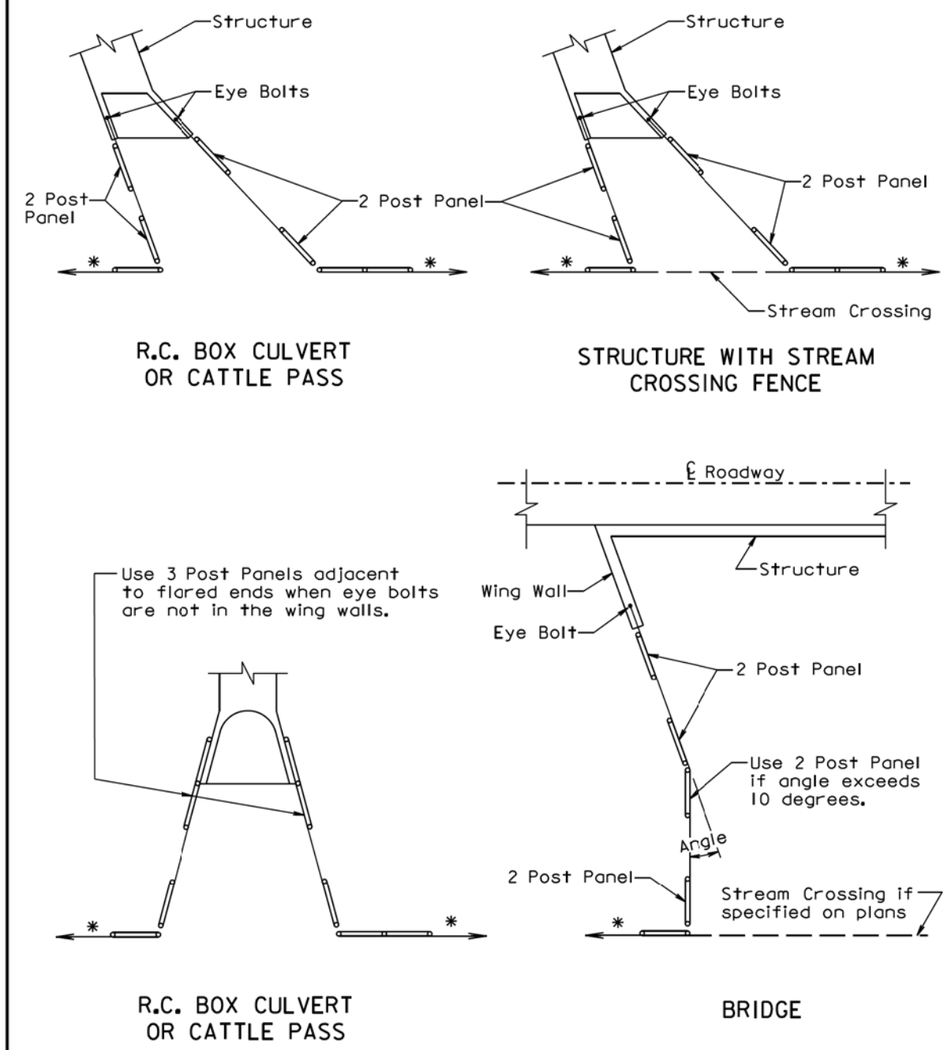
GATES

* If fence length is less than 600' to next corner use a 2 post panel.
If fence length is greater than 600' to next corner use a 3 post panel.

① See Detail B on Sheet 1 of 3.

December 23, 2004

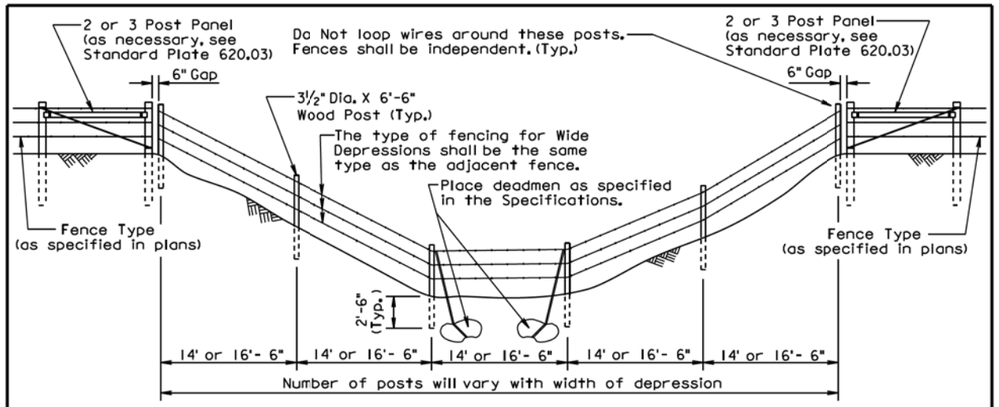
Published Date: 3rd Qtr. 2015	SDDOT	BRACE PANELS AND APPLICATIONS OF BRACE PANELS	PLATE NUMBER 620.03
			Sheet 3 of 3



* If fence length is less than 600' to next corner use a 2 post panel.
If fence length is greater than 600' use a 3 post panel.

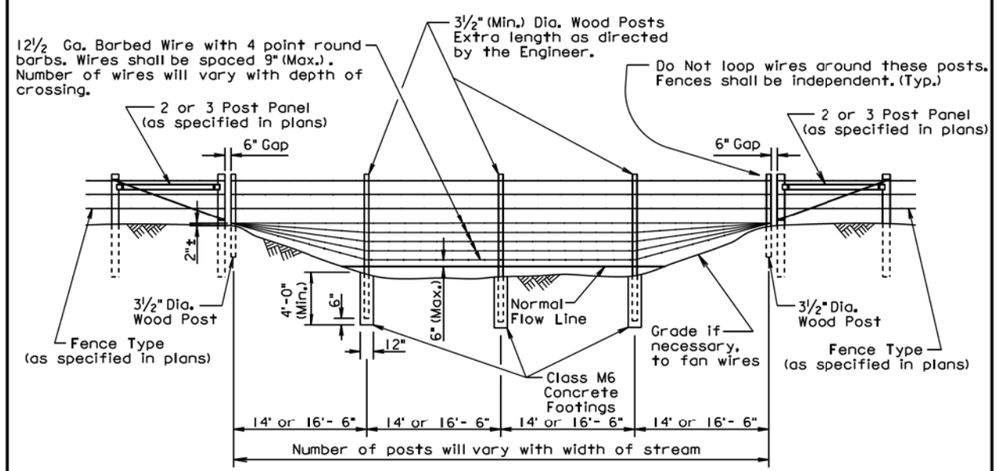
December 23, 2010

Published Date: 3rd Qtr. 2015	SDDOT	BRACE PANEL APPLICATIONS AT STRUCTURES	PLATE NUMBER 620.04
			Sheet 1 of 1



This installation shall be made when requested by the Engineer.

FENCING AT WIDE DEPRESSION (SUBJECT TO FLOODING)



This installation shall be made only when stated in the plans.

FENCING AT STREAM CROSSING

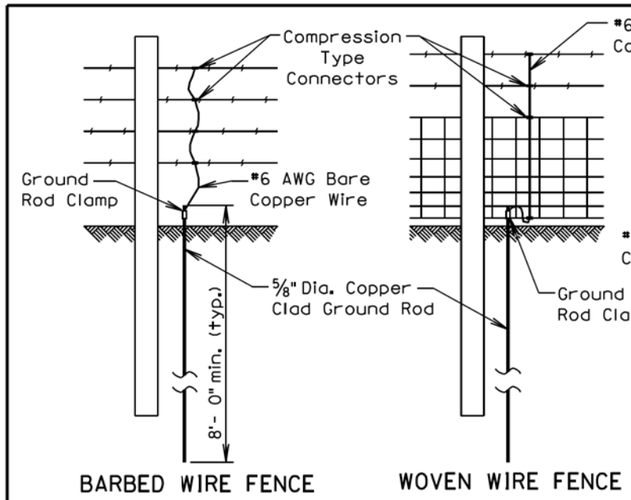
GENERAL NOTES:

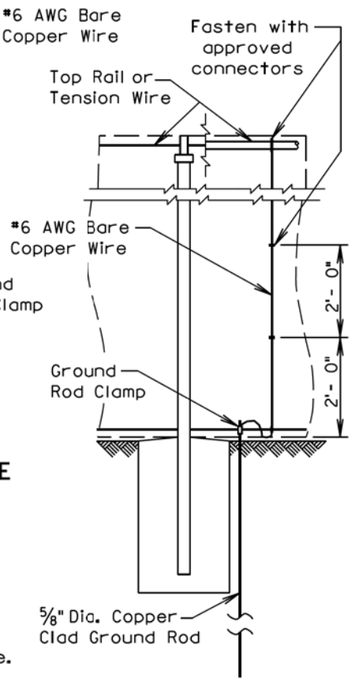
There will be no extra payment for the additional work and materials required to construct the fencing at the wide depression(s) and/or the fencing at the stream crossing(s). The deadmen shall be paid for in accordance with 620.5 A. of the Specifications.

Measurement and payment for the fencing at the wide depression(s) and/or the fencing at the stream crossing(s) shall be at the contract unit price per foot for the corresponding Right-of-Way fence bid item.

February 14, 2015

Published Date: 3rd Qtr. 2015	SDDOT	**FENCING AT WIDE DEPRESSION(S) AND STREAM CROSSING(S)**	PLATE NUMBER 620.10 Sheet 1 of 1





GENERAL NOTES:

Details shown on this standard plate shall apply to all types of Right-of-Way fence constructed with all wood posts or chain link fence.

Continuous fence in urban areas shall be grounded at maximum intervals of 500 feet. Continuous fence in rural areas shall be grounded at maximum intervals of 1000 feet. There shall be a ground at a maximum of 100 feet from a gate in each adjacent section of fence.

Fence placed under a power line shall be grounded with three grounds. One ground shall be placed directly below the crossing and the other two shall be placed 25 feet to 50 feet away, one on each side.

One ground shall be placed directly below each telephone or cable crossing.

Ground rods shall be located on the post side of the fence and shall be as close as possible to the post and fence.

The cost of furnishing and placing all materials for grounding shall be incidental to the contract unit price per Ft for the respective Right-of-Way fence or chain link fence bid item.

The approximate quantites of materials per each installation of a ground are:

- 1 ground rod clamp.
- 1 ⅝" dia. X 8' long copper clad ground rod
- 1 #6 AWG bare copper wire; 7' long for Right-of-Way fence or 10' long for chain link fence.

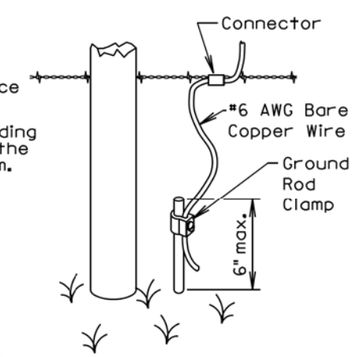
Compression type or other type of connectors:

26" woven wire shall have a total of two connectors, one secured to the top and one secured to the bottom.

32" woven wire shall have a total of three connectors, one secured to the top, one secured to the middle, and one secured to the bottom.

One connector shall be used for each strand of barbed wire.

A minimum of 3 connectors shall be installed on chain link fence, the connectors shall be placed vertically at every two foot increment and connectors shall be placed on the top and bottom tension wires or top rail.

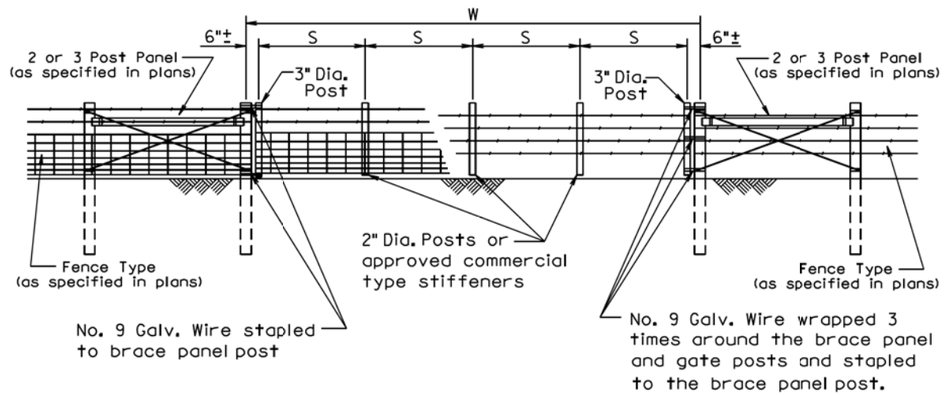


GROUND ROD DETAIL

March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	**FENCE GROUNDING**	PLATE NUMBER 620.11 Sheet 1 of 1

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn



W Gate Width (ft.)	S Post Spacing
16	3 @ 5'-0" ±
20	4 @ 4'-9" ±
24	4 @ 5'-9" ±
30	5 @ 5'-10" ±
40	6 @ 6'-6" ±

GENERAL NOTES:

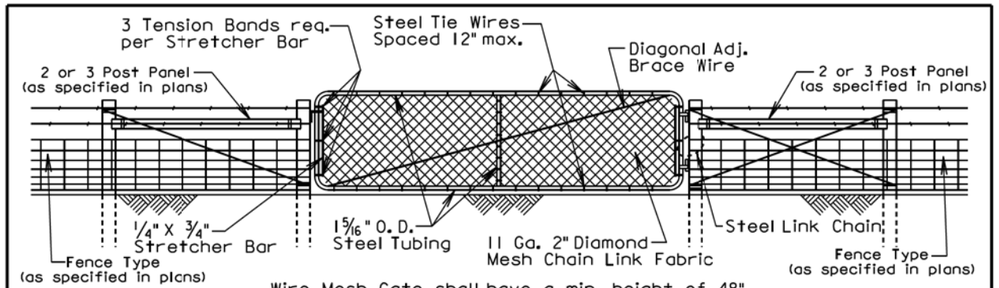
Creosote treatment of the gate posts will not be accepted.

The type of fencing in the gate shall be of the same type as specified for the adjacent Right-of-Way fence.

All costs for furnishing and constructing the wire gate(s) shall be incidental to the contract unit price per Ft for the respective Right-of-Way fence bid item.

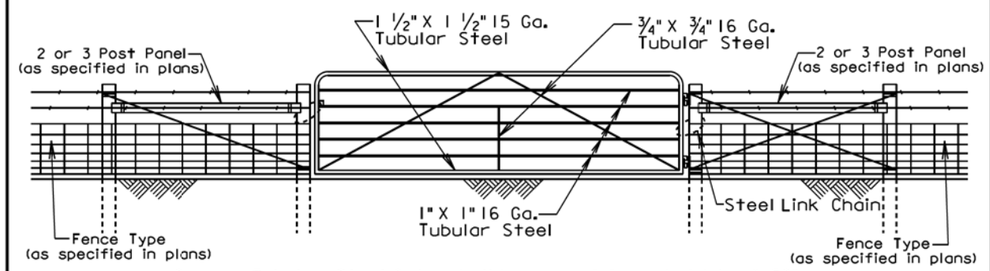
March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	WIRE GATES	PLATE NUMBER 620.20 Sheet 1 of 1



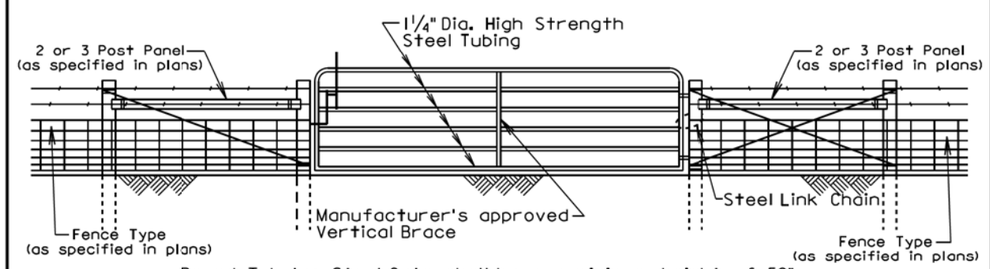
Wire Mesh Gate shall have a min. height of 48".

WIRE MESH GATE



Square Tubular Steel Gate shall have a minimum height of 52".

SQUARE TUBULAR STEEL GATE



Round Tubular Steel Gate shall have a minimum height of 52".

ROUND TUBULAR STEEL GATE

GENERAL NOTES:

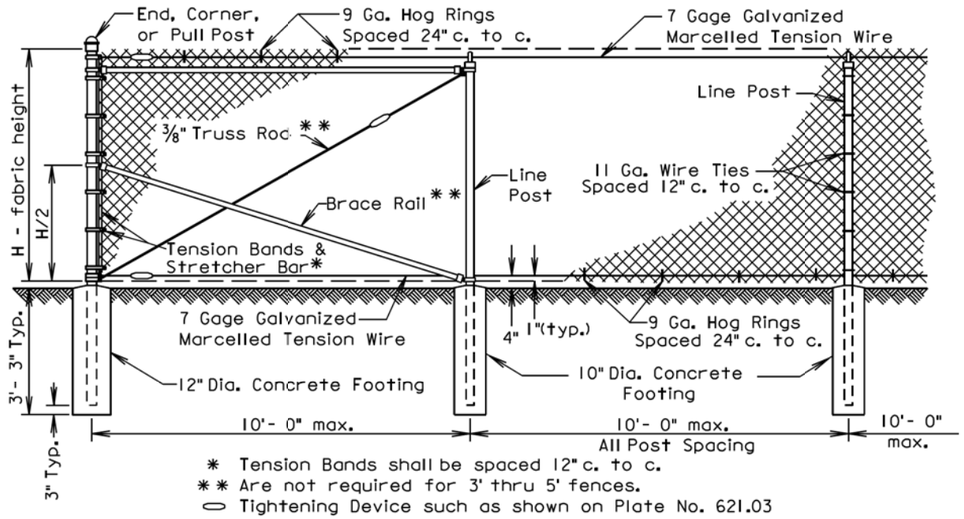
Only single tubular frame gates are shown on this standard plate. If double tubular frame gates are specified, the gates shall be of the same type and materials as shown above. Double tubular gates shall swing toward the middle of the opening and shall be secured by a chain, latch, or other suitable hardware.

Gate hardware shall conform to the specific type of gate installed. The gate and gate hardware shall either be painted or galvanized. The paint on the gates and hardware shall be subject to approval by the Engineer.

The Steel Link Chain shall be a minimum of 1/4", 4' long, rust resistant, and have electrically welded links. The chain shall be wrapped around the gate hinge post and gate frame and the ends of the chain shall be welded together with enough slack in the chain to provide free operation of the gate.

March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	TUBULAR FRAME GATES	PLATE NUMBER 620.21 Sheet 1 of 1



* Tension Bands shall be spaced 12" c. to c.
** Are not required for 3' thru 5' fences.
⬭ Tightening Device such as shown on Plate No. 621.03

Component	End, Corner & Pull Post		Line Post			Top & Brace Rail	
Type of Fabrication	Round Pipe Nominal	Roll Formed Steel	Round Pipe Nominal	"C" Section	H-Beam Steel	Round Pipe Nominal	Roll Formed Steel
Size	3.00" O. D.	3.5" x 3.5"	2.50" O. D.	1.875"x1.625"	2.25"x1.70"	1.625" O. D.	1.625"x1.25"
Weight (lb. / ft.)	5.79 or 4.64	5.14	3.65 or 3.12	2.34	3.43	2.27 or 1.84	1.35

GENERAL NOTES:

Specific details of manufacture of component parts of the complete fence construction shall be subject to the approval of the Engineer. Commercially available items produced specifically for the use intended shall be used wherever possible in the construction of the fence.

"H" (Height of Fabric) shall be as shown on the Plans. Fabric is available in the the following heights; 36", 42", 48", 60", 72", 84", 96", 108", 120", & 144". Fabric heights 60 inches and under shall be knuckled at both selvages. Fabric heights 72 inches and over shall be knuckled at one selvage and twisted at the other selvage.

Chain Link Fabric shall be 2" mesh, No. 9 gage galvanized wire securely fastened to Tension Wire, Line Post, Rails, Braces and Stretcher Bars spaced as shown hereon.

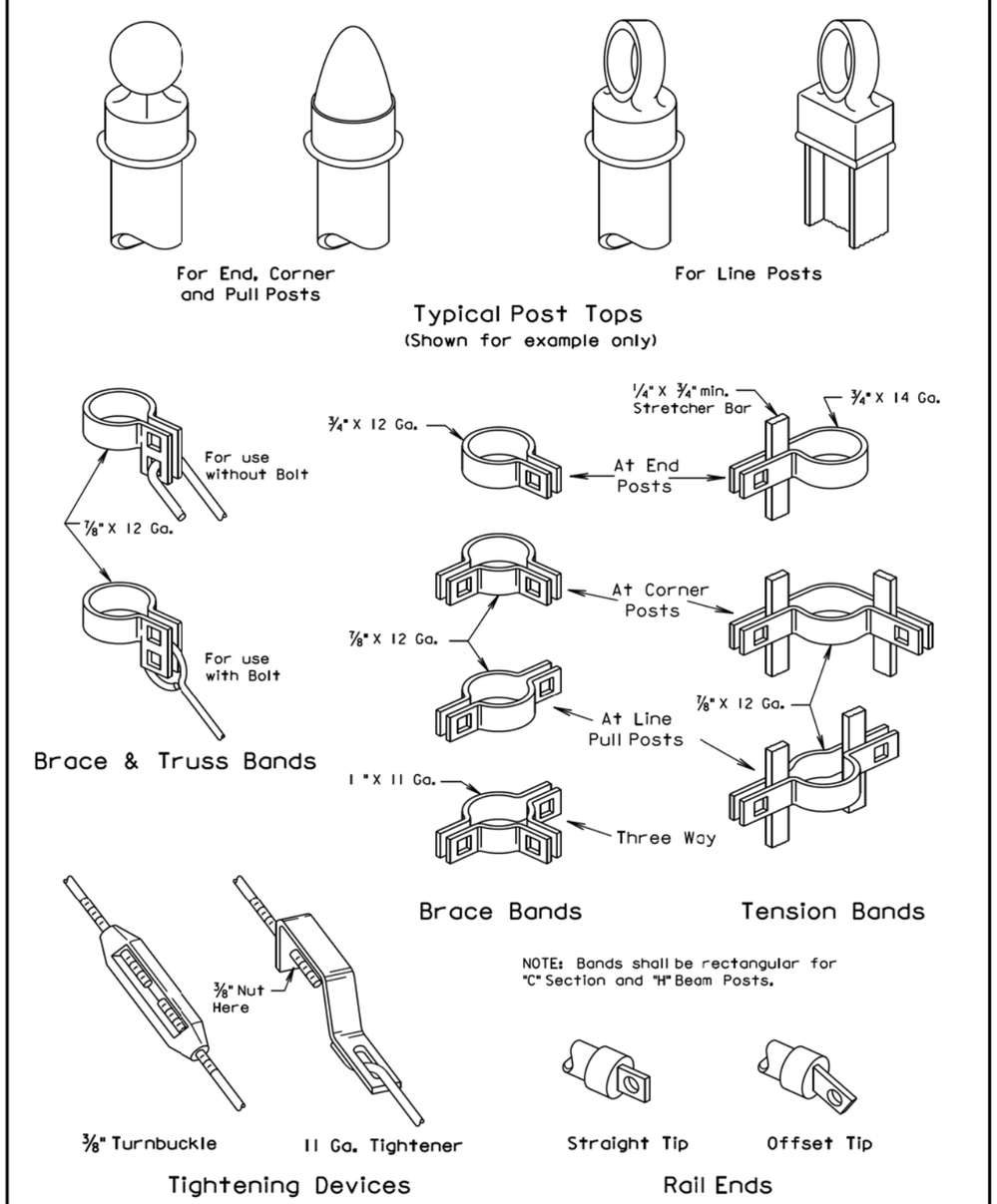
Fence may be constructed with either Round Pipe, "C" Section, "H" Beam, or roll Formed Steel components as shown in the table above. Line post may be Round Pipe, "C" Section, or "H" Beam. The Corner Post and Rails shall be either Round Pipe or Roll Formed Steel. The type of components used shall have prior approval by the Engineer before construction.

All post shall have a means to securely hold the top tension wire in position and allow for the removal and replacement of a post without damaging the top tension wire.

Where fence must cross small bodies of water (such as drainage areas or ponds) that could freeze during the winter, use 11 gage Hog Rings. Provide only two ties per Tension Wire and Top Rail between line posts.

March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	CHAIN LINK FENCE WITH TENSION WIRED TOP	PLATE NUMBER 621.02 Sheet 1 of 1



March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	HARDWARE FOR CHAIN LINK FENCE	PLATE NUMBER 621.03 Sheet 1 of 1

Plot Scale - 1:200
Plotted From - TRSF12139
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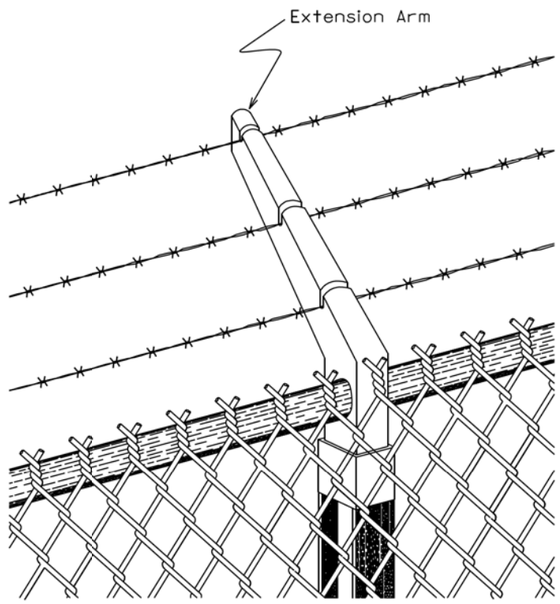


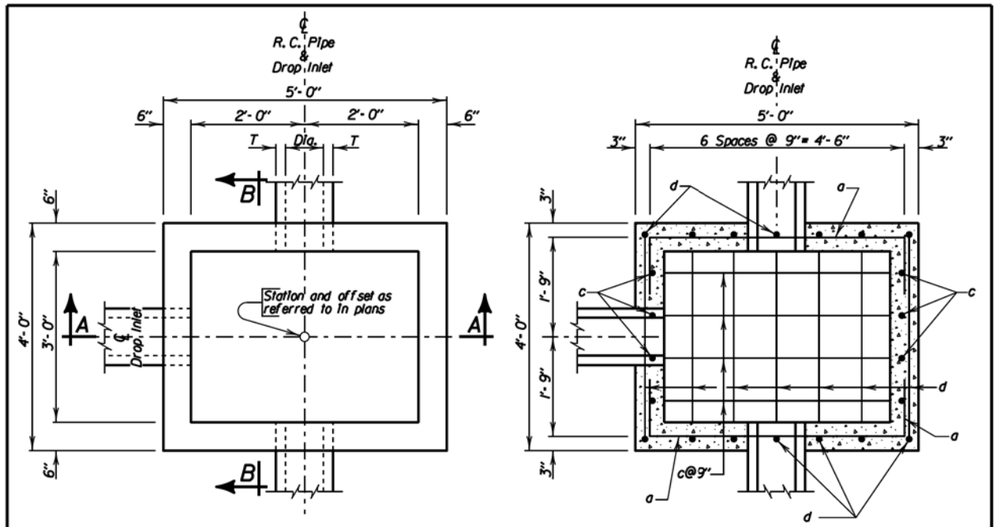
GENERAL NOTES:

Extension arms shall be hot dipped galvanized. End and corner arms shall be malleable iron. Intermediate arms may be pressed steel. Arms shall have sealed caps and three slots to accommodate the barbed wires. The top wire shall be 12 inches above the fabric and 12 inches out from the fence line at an angle of approximately 45°. Adjustable arms may be used. Barbed wire shall be two strand 12½ gauge wire with four point round barbs spaced on 5 inch centers.

Extra payment will not be made for extension arms with barbed wire. Extension arms with barbed wire shall be incidental to the respective "Chain Link Fence" bid item. When extension arms with barbed wire are attached to gates, the payment for the extension arms with barbed wire shall be incidental to the respective "Gate" bid item.

March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	BARBED WIRE TOP FOR CHAIN LINK FENCE	PLATE NUMBER 621.04
			Sheet 1 of 1



PIPE DISPLACEMENT REDUCTIONS		
R.C. Pipe Diameter Inches	T Inches	Class M6 Concrete Cu'd
12	2	0.03
15	2 1/4	0.04
18	2 1/2	0.05
24	3	0.09
30	3 1/2	0.14
36	4	0.20

ESTIMATED QUANTITIES			
ITEM	UNIT	CONSTANT QUANTITY	VARIABLE QUANTITY
* Class M6 Concrete	Cu'd	0.43	0.29H
Reinforcing Steel	Lb	57	26.72H
Frame and Grate	Each	1	———

DROP INLETS FOR 12" TO 36" DIAMETER PIPE

GENERAL NOTES:

* Reduce total quantities of concrete by the amount of concrete displaced by the pipe. The total quantity of concrete shall be computed to the nearest hundredth of a cubic yard. The total quantity of reinforcing steel shall be computed to the nearest pound.

Drop inlets shown may be modified by the addition or omission of connecting pipes as shown on the layouts.

Reinforcing steel shall conform to ASTM A615 Grade 60. The b bars shall be lapped 12 inches. Cut and bend reinforcing steel as required to place pipe(s) through the drop inlet wall.

Pipe shall not enter through a corner of the drop inlet.

Use 2" clear cover on all reinforcing steel unless otherwise noted.

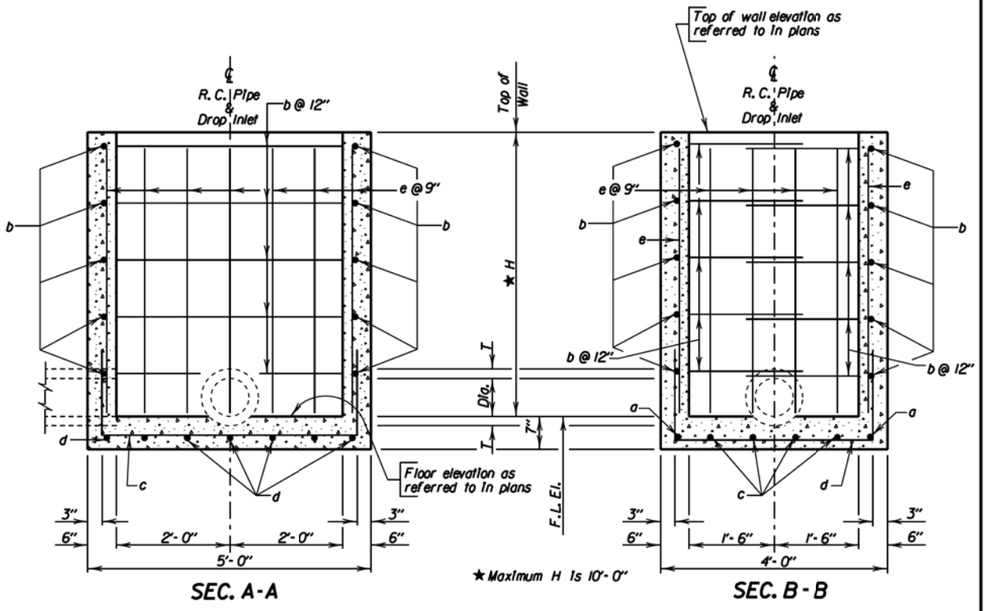
Precasting of reinforced drop inlets will be permissible. Prior to precasting, the Contractor shall submit details to the Engineer for approval.

Maximum pipe diameter shall not exceed 27 inches on the 4 foot wide side and shall not exceed 36 inches on the 5 foot wide side of the drop inlet.

The dimension of H is in feet.

December 23, 2009

Published Date: 3rd Qtr. 2015	SDDOT	3' X 4' TYPE C REINFORCED CONCRETE DROP INLET	PLATE NUMBER 670.10
			Sheet 1 of 2

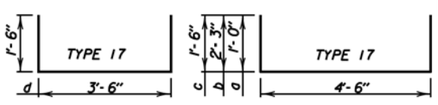


DROP INLETS FOR 12" TO 36" DIAMETER PIPE

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
a	2	4	6'-6"	17
b	2H	4	9'-0"	17
c	4	4	7'-6"	17
d	7	4	6'-6"	17
e	22	4	H - 2"	Str.

Bending Details



NOTE: All dimensions are out to out of bars.

December 23, 2009

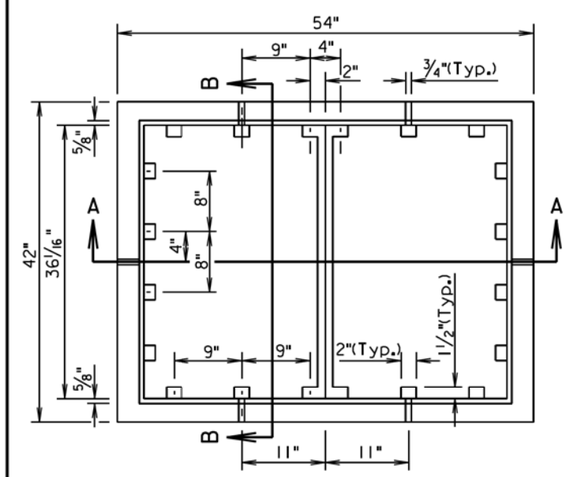
Published Date: 3rd Qtr. 2015

SDDOT

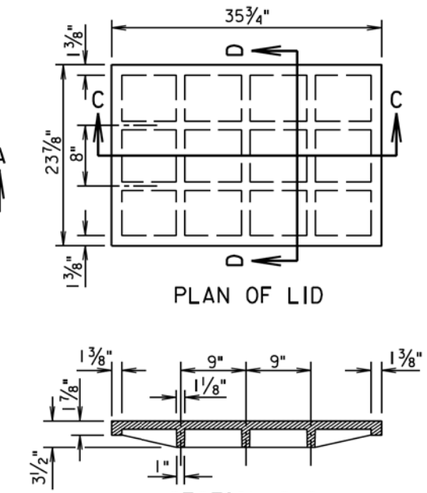
3'X 4' TYPE C REINFORCED CONCRETE DROP INLET

PLATE NUMBER 670.10

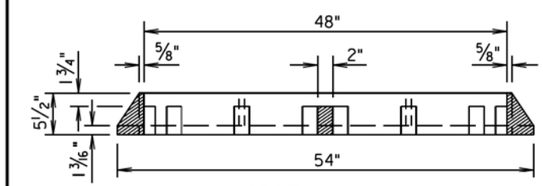
Sheet 2 of 2



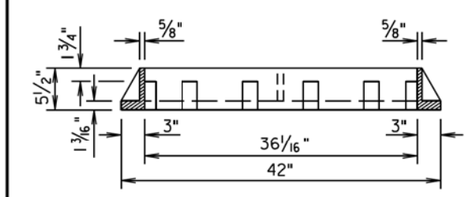
PLAN OF FRAME



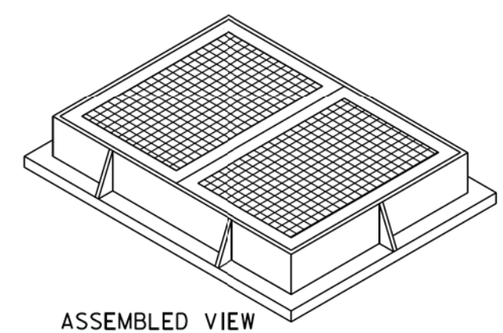
PLAN OF LID



SECTION A-A



SECTION B-B



ASSEMBLED VIEW

GENERAL NOTE:

Total weight of the frame and lid shall be 1130 pounds minimum.

March 31, 2000

Published Date: 3rd Qtr. 2015

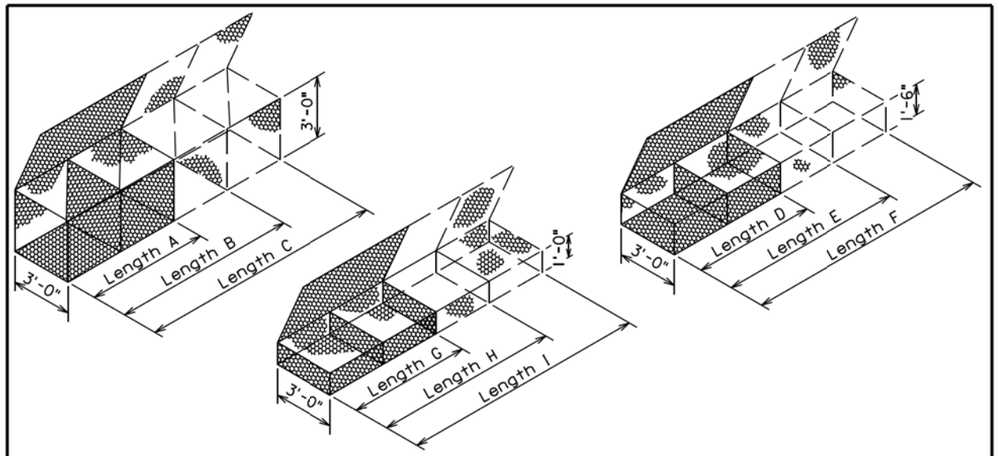
SDDOT

TYPE C MANHOLE FRAME AND LID

PLATE NUMBER 671.20

Sheet 1 of 1

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn



GABION DETAILS

STANDARD SIZES

SIZE	LENGTH	WIDTH	HEIGHT	NUMBER OF CELLS	CAPACITY, Cu. Yd.
A	6'-0"	3'-0"	3'-0"	2	2.0
B	9'-0"	3'-0"	3'-0"	3	3.0
C	12'-0"	3'-0"	3'-0"	4	4.0
D	6'-0"	3'-0"	1'-6"	2	1.0
E	9'-0"	3'-0"	1'-6"	3	1.5
F	12'-0"	3'-0"	1'-6"	4	2.0
G	6'-0"	3'-0"	1'-0"	2	0.7
H	9'-0"	3'-0"	1'-0"	3	1.0
I	12'-0"	3'-0"	1'-0"	4	1.3

Above Dimensions subject to mill tolerances.

GENERAL NOTES:

Lacing and internal connecting wire shall be 0.0866 inch diameter steel wire ASTM A641 Class 3 soft temper measured after galvanizing and for PVC coated gabions shall be 0.0866 inch diameter steel wire measured after galvanizing but before PVC coating.

The lacing procedure is as follows:

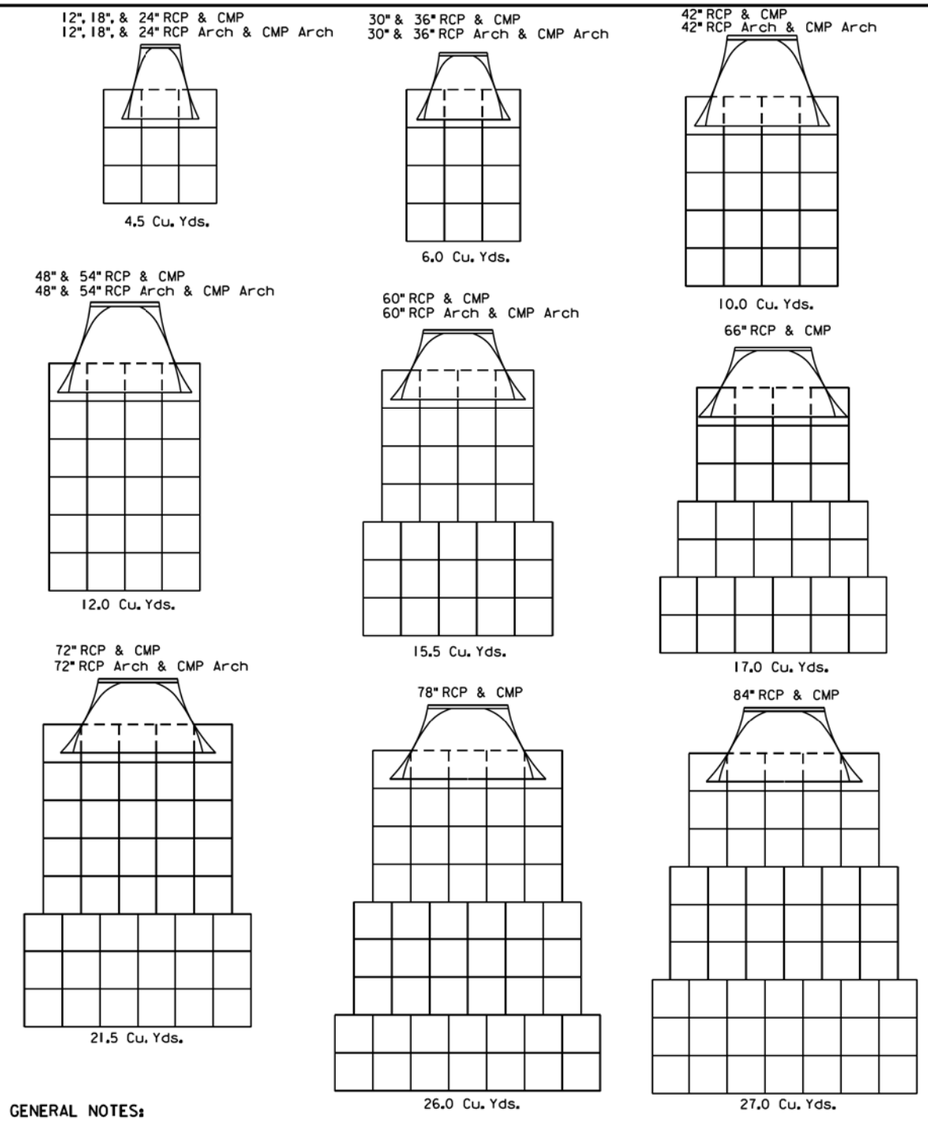
1. Cut a length of lacing wire approximately 1 ½ times the distance to be laced but not exceeding 5 feet.
2. Secure the wire terminal at the corner by looping and twisting.
3. Proceed lacing with alternating single and double loops at a spacing not to exceed 6 inches.
4. Securely fasten the other lacing wire terminal.

Wire lacing or interlocking type fasteners shall be used for gabion assembly and final construction of gabion structures. Interlocking fasteners for galvanized gabions shall be high tensile 0.120 inch diameter galvanized steel wire measured after galvanizing. The galvanizing shall conform to ASTM A641-92 Class 3 coating. Fasteners shall also be in accordance with ASTM A764, Class II, Type III.

Interlocking fasteners for PVC coated gabions shall be high tensile 0.120 inch diameter stainless steel wire conforming to ASTM A313, Type 302, Class I. The spacing of the interlocking fasteners during all phases of assembly and construction shall not exceed 6 inches.
All fasteners shall be placed where the mesh weaves around the selvage wire at the vertical and horizontal joints.

June 26, 2001

Published Date: 3rd Qtr. 2015	SDDOT	BANK AND CHANNEL PROTECTION GABIONS	PLATE NUMBER 720.01 Sheet 1 of 1



GENERAL NOTES:

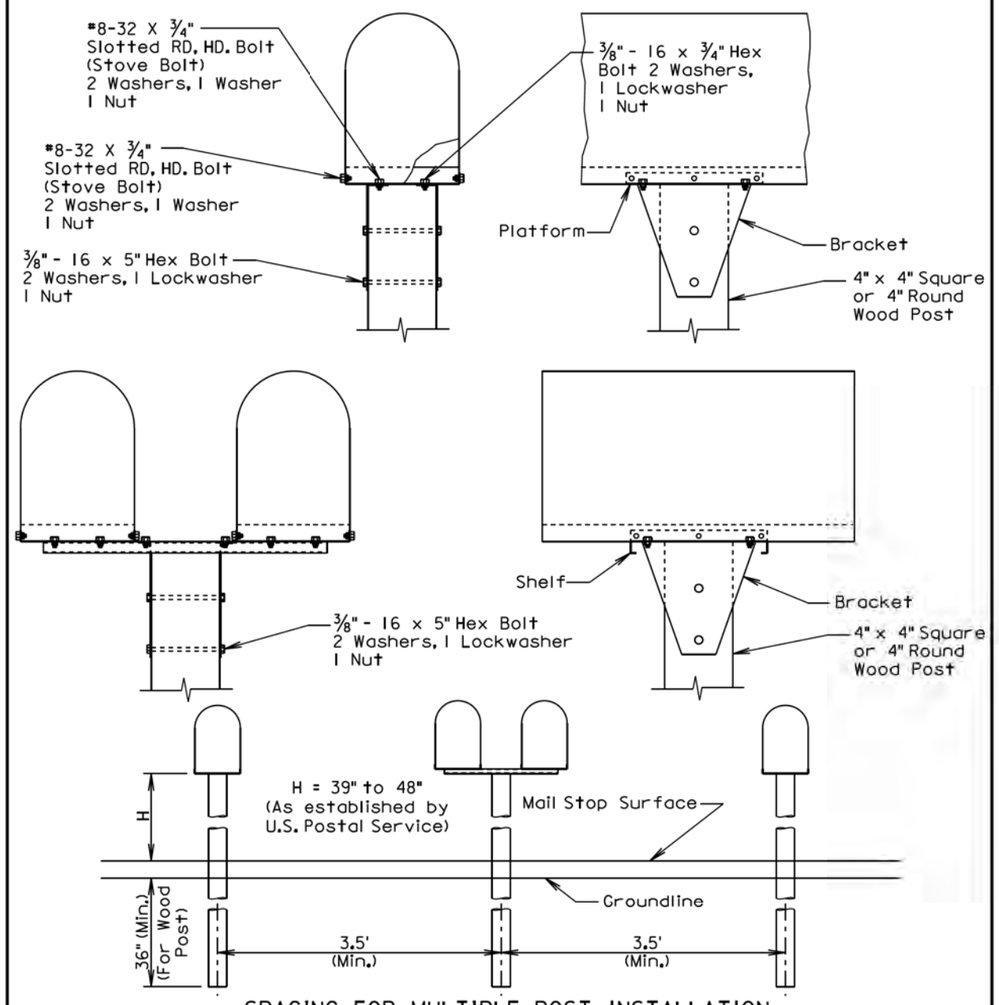
Gabions at outlets of C. M. pipe and R. C. pipe shall be placed under the end section a distance of 2' from the outlet end of the section. For C. M. pipe end section installations, the upper fabric of the gabions shall be modified to accommodate the metal end section in a manner approved by the Engineer.

Quantities shown on this standard plate are based on standard gabion sizes D, E, and F (See Standard Plate 720.01).

June 26, 2001

Published Date: 3rd Qtr. 2015	SDDOT	BANK AND CHANNEL PROTECTION GABION PLACEMENT UNDER PIPE END SECTIONS	PLATE NUMBER 720.03 Sheet 1 of 1

Plot Scale - 1:200
Plotted From - TRSF12139
File - ...\02QC_SectionB_Standard_Plates.dgn



SPACING FOR MULTIPLE POST INSTALLATION

GENERAL NOTES:

The post support assemblies provided should be consistant throughout the project.

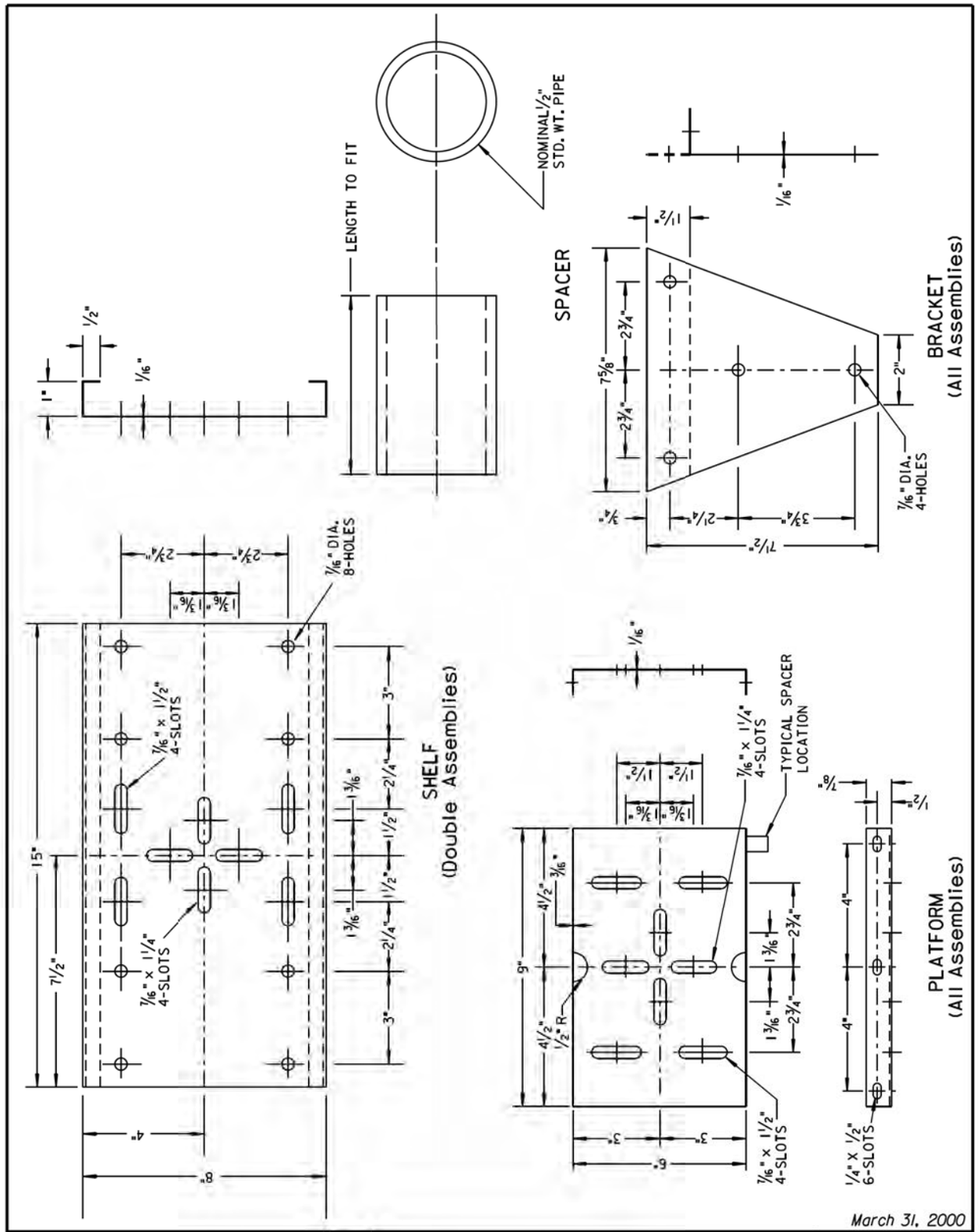
Single and double mailboxes may be in any sequence.

Post support assemblies shall be one from the approved products list, a 4"x4" or 4" round wood post, or an alternate post support assembly that meets the test level 3 crash testing requirements of NCHRP 350 or MASH.

Alternate mailbox support assemblies shall be approved by the Engineer prior to installation. The Contractor shall provide the Engineer written certification that the mailbox support assembly has met the crash testing requirements and will be installed in accordance with the manufacturer's installation instructions.

September 6, 2013

Published Date: 3rd Qtr. 2015	SDDOT	**SINGLE AND DOUBLE MAILBOX ASSEMBLIES**	PLATE NUMBER 900.02 Sheet 1 of 1



March 31, 2000

Published Date: 3rd Qtr. 2015	SDDOT	**MAILBOX SUPPORT HARDWARE**	PLATE NUMBER 900.03 Sheet 1 of 1